COMPUTATIONAL AESTH-ETHICS

Understanding visual computation processes between the image and its context

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ABSTRACT

This master thesis is developed as an artistic practical and theoretical research, established at an intersection of computational image-making and image-reading processes, and their aesth-ethics in a broader socio-technical environment. The presentation of my artistic research, along with relevant projects in the same field, will be followed by a theoretical discussion on the ontology of a digital, computer-generated image, its aesthetics and ethics within underlying ideologies in the discourse of their representation - between their content and context. The discussion is located on the axis between the image analysis and synthesis processes elaborated through the implementation of machine learning-based tools.

The analysis in this research goes beyond the representational surface of the image, articulating the history of artificial intelligence and computer-generated images, correlations and oppositions between the affordance of the medium, tools and their syntax, and their limits of creativity within the context of critical data and image semiotics. Through a selected series of three projects: *Digital Prayer* (2020), *FUTUREFALSEPOSITIVE* (2021), and *PROMPT: WAR STORIES* (2022), the concept and the approach in using different machine learning-based tools will be elaborated, defining the threshold between the human agency and algorithmic automation.

The epistemology of computed, statistical images is disseminated through their aesthetics of representation, carrying an ideology of 'thoughtlessness by automation', examining the balances of co-creation between the human and the machine - determining agency, against metaphors, fantasy and mystification; probability and prediction. Between optimisation and accuracy, quantity and quality, universality and uniqueness, this research underline artistic examples and theoretical concepts that address the importance of human agency in the age of automation. Paradigms of development and integration of machine learning systems on a political, social and ethical scale can be understood through the artistic appropriation of these tools.

From the database to the combinatorial infinity and statistical transcendence, the critical points between the spectacle and backstage resources of statistical art will be extracted, observing the image behind the image, and the datasets beyond the computation. The semiotic interplay between the content and context becomes necessary to address responsibility and visibility, so as to better understand not only the technologies but the systemic structures, along with the ideologies, that lie behind them.

Keywords: *machinic vision, image-making, image-reading, database, automated creativity, aesth-ethics, generative ideology, algorithmic thoughtlessness, algorithmic culture, demystification*

TABLE OF CONTENTS

INTRODUCTION

This master thesis is based on practical and theoretical research established at an intersection between: (1) the implementation of *machine learning* tools for *computer vision* in my artistic projects; (2) a comparative analysis of other research and artistic examples that use the same tools; and (3) theoretical discussion on technological and creative processes through media theory, contemporary philosophy and critical view on some of the tools and topics that fit under the term 'artificial intelligence'.

Artificial intelligence is not a novel term, but in the past decade, and onwards, it has taken commonplace in scientific and artistic communities and discourses. In a technical sense, many different tools and technologies fit under the term AI, or rather under the technical term of *machine learning,* as the concept of AI can be misleading or ambiguous in its interpretation. Beginning with the technical developments and conceptual frameworks of these tools, we will introduce the algorithmic culture in a broader sense, the history of generative computer art and *computer vision*, along with the contemporary tools and technologies in the field of machine learning, such as *artificial neural networks* (*ANNs*) or *generative adversarial neural networks* (*GAN*)-based tools, object recognition, and *text-to-image* prompt-based algorithms and scripts. This research will introduce the potential of computer vision systems for image synthesis and analysis, whereas the purpose and affordances of these tools will be analysed through different artistic approaches and critical analysis of the politics of the *image in the age of machine learning.* We aim to analyse them in the current environment of their implementation and appropriation in tasks such as generative automated image-making [image-synthesis] and image-reading [image-analysis] through the scope of *computational aesth-ethics*.

Aesth-ethics in this research is a coined term that addresses the intertwined perspective on the analysis of the 'affect' and 'effect' that the computational imagery has on nowadays visual culture, emphasising the understanding of (1) its visual characteristics behind the representational surface - aesthetics of the form, and the image-making process itself, affordances of the tools, that shape the visual identity of these images; and (2) its meaning, behind the scope of representation, that leads us to ethics or *technoethics* that underlie these image-making and image-reading processes. Aesth-ethics is, therefore, a construct that gives a framework to this research. The development of each project was simultaneously an investigative process of exploration and iterative, action-based research between theory and practice, with an aim to contextualise and define the characteristics of the mentioned tools, through the visualisation of computational processes that they provide, analysing their context and meaning. On the other hand, it will examine the creative potentials and aesthetics of artwork production, so to provide a broader ethical perspective on the human-machinic cohabitation of the automated condition and techno-ecologies of thought and expression. The method of artistic

research was to implement a series of feedback loop tasks of representational and semiotic hacks that disambiguate the distribution of responsibilities, and the notion of *agency* between the human [cognition] and the automated [systems]. Deconstruction of the premise that an automated computational system can be *creative* will be introduced through the contextualisation of qualities of generative results-outputs, where understanding of meaning goes past the representational surface - contextualising the form, analysing software ontology, and philosophy of a coded image and its semiotics, along with conceptual premises and procedural experimentation. Another premise to be taken into account is the *neutrality* of automated systems, which will be questioned through practical examination and reverse-engineering of automated image-making and image-reading processes, and theoretical arguments on technoethics through the analysis of created visual outputs. Both of these examination objects of *creativity* and *neutrality* will be elaborated through theoretical arguments that are an integral part of this research. Through such a research framework, the aim is to decode and deconstruct notions of contemporary algorithmic culture, and to relate it to psychological, perceptual and cognitive shifts in the visual culture and artistic practices, and socio-demographic concerns and consequences of automation. In the public discourse, there are frequent instances of praising automated systems and algorithmic data processing as a form of *intelligence*, which obfuscates the purpose and the limits of implementation of these algorithms and tools for different systems and industries. Between the media~marketing portraiture, actual technological developments, and scopes of implementation of these tools, confusion and discrepancies often emerge - so the understanding of *how, why,* and *for whom* these systems work comes into question. This analysis will be one of the key motifs in this research - to differentiate the concept of AI as a cluster of various tools and technologies, and AI as a discourse, concept and, nevertheless, *ideology*.

On computational *aisthēsis*, the intention is to specify the context of aesthetics as the study of art expanded into the theory of perception, epistemology and ontology of computed image - being related to media studies and analysing technological innovations that intertwine and influence both aspects of socio-political and aesthetic order, manifested through the popularisation of [in this particular case electronic computational] technology itself, that is, indeed, reflected in arts, which will be the guideline in the articulation of ideological and political condition that the propaganda of *artificial intelligence* —as computational algorithmic culture nowadays— carries within. From the anthropomorphisation of technologies, towards the de-anthropocentrism of agency and accountability, the challenge to articulate the human-machine condition in a relationship of co-production is a task that requires a state of deep attention, investigation and learning. One of the key arguments in 'proving' the intelligence or independence of AI systems is to portray these systems as *creative* - therefore to be able to *autonomously create art*. This hypothesis will be one of the key topics of this research - not from the instance of the analysis or definition of what creativity or art might be, but in showcasing counter-critical examples of relations between humans and machines, and the levels of their autonomy, or rather co-dependence of production and extraction. It is not about *what the machine sees*, it is about *what we see*. Towards algorithmic production of images and their meaning, there is a resulting ambivalence, ambiguity, and lack of individual agency in the developing

process - of an idea, or intention, which is a field of debate on both *aesthetic* and *ethical* levels. The lack of agency or intent in an image does not mean that image is anti-ideological or apolitical. On the contrary, such imagery can teach us a lot about the society we are in, in Bernard Stiegler's words - a society of *symbolic misery*[1].

The relationship that develops between a human as a user, and a machine, as a tool that *calculates,* is established on the mathematical logic of correlation and processing of binary values on a pixel grid, a statistical and combinatorial probability generator of data input. Therefore, it is unrelated to human logic of causality and experience of life, yet dependent on the datasets and training examples that are extracted from human labour, individual and collective histories, whereas *any* —or rather— *all* data traces can be classified, stored and categorised. In image-making and image-reading processes, both *agencies*[2] of *intent* and *automation*, participate in a production-prediction loop, a procedural optimisation through a theoretically infinite number of possible iterations, a power of the multitude. This combinatorial infinity in production gives us endless opportunities to project meanings, speculate the superiority of computational systems, while we are at risk of forgetting the collective efforts that were, and still are, essential for the development of these systems and tools. Examining and visualising the core characteristics of these tools, and the processes that lie beneath - we deconstruct the *image behind the image*, the scope of meaning of the data-image beyond the representational layer, so as to understand what these images *are* in their epistemological and teleological scope, and not only what they *simulate*.

In the first chapter, a brief history of algorithmic culture will be introduced, as a culture that precedes the computational age. With an overview of the cultural and technical context in the history of computer-generated art, we will refer to the theory of cybernetics, feedback loops between the human and the machine so as to introduce the concepts that shaped the algorithmic culture as it is nowadays, in contemporary computation that is a networked geopolitical system. Zooming in, we go from this broader, global perspective, towards the user interface layer. The ontology of the screen as a medium and user interface will be addressed in reference to the writings by Lev Manovich, Vilém Flusser, Boris Groys, Edmond Couchot, Oliver Grau, Hito Steyrl, and more. Observing the aesthetics of computed synthetic imagery helps us to understand the aspects of the human relation to the image, contextualising the representational aspects of it and navigating its possible meaning[s] within a globalised code-culture of life on the screen while treating digital imagery as data. The tools and technologies that will be defined are: *artificial neural networks, computer vision, machine learning*, *generative adversarial neural*

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[1] A reference to a title of Bernard Stiegler's two-volume book: *Symbolic Misery, Volume 1: The Hyper-Industrial Epoch* and *Symbolic Misery, Volume 2: The Catastrophe of the Sensible* both translations published by Polity Press, Cambridge in 2014 and 2015. The [original title] *De la misère symbolique. Tome 1, L'époque hyperindustrielle* and *De la misère symbolique. Tome 2, La Catastrophè du sensible* books were published by Galileé, Paris in 2004.

[2] *"There is an affiliation of interactive and interpassive mediation and technological mediatization. The apparatuses give both belief and alienation."* Andre Nusselder, *Interface Fantasy: A Lacanian Cyborg Ontology*, (Cambridge: Massachusetts: The MIT Press, 2009.), 128.

networks (*GANs*), *pattern recognition*, *object detection*, and *text-to-image prompt* models and softwares [*DALL-E, Midjourney, Stable Diffusion*]. The tools for image-making and image-reading will be explained through their technical characteristics, and examples of implementation in industries and arts in the current times. These technical aspects will further be analysed through the media theory and philosophy of aesthetics and semiotics of the generative, computed imagery. Some of the artistic examples that will be referenced have been made by the artists/computer scientists/software engineers like Mike Tyka, Memo Akten, Anna Riddler, Robbie Barrat and Mario Klingemann. This chapter will pose the question of the aesthetics and common characteristics of the computed imagery outputs: recognisable and repetitive style, appropriation, cultural and intellectual, towards assimilation in expression; but also assimilation in interpretation - fascination and metaphors that come in between, that are re-branding computational processes as imagination, inception, dream.

Against such abstractions, the first chapter will also introduce the problem of ethics and *technoethics*, with remarks and critical examples of the implementation of image-reading tools, more specifically, *object recognition* applied in surveillance systems, bias and the modules of understanding human error and wrongful implementation of such classification tools. The crucial layers of building and implementing recognition models are crowdsourcing, non-transparency in datasets and labelling processes, leading to human bias causing discrepancies in an ethical and moral context, and social consequences of the computer-generated outputs as decision-making agents. The examples that are included are projects, writings and findings by Kate Crawford and Trevor Paglen, Yarden Katz, and more. For this thesis, ethical examples are important in taking a standpoint of the subjectivity of the structure of these systems, therefore addressing the agency and responsibility of the maintenance and development of these systems –that is– human.

After contextualisation of the history of algorithmic culture, computer-generated art, tools and technologies that are defining what machine learning in computer vision is nowadays, and an overview of aesthetic and ethical traits of automated image processing, a presentation of my projects will follow up. Through a selected series of three projects I have created in the past three years (2020-2022) - *Digital Prayer* (2020), *FUTUREFALSEPOSITIVE* (2021), and *PROMPT: WAR STORIES* (2022), the conceptual and critical approach in using different machine learning-based tools will be elaborated on these practical examples. These projects create a triptych through which I aimed to examine the affordances in computational image production and to visualise, so as to demystify these processes on the scope of representation, semiotics, symbolism and rituals; to articulate the key instances of the human psyche that are being projected into these technologies. In these experimentations, I was able to gain a personal insight into the scope of co-creation, where I was able to recognise the borderline — where *I –as an agent–* end — and the script, or automation, begins, and vice-versa. By co-creation, the examples shown in this research will offer a point of view on the threshold between data, knowledge, creativity, and computation; simulation and obfuscation, between the artist-user and the machine-tool.

The second chapter will focus on the project *Digital Prayer*, with which I have started the practice of implementing machine learning models into video installation art. The project is made through the image-making processes using the *styleGAN* model, running on a database of 4000 digital reproductions of Orthodox Icons, that I have collected and prepared for the following algorithmic processing. *Digital Prayer* was highlighting the focus on the process, not on the final output, so as to visualise *the invisible* by exposing the code and presenting the layers of algorithmic processing iterations. This approach is used to establish a relationship between an algorithmically computed image and the canonical structure of an Orthodox Icon, with a premise that the image-making model will be able to generate images that resemble Orthodox Icons, opening further discussion and context for analysis, between mystification of AI and semiotics of a computer-generated image. This was an artistic and theoretical research project, initiated at the Faculty of Media and Communications, Singidunum University Belgrade, and afterwards awarded and supported by the Centre for the Promotion of Science in Belgrade, as partners of the European ARTificial Intelligence Lab project. *Digital Prayer* was presented as a solo exhibition of the same title in Remont Gallery in Belgrade in June 2020; as part of Ars Electronica Festival 2020 Belgrade Garden; at European Open Science Forum, Trieste (2020) and Speculum Artium New Media Festival, Trbovlje (2020). This project was presented in the book *Practice of Art and AI:* European ARTificial Intelligence Lab*,* ed. Andreas J. Hirsch, Markus Jandl, Gerfried Stocker, published by Hatje Cantz in 2022.

The third chapter is dedicated to the project *FUTUREFALSEPOSITIVE*, created in 2021, as part of artistic research under my master's studies at the Interface Cultures department of the University of Art and Design in Linz. This project is an interactive real-time video installation that was developed using pre-trained models for *object recognition*, applied to a ritual of coffee cup reading - a fortune-telling tradition existing in the Balkans, and originally from Turkey. A relation has been established between computer bias - *false positives* and human bias of *apophenia* or *pareidolia*. It expands towards the psychological element of prediction in contrast to the statistical value of probability. That allows the spectator to form a creative interpretation of the generative output —reading— through understanding the human factor in determining the evaluation process of an automated system. The correlated artistic examples that will be referenced are created by artists such as David Rokeby, Kyle McDonald, KairUs, and Shinseungback Kimyonghun. With a premise that *machines see what we want them to see*, this project aims to address human levels of agency in the automated processes that cannot be obscured - the more individually responsible we feel about such systems entering our day-to-day environment, the more likely we will be able to understand how to fix them. Exhibited first time at Ars Electronica Festival 2021 as part of *Interface Cult*, Interface Cultures group exhibition; at the *Symposium on Artificial Creativity* at the University of Theatre and Music, Munich, as part of an exhibition and panel discussion; and in Pančevo 20th Biennial of Art (2022); it was also presented as a keynote in *Social Marginalisation and Machine Learning: Defying the Labels of the Machinic Gaze*, an online panel discussion hosted by Autograph ABP Gallery, London, in August 2022.

The fourth chapter is focused on the analysis of *text-to-image prompt-based* algorithms

and softwares, and the exploration of these tools, resulting in the project *PROMPT: WAR STORIES* (2022), a two-channel video and audio installation placed in a camouflage camping tent. The research behind the project was questioning the veracity of a generated image, semiotics, and limitations of a language-based image-synthesis model, its aesthetics, bias, authorship, censorship and over-saturation of production. Each of the available tools and models I was testing came with its limitations, allowances and aesthetics. These pre-trained models consist of quantified traces of reality and collective histories, becoming a substance for algorithms to generate content that recycles the past. On the borderline between sensitive content and an easy slip into topics of violence, this project explores the depths of the subconscious of these models, excavating the influences of media and online information exchange. The models build the spine of quasi-historical narratives simulated by the algorithms and are often obfuscated with prejudice and misinformation, along with personal, author bias. Exhibited first time at *AI & Art Pavilion for Esch 2022*, Luxembourg, as part of *Remix Culture*, Interface Cultures group show; at Ars Electronica Festival 2022 - *Crossing the Bridge*, Interface Cultures group exhibition; and at Speculum Artium New Media Festival, Trbovlje (2022).

In the final, fifth chapter, after the elaboration of my artistic research projects, a theoretical discussion on the ontology of automated computer vision systems, with an overview of theories previously introduced in the first chapter, will be elaborated within the context of current notions of computational logic applied to speculation of *automated creativity* and *obfuscated agency*. Each implementation of these tools onto each of the introduced projects was intended to critically analyse and understand not only the technical processes, but to understand the limits —and benefits— of image-making and image-reading processes. By limits and benefits, this research will explain some of the possible approaches to understanding machinic vision in accordance with a broader epistemological and ethical scope, in relation to our networked society of images, and the ways we change *our ways of seeing* in accordance with the affordances of such image production.

The topic is not about questioning the technological capabilities to produce an image, but human capabilities to disambiguate the meaning of an image that surpasses the ghost in the machine, that converges internet-sourced manifestations of cultural codes of exchange through communication and visual representation, into discrimination, classification and [self-]optimisation. It will reflect on a socio-political and ethical level, positioning the goal of the research on the *human condition* under the *machinic gaze* and *automated creativity*. The arguments for the analysis will compare writings by Kate Crawford, Trevor Paglen, Vladan Joler, Matteo Pasquinelli, Sofian Audry, Vilém Flusser, Bernard Stiegler, Dan McQuillan, Hito Steyrl, Alexander Galloway, and more, which were all equally important in shaping the ideas behind this research. The correlations between the code and the image on the levels of: syntax that influence semiotics; the effect of *the representational* and *the belief in images*, towards consequences of *algorithmic thoughtlessness* are questioned in this final chapter, with a final overview of *demystification* of these relations.

This research offers the modalities for understanding the *zeitgeist* of computational imagery. Interpreting possibilities of the application of machine learning tools comes with the responsibility to reject the *hype*. Examining *novelties* offered in algorithmic models is needed to align and locate our own position - to draw the line where human agency stops and automation begins. Also, to determine if there is such a threshold at all - blending the feedback loop between the user and the machine. Automation is a collective effort, and claiming back the totality of our agency rather than dispersion into particularisation - *to see a world in a grain of sand* - we have to detect the structures of the network we are part of. This research extracts the visual aspect of the experience and agency. In the pervasiveness of visual communication, visual culture should be equally important.

OpenAI ChatGPT captcha, 2023.

1. COMPUTATIONAL AISTHĒSIS

…technology is a formal means to ultimately manipulate meaning, not formalisms,
whereas a computer program, be it a compiler, a word processor,
an image or sound manipulation program, is conceived of as a symbolic formalism
employed for an equally formal manipulation of symbols. [3]

Florian Cramer - *Words Made Flesh: Code, Culture, Imagination*

1.1. EVOLUTION OF ALGORITHMIC CULTURE

Algorithmic culture, and algorithms as a concept, precede the age of contemporary computing. The term "algorithm" comes from the Latin translation *Algoritmi de numero Indorum*, a study by the mathematician and astronomer al-Khwarizmi[4]. An algorithm is a procedure of organising a process, or a rational activity through a specific set of instructions, with an outcome that has to satisfy the intention, but nevertheless, can be produced differently while taking the same set of instructions. Algorithms can be presented through technological processes, computer programming, culinary recipes and art, among many other examples. They are inscriptions for a procedure or protocol. In the mid-twentieth century the algorithmic culture influenced *"modernist research into the creative process, the material and contextual identity of the work of art under the influence of information theory, systems theory, cybernetics and semiotics."*[5] Alan Turing, a mathematician and logician, devised the concept of an algorithmic machine of general application, called the *Turing Machine*. The *Turing Machine*, as a conceptual model, became the foundation for computer science. It does not represent a physical, but an abstract machine that manages the given symbols based on the given rules according to the mathematical calculation model. In computing, i.e. computer science, an algorithm is understood as a clearly defined form of instructions implemented within a computer, with a goal to try to solve a set of problems or perform a calculation procedure, which is also, in a narrower sense, a computation procedure. A computer program is described by an algorithm and implemented with the help of a code - because the code makes the abstract language of the algorithm concrete, and then it delivers it to the computer as a program. The algorithm, that leads to a specific number as an answer, refers to the calculation procedure, that is computation.

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[3] Florian Cramer, *Words Made Flesh: Code, Culture, Imagination,* (Rotterdam, Netherlands: Piet Zwart Institute, 2005.), 18.

[4] al-Khwarizmi, Muḥammad ibn Mūsā al-Khwārizmī, (750-850.), mathematician and astronomer whose major works introduced Hindu-Arabic numerals and the concepts of algebra into European mathematics. Latinized versions of his name and of his most famous book title live on in the terms *algorithm* and *algebra*; Britannica. "al-Khwarizmi." accessed November 09, 2022. www.britannica.com/biography/al-Khwarizmi.

[5] Dejan Grba "Algoritamska i softverska umetnost." (2010), http://dejangrba.org/lectures/sr/2010-digital-art/006.php. accessed December 04, 2022.

In the ontological sense, in the case of translating instructions into computer code, the instructions, as carriers of ideas, are introduced into the language of a new medium that does not hold a spatiotemporal or material context —unless instructed to simulate it— the time-space human relation is a flattened digit sheet on a computational surface. Therefore, it can be said that, through the computer code, the interpretation of the idea was realised in the most refined way possible, exempted from external factors. It remains in the code and manifests as digital visual information, i.e., an image, through a computer interface. In the case of software processing of instructions~algorithms through computer code, there is a large number of variations in the result or procedure of solving the task in an extremely short period of time, as opposed to calculations that would require long and often physically impossible processing from a human. Because of it algorithms nowadays might be perceived as mathematically abstract rules implemented upon concrete data. On the contrary, algorithmic culture is originating from material practices, procedures, routines and rituals forming algorithms through mundane activities and organisation and division of time, labour or social relations, preceding any complex cultural system.[6] As algorithmic processes are encoded into social practices when being translated into an operational asset for data classification in computing, a question that is being imposed is not on the logic of the computer system itself, but on human logic of rearranging or re-engineering inputs of collective behaviour as data into a protocol that in reverse predicts or projects a pre-imposed assumption or logical premise - that as a result turns imposed over human thought, protocols or rules of labour, human physical needs (quantified self), social and psychological habits, and so on.

As algorithms are implemented in the computational processing of the automation of labour, this automation is expanding towards a non-human goal of acceleration, as the only seemingly sustainable effort of economic growth. In such a simulated world of predictions that is taking over and re-arranging our daily routines, habits and protocols, there came an outcome of transcending or rather the suppression of human agency. To do so, this collective effort has been wrapped under the term artificial intelligence. The term artificial intelligence was created in 1956 by several authors, including John McCarthy, Marvin Minsky, Nathaniel Rochester and Claude Shannon in a scientific study proposal at Dartmouth College, USA. For the purposes of the conference itself, the authors focused on research into the possibility of creating machines that 'think'. The general way of defining artificial intelligence carries a reference to human intelligence, which, according to Howard Gardner, can be seen as "*biopsychological potential for processing information, for solving problems or creating products that have cultural value*"[7], while Marvin Minsky

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[6]"*In terms of anthropogenesis, it could be said that algorithmic processes encoded into social practices and rituals were what made numbers and numerical technologies emerge, and not the other way around. Modern computation, just looking at its industrial genealogy in the workshops studied by both Charles Babbage and Karl Marx, evolved gradually from concrete towards increasingly abstract forms."* Matteo Pasquinelli, "Three Thousand Years of Algorithmic Rituals: The Emergence of AI from the Computation of Space"*, e-flux journal,* issue #101 (June 2019): 3-6. https://www.e-flux.com/journal/101/273221/three-thousand-years-of-algorithmic-rituals-the-emergence-of-ai-from-the-computation-of-space/. accessed November 11, 2022.

[7] Howard Gardner, *Intelligence Reframed: Multiple Intelligences for the 21st Century*, (New York: Basic Books, 1999), 33-34.

considered artificial intelligence "*a science that deals with making machines that can perform tasks that would otherwise require human intelligence.*"[8]

INTELLIGENCE IS A COLLECTIVE EFFORT

In a scientific article "*Siri, Siri in my hand: Who's the fairest in the land?"*, published in the journal Business Horizons, Vol. 62, Issue No.1[9], authors Andreas Kaplan and Michael Haenlein state the following division of artificial intelligence systems: (1) analytical; (2) human-inspired; and (3) humanised artificial intelligence. Analytical artificial intelligence has characteristics that are consistent with cognitive intelligence and serves to assume future decisions, or reactions, from past, learned situations. They are used for security systems designed to detect fraud in financial systems, facial recognition systems and the like. Understanding or recognition of human emotions is included in the creation of artificial intelligence inspired by human behaviour, expressions and emotions, while humanised artificial intelligence tends to display all cognitive, emotional and social competencies, and remains a task for the future. A computer program can imitate the manifestations of intelligent human behaviour, such as winning a game of chess, recognising objects in pictures, and so on. This research deals exclusively with that segment of artificial intelligence which is based on image processing, i.e. the technique of computer vision, which is one of the subtypes of machine learning. The modern computer and IT society, in the way of creating the technologies it uses, is based on ideas created more than half a century ago. The concept of neural networks and artificial intelligence dates back to the 1960s. Ideas for the development of artificial neural networks in that period were delayed only by the hardware's capacitive inability to process the data in a quick manner as it is possible nowadays. In such reconfiguration of global systems and industries, a view from above by the computational power of data processing is portrayed as (1) *neutral* and (2) *intelligent*.

Intelligence is a collective effort, and neutrality is only claimed by the mentioned mathematical abstraction. The algorithmic protocols have to be engineered towards a desirable outcome and goal, so to deliver a result - and that requires human intention. In the collective shift in the paradigm of industrial and social labour and production along with the surveillance in the global networked culture, the advancement of technologies that fit under the term *artificial intelligence* is used in specific areas, such as medical diagnostics, self-driving cars, autonomous weaponry, and surveillance, and accordingly, they also entered the pores of economy, justice, and so on, with ever-expanding ways of implementation. There is an interpretational issue revolving around the term artificial intelligence itself, confusing many different tools and systems for a concept of automated

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[8] *"...the science of making machines do things that would require intelligence if done by men. It requires high-level mental processes such as: perceptual learning, memory and critical thinking.*", Marvin Minsky. *Semantic information processing* (1968), (London, UK:The MIT Press, 2003.), 45.

[9] Andreas Kaplan, Michael Haenlein, "Siri, Siri in my hand: Who's the fairest in the land?", *Business Horizons*, Volume 62, Issue 1, (January–February 2019): 15-25., accessed November 08, 2022., https://doi.org/10.1016/j.bushor.2018.08.004.

and, therefore, independent systems. The mysticism revolving around AI helps neither the development of the actual technologies nor the general understanding of what are the systems that are underlining the discourse around this flashy cover term. In this writing, artificial intelligence will be used as a cover term only in the scope of ideological portraiture of the implementation of technologies, while the technologies will be addressed under the term machine learning and its subfields or other sub-terms — computer vision, neural networks — respectively baptised in a very anthropomorphic manner.

The decision-making processes can by all means be translated into an algorithmic procedure. To some extent, many processes —once explained through an algorithm— *can* be automated. Yet the decision-making itself, the resulting answer is a non-computable task, as Mihai Nadin, philosopher and researcher in the fields of semiotics, computer science and aesthetics, argues on the concept of *Entscheidungsproblem*[10]*:* "*The negation in reference to the mechanical decision procedure is indirectly an affirmation of what became the algorithmic set of rules making the solving of a problem through mechanical 'reasoning' possible. Indeed, there is a part of reality that can be described through algorithmic computation. It turns out that this part of reality is at the same time decidable: it can be fully and consistently described. […] demonstrating the impossibility of a machine-based procedure for proving the truth of mathematical statements actually set the foundations of a particular type of machines that will eventually change civilization."*[11] In such an attempt to establish a civilisation change, as Nadin states, we delegate the combinatorial restructuring of the world to an abstract statistical probability of self-improving rule-based computational systems that by no means can prove or disprove any decision. This is one of the key arguments that will be problematised in this research forming different points of view, within the scope of creative production, intention and context of an image, arguing that the initial premise and the desired outcome selection and evaluation, respectively are still human responsibility. Algorithmic culture has its value in representations of dissemination, knowledge acquisition and evaluation, algorithms are procedural assets in proving and disproving a theorem, premise, or a hypothesis, but it is human nature is one that understands the performance, has the ability to stop, or affirm and constitute a specific condition, decision or definite outcome of a performed task.

The technological introduction has its counterbalance in the epistemological scope of analysis of human—computer—*image* relation in a feedback loop. Media portraiture of artificial intelligence can only generalise techno-solutionist aspirations to build the price over their product, and too often it is spoken about AI as an heir to the throne of cognitive intelligence, insinuating potential singularity in the not-so-far future, we are far from any

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10 The decision problem, a mathematical problem posed by David Hilbert and Wilhelm Ackermann in 1928, proposes a true-false challenge to the algorithmic processing of a question. The challenge proved that an algorithm cannot determine whether an input statement is universally true or false.

11 Mihai Nadin, *"'In Folly Ripe. In Reason Rotten'.* Putting Machine Theology to Rest'*', arXiv,* 2017., 5., https://doi.org/10.48550/arXiv.1712.04306. accessed December 10, 2022.

possible simulation of such artificial sci-fi *Übermensch*[12]. On the contrary, we can talk about the human condition within the operative scope of these systems, as Mihai Nadin introduces *Homo Turing - "is an outcome defined by Bolter (1984): utilitarian, calculating, shallow, living by cost-benefit analysis. It seems that in reshaping homo sapiens intuition, spontaneity, empathy, compassion, and even judgment were traded for expediency. Of course, Turing could not foresee the consequences of his visionary work."*[13]

It is not about technology, but about ideology.[14]

Algorithmic culture helps us navigate the world around us, from intuitive to collectively established sets of rules, procedures, rituals, principles or protocols, as the cultural effect of divisions of labour, to more complex systems, from physical routines to abstract mathematical formulations, it is a framework for acquiring knowledge. Algorithms are sets of instructions, and rules to achieve a desired goal, integral to computer-computational systems. In contemporary computing, algorithms are essential not only for procedural code-writing and human-made execution protocols, but algorithms can be self-improved via *machine learning* and *artificial neural networks* - which will be further explained in chapter *1.2. Machine Learning*, and it's subchapters. These technologies reignited the discourse of systems developing *intelligent behaviour*, on a premise that they are self-optimising or self-regulating, being able to *learn* from the ever-faster processing of massive amounts of data. The promise of knowledge beyond human comprehension obfuscates the nature, logic and role of these systems. Also, the mathematical or statistical nature and logic of these systems do not make them *neutral.* Such anthropomorphised and techno-solutionist portrayal of a physical and infrastructural geopolitical and industrial shift on a global scale at the same time disperses the human agency and social, political and ethical responsibilities, which is a perfect environment for the accumulation of the power of the corporations, industry magnates, and governments. Algorithms help us understand the world around us, but human decisions shape the culture that we live in.

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[12] *Übermensch* is a concept of a *super-* or *over-* man (in English attempt to translate the coined word) introduced by Friedrich Nietzsche in his book *Also sprach Zarathustra* (1883) [eng.tr. *Thus Spoke Zarathustra*], with the characteristics and values that shift to a grounded human ideal of coexistence with nature and life around him, able to surpass human, earthly problems and challenges and live in equilibrium with the world. As the concept of *Übermensch* was often misinterpreted since being appropriated in Nazi propaganda, the misuse of the term would read in a human entity that is *above* other humans, a *master race* that is more powerful or dominant. Current attempts of personifying or portraying 'artificially intelligent' entity often resembles a humanoid entity that is simply dominant over other species, along with the promises of such entity being possibly able to solve all human [worldly] problems - therefore attempting to promote such futuristic aspirations initially as superior to a human and dissociating human responsibility of self-improvement to a techno-solutionist strategy.

[13] Nadin, *"'In Folly Ripe. In Reason Rotten'.* Putting Machine Theology to Rest*",* 5.

14 "AI is an Ideology, Not a Technolgy." Glen Weyl. wired.com (March 15, 2020) https://www.wired.com/story/opinion-ai-is-an-ideology-not-a-technology/. accessed January 10, 2023.

1.1.1. THE INTERFACE LAYER - SEMIOTICS OF THE COMPUTED IMAGE

The image is not a mirror, but a projection.
Vilém Flusser - ***Into the Universe of Technical Images***

UNDERSTANDING COMPUTATIONAL IMAGERY

The interface as a term is used in engineering to denote a special part of a computer system that allows two physically or logically different elements to communicate (such as a human and a computer or a computer and another device). A computer interface is a layer of communication between a human and a computer, humans through computers, but also between computers themselves. The computer user interface enables such communication with its adaptation to human sensory devices. In this research, the main focus will be on a digital/screen image as an interface adapted to human visual percept. This image adopts the formerly established premises of visual-sensory understanding and perception of aesthetics, symbolism and interpretation - even though in its medium the image is being simulated and translated, rather than created, copied, or re-interpreted. The medium is binary, electronic and pixelated. The relation between the symbolic, representational and semiotical in the medium will be discussed. A graphic user interface (GUI) is an optimised display of image and text content that allows us, t*he users*, to manage computer operations and commands, without having to enter into background coding processes. It displays information converted from code to image, in a way that one can easily get to the desired operation. "*It is the boundary surface of a technical, computer system that allows a person to communicate with that system, to see or touch content that, if it were not for the interface, would not be available to his perception, although they would objectively exist. And vice versa - the GUI makes available to the computer system the information obtained from the users of that system.*"[15]

The interface is not only tailored to our needs but our needs are tailored to it.
The use of the computer interface changes our perception,
the system of communication and information.[16]

The screen-image interface consists of pixels with numeric values specified within the code. It is a custom-optimised projective form, which allows us to easily use computer functions in human-computer-human communication, that is adjusted to our reality as much to the operative scope of a computer system. It is a co-existence and co-habitation [of techno-ecosystem]. When analysing computed imagery, GUI is reduced to its function of communication through code, as a form and a medium that is a foundation for the

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[15] Oleg Jeknić, *Teorija interfejsa.* (Belgrade: Centar za medije i komunikacije, 2016.), 20.

[16] Lev Manovich, *The Language of New Media* (Cambridge, Massachusetts: The MIT Press, 2001), 56.

possibility of making an image on the screen. The artistic projects introduced in this research are developed as a set of instructions, database navigated generative content or real-time camera input, intersecting code and image—or hard-coding images—without proxy use of any post-production tool or software. The main elements of interaction emerge within the co-creation process of visual output between me as an author and the computer program as a tool, exploring the different applications of these tools and articulating results of generative output in a feedback loop of adjustment, repetition and curation of the output material. As Ryszard W. Kluszczyński introduces the relationship between interface and the experience of interaction within the human-computer behaviour protocols: "*Nevertheless, those interactions fulfil a more serious, more complex, and not merely cognitive function in the area of contemporary communication practices. They also play a role in the introduction to the world of communication taking place through computer technology. The processes of communication interaction proceed one step further in this world: they take the form of a two-stage procedure. In the first one, there is interaction, which takes place between the user and computer tools, the instruments of communication practices. The so-called human-computer interaction (HCI) is now becoming a basic sphere of communication behaviours, and disciplines of contemporary research, dedicated to this area, play the role in the research on communication processes, which cannot be overstated. In the second stage, the area of interaction develops between these tools-instruments, defined as an interface in this role, and, indeed, people may be communication partners, who, however, increasingly take the form of information resources (databases, hypertexts). In the latter case, communication becomes a process of exploration, acquisition and processing of data (information), the process that encompasses the spectrum, as the concept of cultural interface of Lev Manovich indisputably proves, all the cultural achievements of mankind.*"[17]

It is clear that data or information processing is an inevitable two-way communication not between humans through an interface, with a computer as a medium - but towards an extension of the protocols - while we are developing our cultural interfaces, the computer-computer interaction is instructed to absorb and utilise data and information given. The interface as a navigable environment for the usage of a tool (algorithm, software, etc.) becomes a place of imagination, that is rather being developed within the computer-computer system, even when hard-coded, the imagery that we are analysing in this research is the one of a kind where we extract representational values of understanding, more often than there is the questioning of the protocol itself. It is a projective form of creation and consumption that is emerging through an interactive surface of visual languages, and cultural and computer codes. Such a projective form brings the result of simulated reality in the form of a digital image as we perceive it. The screen as an interface can be used as a medium of expression, and communication on the human-computer-human scale, and as a representational surface for digital images and digital files as adjusted to our visual perception. Using the screen as a form, medium of an artefact, and a mirror into the world intersected between the code and image, we separate from the

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[17] Ryszard W. Kluszczyński, *Theoretical, Philosophical and Cultural Contexts of Interactive Art*, 38. accessed December 14, 2022.
https://www.academia.edu/4553033/Theoretical_Philosophical_and_Cultural_Contexts_of_Interactive_Art

utilitarian, optimally designed user interface and its functionality for the purpose of processing digital files by entering directly into the work on the code. We can create different digital forms of the same content - carriers of visual/textual information, get to the core of digital data and thus visualise invisible processes, through changes that we find back in the interface layer. The interface layer of a screen is not only a place for representation and information exchange, but it is a surface of visualisation of the processes inside the machine, where we can perceive and understand the outputs and communicate them within the scope of our imagination or interpretation not only in an aesthetic sense but in a critical and ontological quest for understanding the obfuscated world of machine learning as it is observed in this research in particular. "*That the user of the interface is also its subject follows the notion of the interface as that which at once separates and draws together in augmentation. Likewise, agency, or the will and means to action, is capacity at once mediated by and produced upon the interface. The human-machine interface is neither the first interface nor the only type of interface that may be defined as a form of relation. The concept of the interface was developed for use in the field of fluid dynamics. Fluidity provides a powerful metaphor for the operation of the interface, as well as for associated processes of mediation and control. To engage an interface is also to become a constituent element within a kind of fluidity. Likewise, subjectification may be described as a process of becoming fluid. The interface is a liminal, or threshold condition, that both delimits the space for a kind of inhabitation and opens up otherwise unavailable phenomena, conditions, situations, and territories for use - exploration, participation, and exploitation.*"[18]

The interface hides the background processes of the computer, and our understanding, as an average user, is reduced to the ease of using the computer as a tool and media tool, but not the ability to understand the complex background processes of information processing. The interface is an optimised projective form, which can be personalised by the user. Each computer user uses their own interface, while at the same time, these interfaces reflect and transmit invisible information all over the planet. The interface layer creates instrumentalised images of unity and wholeness, and thus, according to Bratton, "*takes on political-theological coherence and appeal"*[19]. According to such mechanism, the communication-informatics tool is mystified and presented as an intelligent technology possessing greater knowledge than humans. The problem that is being concealed is the quality and use of that knowledge, which is, in fact, made up of information, which is again written as binary data in the computer. A computer without a given instruction is unable to recognise the importance of information, it is guided by statistical operations. Successful statistical processing always requires a large amount of data, so that the solution, in terms of its probability, is as accurate as possible. Yet these operations that are lacking intention in computer processing, for us, do create feedback of meaning, they carry cultural messages and project our experiences: while the logic of data processing is by all means different from human logic, the former is a numeric - digital process of

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[18] Branden Hookway, *The Interface Effect,* (Cambridge, Massachusetts: The MIT Press, 2014.), 5.

[19] Benjamin Bratton, *The Stack: On Software and Sovereignty*. (Cambridge, Massachusetts: The MIT Press, 2015.), 229.

calculation and pattern recognition as correlation, the latter is - causal and continual logic; the collision and communication between the two via computer interface shifts a paradigm in human ways of seeing and therefore in cultural coding, as inspired by machinic processes we adjust our ways of communication and perception in a framework that provides a machinic protocol and algorithmic procedures.

"...in the context of semiotics, the computer interface behaves like a code that carries cultural messages in different media."[20] Manovich stated in his book, *The Language of New Media* - as we are aware, the interface has been adjusted to the elements of our user experience, however, our experience of culture is also adjusted to the interface – and not only our experience but the means of content production becomes a roulette of image-making that sparks on the surface of data collection and algorithmic predictions. The code is often so widespread and solid in the logical system that it can potentially influence the creation of a model of thinking. Due to its stability and the ability to use it to express any type of communication content, the code can become non-transparent, as it happens with artificial neural networks and machine learning algorithms in general. The *Whorf-Sapir hypothesis* is based on such an assumption, taking language as an example of such a code. The hypothesis says that a person's thinking is shaped by the code of his mother tongue, that each language can shape a different way of thinking, and that they cannot be fully and completely translated from each other so that understanding and meaning are identical in both languages.[21] This might be only a hypothesis but in the sense of the shift of language and culture-coding, it could feel resonating with our ways of thinking that are being re-shaped with each re-iteration of our communication and exchange systems, predominantly filtered via visual culture with its [over]growing temporality in image [over]production. Manovich continues with the idea that one of the examples of the use of non-transparent codes is just a computer interface, which shapes the way a user uses a computer, as a user's thought in the context of using and interacting with media content within a computer. The interface is *"far from being a transparent window to data inside a computer, an interface with itself."*[22] When the paradigm of image-making is shifting, the visual results, or outputs that appear when applying the novel techniques, through their aesthetics, are shaping the way we think of an image, of how we produce and imagine it.

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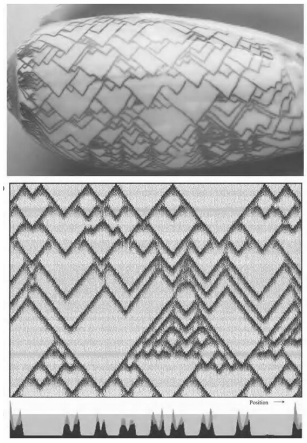
[20] Manovich, *The Language of New Media*, 117.

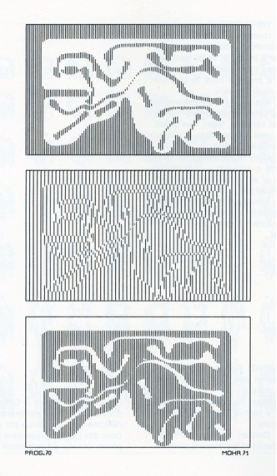
[21] *ibid*., 64.

[22] *ibid.*

1.1.2. BEGINNINGS OF COMPUTER-GENERATED ART

Generative art does not imply a narrowly formed direction, but an artistic practice that is based on partially or completely autonomous, automated processes in the way of performance. Automation can be performed by a machine, software, code or algorithm. Concepts of generative, algorithmic and software art are similar to conceptual art in the idea of using predetermined procedures when planning, performing and presenting a work of art. In the case of generative art, predefined procedural, aesthetic and other decisions of the artist are combined with unforeseen factors and unpredictable contents.[23] In generative or algorithmic art, i.e. in the process of generating work, deviation from given rules, and the very factor of randomness that arises comes as the result of mechanical, mechanical or software automated processing of information and given instructions. Generative and algorithmic art can therefore also be analog, and the first procedures in music and visual art appear long before the use of computers as tools, as is the case in modern art with *process art* (Sol Le Wit, Hans Haacke), music by John Cage, while the presence of algorithms is also recognised in the nature that surrounds us.





[Left] Image 1: Hans Meinhardt, The Algorithmic Beauty of Sea Shells[24]
[Right] Image 2: Manfred Mohr, P-70, "circuit imprimé", plotter drawing ink on paper, 50cm x 25cm, 1970-1971[25]

Computer-generated art is based on numerous possibilities of combinatorics, statistics, and therefore calculations and permutations within a certain set of data and instructions. By using the computer as a tool, the use of code for the purpose of creating generative

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[23] Dejan Grba, “Generativna umetnost.” (2010) http://dejangrba.org/lectures/sr/2010-digital-art/005.php accessed January 20, 2023.

[24] Hans Meinhardt, *The Algorithmic Beauty of Sea Shells,* Springer Science & Business Media, (2009) https://doi.org/10.1007/978-3-662-13135-0. accessed November 17, 2022.

[25] About the algorithm: “The data points for this drawing were digitalized by an "electronic light pen" (Benson Lecteur Digital 5075) by tracing the surface of a printed circuit. The algorithm used these data points and drew parallel lines defining negative, alternate, and positive surfaces.”; First published in Catalog Manfred Mohr, "Computer Graphics, Une esthétique programée", ARC - Musée d'Art Moderne, Paris, 1971 https://www.emohr.com/ww4_out.html. accessed January 20, 2022.

works is accepted and examined, and with the development of the Internet, many projects involving data processing [Data Art] have been created; through the technique of transcoding based on computer processing, control and articulation of various media contents. Computers can be used to create simulations of the physical and natural processes [Artificial Life]. One of the pioneers of computer generative art is Manfred Mohr. His early works included computational processes of combinatorics and the use of algorithms in drawing practice.

In the 1970s the links between aesthetics, information processing and *information theory* by Claude E. Shannon from the 1940s, or *cybernetics theory* by Norbert E. Wiener[26] were analysed by Frieder Nake, Abraham Moles and Max Bense, among others, will be mentioned in the following paragraphs. The information theory, as well as the cybernetics theory, made a significant impact not only on mid- and late-20th century definitions of computer art aesthetics, but also on the form and methods for the development of artificial neural networks as they are in computer science nowadays, and onto premises and promises of the future of machine learning or artificial intelligence. The influence and the concerns that were emerging at the time are similar to nowadays relation of technological [mis]use, development background, and intertwinement with politics or military. The following examples of the notion of defining cybernetics and aesthetics of computer-generated art hold in common the notion of possible coexistence and interrelation between human and machinic systems on the scope of communication, yet taking a critical stance on the dangers of non-ethical use and development of the exact same tools that are being examined through art, control systems for exploitation of power, military purposes and so on. It is important to take into consideration that computers were first developed to execute the calculations required by the shift in modern warfare, such as ballistic trajectories, cryptography, and speculative modelling to virtually test the atomic bomb, where key research in the 1940s was intertwined between companies, universities and military (e.g. RAND and US Army Ballistic Research Laboratories). The transposition of the research processes and achievements into *computer* or *generative art* did not come as a coincidence but a rather elaborated strategy to foster and justify the expansive research programme, being aware of innovations that can be adapted or elaborated in the other areas where computer technologies might be implemented.[27]

Norbert Wiener, one of the authors who established the theory of cybernetics [under that name] in his book *Cybernetics: Or Control and Communication in the Animal and the Machine* (1948) stated: *"We have decided to call the entire field of control and communication theory, whether in the machine or in the animal, by the name 'Cybernetics', which we form from the Greek 'κυβερνήτης' or 'steersman'."*[28] During World

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[26] Britannica, T. Editors of Encyclopaedia, "Norbert Wiener." Encyclopedia Britannica. (November 22, 2022). https://www.britannica.com/biography/Norbert-Wiener. accessed January 20, 2023.

[27] Lindsay Caplan, "The Social Conscience of Generative Art", *Art News, Art in America* (January 3, 2020.) https://www.artnews.com/art-in-america/features/max-bense-gustav-metzger-generative-art-1202674265/. accessed January 10, 2023.

[28] Britannica, T. Editors of Encyclopaedia. "cybernetics." Encyclopedia Britannica, (December 30, 2022). https://www.britannica.com/science/cybernetics. accessed December 30, 2022.

War II, Wiener worked on missile guidance systems - automatisation of aiming and firing of anti-aircraft guns, inventing the Wiener *filter,* where he was investigating *information theory.* This work afterwards led him to the development of the concept of cybernetics. After the war, Wiener refused to continue any work funded or related to the military, considering the political interferences and militarisation of science a concern towards such tendencies of generating power via the use of novel technologies and information systems, taking an ethical stance towards the responsibility of a scientist regarding the possible consequences of their work,[29] redirecting personal efforts in cybernetics to fields such as physiology and psychology, most remote from war and exploitation.[30] As part of the *Macy Conferences*[31] these *Cybernetics Conferences* were held between 1946 and 1953. The conferences had the purpose to set principles and foundations on the science of the workings of the human mind, therefore they had an interdisciplinary character, further influencing not only the research in cybernetics, but also systems theory, and cognitive science. In Wiener's approach, cybernetics began with the simple idea of feedback which is *"control of a machine on the basis of its actual performance rather than its expected performance"*[32] and *"the property of being able to adjust future conduct by past performance."*[33] The feedback is formed between different entities, or *communicative organisms* - human, animal and machine. *Whereas the "first cybernetics" dealt with notions of information, control, and communication (in animals and machines), the second cybernetics deals with notions of self-organization, emergent structures, networks, adaptation, and evolution.*[34] As Alexander Galloway notes: "*[…] there is little instrumental difference between man and machine since both are able to affect dynamic systems via feedback loops. In this way the cybernetic system of man and machine is born. Its virtues are balance, self-regulation, circularity, and control. In a word, protocol."*[35]

There were many experiments and achievements in connecting arts and mathematics, statistics and information processing - with an aim to perceive and address aesthetics as a computationally most optimised way to create a pattern out of a mathematical relation/

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[29] *"Importantly, computers continued to make their way into art and culture not in spite of their entanglement with the military-corporate research complex, but because of it. The artworks, exhibitions, actions, and texts that comprise the early history of generative art were meant not only to integrate computers into artmaking, but also to reimagine the political agency of artists and artworks alike. Generative art, in other words, was tied to a generative understanding of art's political role."*, Lindsay Caplan, "The Social Conscience of Generative Art", *Art News, Art in America* (January 3, 2020.) https://www.artnews.com/art-in-america/features/max-bense-gustav-metzger-generative-art-1202674265/. accessed January 10, 2023.

[30] Peter Galison, "The Ontology of the Enemy: Norbert Wiener and the Cybernetic Vision," *Critical Inquiry*, vol. 21, no. 1, (Autumn, 1994), 254.

[31] Macy Conferences were a set of meetings of scholars from various academic disciplines taking place in New York were *organised by the Josiah Macy, Jr. Foundation* between 1941 and 1960. Even though Macy Conferences were dedicated to a wide range of disciplines, the Cybernetic Conferences became the most common reference to the series of Macy Conferences. *American Society of Cybernetics.* https://www.asc-cybernetics.org/foundations/history/MacySummary.htm accessed January 20, 2023.

[32] Norbert Wiener, *The Human Use of Human Beings: Cybernetics and Society*, (Hachette Books, 1988.) 24.

[33] *ibid.,* 33.

[34] Edmond Couchot, "*The Automatization of Figurative Techniques: Toward the Autonomous Image"*, ed. Oliver Grau, MediaArtHistories. (Cambridge, Massachussets: Leonardo, The MIT Press, 2007.), 185.

[35] Alexander Galloway, *Protocol: How Control Exists after Decentralisation,* (Cambridge, Massachusetts: The MIT Press, 2004.), 106.

formula. With an aim towards the *shortest description,* the algorithmic theory of beauty aligned, but only partially as a concept. The American mathematician George David Birkhoff, in his study *Aesthetic Measure* from 1933[36], elaborates on complexity as a quantifiable value, where the greater the degree of order relationships are in a work of art, the smaller its aesthetic value is, so the aesthetic value is increasing in proportion to the complexity of representation.[37] Between redundancy and complexity, it has been strictly tied to a hard-coded instructed mathematical process. However, nowadays computer image-making operates within completely different rules, which are *n*-layered complex systems, through which data extracted from digitised real-life documentation, etc., are being processed via layers of neural networks, which obfuscate the distribution of values within the process, the visual approach that emerged is aiming for photorealism, rather than a simulation of mathematical concepts or problems through hard-coded imagery. As the output visualisations are not just geometrical interpretations as *data graphs*, or visualisations of mathematical processing of data input, but matrices of pixel values — that principally operates with the same kind of values-data — they carry a representational value, rather than a geometrical or abstract one. After Birkhoff's model, another philosopher, Max Bense expanded the theory, having in mind that art can no longer be grasped along classical terms of analysis like proportion, harmony or symmetry. He introduced information aesthetics that is based on the statistical analysis of art objects and has included findings from information theory, semiotics and philosophy, influenced by cybernetics.

Bense distinguished four methods within the aesthetic synthesis: the semiotic, the metric, the statistical, and the topological. As he writes in his book *Aesthetica: "…today we not only have mathematical logic and mathematical linguistics, but gradually developing also a mathematical aesthetics. … Since this statement is directed to the specific elements of the "aesthetic state" or, as one can also say, to the specific elements of the 'aesthetic reality,' which are given as such and whose occurrence, distribution and summary are described in a mathematical language, this new aesthetic is empirically and numerically oriented. [...] We therefore speak of 'aesthetic materials' as well as of 'aesthetic semanteme'. The mathematical representation and the empirical determination in the new aesthetics relate to both areas and therefore in no way refers, as is often thought, only to formal or syntactic connections. Generative aesthetics is now to be understood as the summary of all operations, rules and theorems, through application to a multitude of material elements that can function as signs. Aesthetic states (distributions or configurations) can be consciously and methodically generated from these. [...] It is clear that every generative aesthetics which makes an aesthetic synthesis possible is preceded by an analytical aesthetics, by which process aesthetic structures are prepared as aesthetic information from given works of art, which are their carriers. This prepared aesthetic information must be describable in the abstract in order to be able to be projected and realized in a concrete quantity of material elements. There are currently four possibilities for such an abstract*

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[36] "Information Aesthetics" http://dada.compart-bremen.de/item/article/6. accessed December 06, 2022.

[37] Claudia Giannetti, "Cybernetic Aesthetics and Communication." (2004) accessed December 20, 2022. http://www.mediaartnet.org/themes/aesthetics_of_the_digital/cybernetic_aesthetics/08/.

description of aesthetic states (distributions or designs) that can be used to produce aesthetic structures: the semiotic, which proceeds in a classifying manner, and the metric, statistical and topological, which are numerically and geometrically oriented."[38] Here, the aesthetic process is interpreted as one of information, so the artworks are carriers of aesthetic information.

Along with Bense's information aesthetics, Abraham Moles even conceives perception as something that can be formally described through technical information theory and functions as a reverse combinatory process. *"In a seeming rehash of 17th century encyclopedic Lullism, Moles proposes to refound the arts on the basis of permutational combinatorics."*[39] In tune with Bense, Moles writes both poetics and aesthetics in which a near-infinity of generative output likewise corresponds to computational decoding of aesthetic phenomena. It is a totalism that includes both synthetic creation and analytical perception. In the attempt to map all arts and thinking onto algorithmic processes, Moles' theory resembles artificial intelligence research and its project to formally describe semantics as a higher complexity syntax. The manifesto by Abraham Moles is concerned with the application of cybernetics and information theory applied to computer-assisted art and aesthetics his models of creative machines, as well as his reflection upon the consequences of aesthetic change in regard to the notions of artist, work of art, and recipient, where Claudia Gianetti explains: *"... Moles proposes five models: the machinic viewer, the amplifier of complexity, permutational art, the simulation of artistic creation, and the creation machine based on successive integration. [...] [He] was aware that this «invasion of our thought by mechanical processes» could spark off a regular—quantitative and qualitative— sociocultural revolution that raises a number of questions about the possible consequences of this transformation. […] Moles pointed to three fundamental transformations that have continued to occupy the center ground of media-art theory up to the present day: the transformation of the function of the artist, that of the notion of art, and that of reception.*[40]*"*

In the context of ethics, which will be introduced in the subchapter *1.3. Making-Meaning,* the questions that emerge within the concept propositions on the scope of the agency between the human and the machine in the creative, but also discriminative processes. Obviously, the machine will not replace the artist, but it does influence his function in the creative process, whereas the responsibilities and understanding of the medium or the tool itself shift towards new articulations of the role of the artist*: "The artist changes into a programmer in the degree to which he accepts this changeover. [...] It remains to be examined wherein, according to Moles' theory, the ‹other vision› of art and artists consists, and in which form the aesthetic results of media art are evaluated by information aesthetics. To assert that aesthetic values are calculable means to carry to an extreme the*

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38 Max Bense*, Aesthetica: Einführung in die Neue Aesthetik* was published by Agis Verlag (Baden-Baden) in 1965.,333. Translated by Robin Parmar, 2022. retrived from: *https://www.theatreofnoise.com/2022/08/aesthetica-by-max-bense-partial.html, accessed December 20, 2022. https://archive.org/details/bense-aesthetica-english-extract.*

39 Cramer, *Words Made Flesh: Code, Culture, Imagination,* 93.

40 Giannetti, "Cybernetic Aesthetics and Communication." (2004), 9.

formalization of the language of art. [...] If the artist becomes a programmer, if aesthetic values are determined by operational systems, and if the work is produced on the basis of defined creative methods, then according to Moles the aesthetician has a new function. [...] The relevant organigrams make it clear that every machine for analyses can also be employed as a machine for syntheses, i.e. as a source of works of art."[41] In continuation Moles introduces the role of the aesthetician. As the systems of the art world and image production have changed, in my opinion, the role that he proposes: "*Even if not in the strict sense the author of these works, since the author vanishes behind his work, the aesthetician is at least the manager and person accountable."*[42]*;* shall be articulated to the accountability and the aesthetic and cultural value that is distributed, impacted and inspired by internet culture and the world of media with overproduction of content and dissemination of the image and authorship. These premises can also be related to the ethical scope of accountability and agency once the machinic image production becomes an irreversible, opaque process, and the artist's role shifts to a different paradigm. The belief in computer-generated images, as much as decoding them - in the realm of the visual interface - the image as a medium, and as the surface of communication, brings possible ways of understanding through articulating the aesthetics, perceiving the contextual value of a process through the visual surface, and revealing the ontology of such imagery. In relation to philosophy and media art theory, the analysis of the aesthetics is addressing the representational surface of the image - their syntax and limits of creativity, in the context of critical data and their semiotics.

As Florian Cramer notices: *"In tune with Bense's philosophy and its grounding of aesthetics on technical information theory, it [Moles' manifesto] conceives of "permutational art" as a "fundamentally anti-semantic activity.'"* He notes further on the manifesto[43] as: "*... a historical document of cybernetics and its attempt at a universal science of technology that investigates human-machine interaction. Cybernetics largely faded out and was often considered obsolete in the 1970s until many of its ideas—most importantly the description of cultural processes in terms of technical processes—resurfaced in the 1990s, in the guise of technical media theory."*[44] As critical as it may sound, Cramer's reaction is as accurate in the context of permutational anti-semantical activities. The systems nowadays surpass the co-production between the receiver-maker which are becoming the blurred lines. In the context of the revival of cybernetics and feedback loops, art becomes a two-way communication. As Ryszard W. Kluszczyński explains, analysing Jack W. Burnham's essay *Aesthetics of Intelligent Systems*, published in 1970*,* rather in the scope of interactive art, yet relatable to the image-maker-receiver feedback loop that is highlighted in this research: *"Burnham takes up again the attempt at aesthetic analysis of the relationship between humans and computerized environment. … The artwork becomes the centre of concepts, and the form becomes a process and a*

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41 Claudia Giannetti (2004): "Cybernetic Aesthetics and Communication.", 9.

42 ibid.

43 In 1961, Abraham Moles, published the "First Manifesto of Permutational Art" (Erstes Manifest der permutationellen Kunst) in the experimental poetry magazine *Rot*.

44 Cramer, *Words Made Flesh: Culture, Code, Imagination, 93.*

system. The aesthetics in question of the intelligent systems is understood by Burnham as a kind of dialogue involving the collection and exchange of information by the two systems, each of which affects the partner's states and changes them. The user of computer technology – the recipient of digital art, should not be, in his view, perceived as an external observer, but as an integral part of the entire system. The computer unites the observer and the object of observation. … Interactive computer programs are building a platform for human-computer dialogue, the aim of which is common, creative thinking of man and a machine in real-time. This dialogue is open, it consists in overcoming by both partners – the computer and man – the initial positions. Art, using computer systems, is thus a living experience."[45]

This unification will come into question because, in this research, we treat the feedback loop not on a level of recipiency or reaction, but on a level of content production and co-creation, where the experience of making data-driven statistical computer imagery becomes an exemplary element of the ideology of AI. In this feedback loop, there is a reciprocally passive scope of intention or goal in production, reduced to the content that is a simulation of representational visuals. However, its history, form and algorithmic protocols rely on similar methods and aesthetic premises as the promises of cybernetic and early computer-generated art have held. Calculation and interactivity endow images with technical faculties that no images have ever possessed before. As Edmond Couchot remarked on the development of capacities for figurative processes of the computed image, he predicted: "*The computer automatically creates the shapes, the colors, the movements of the image—or more accurately of the virtual semiotic objects that the image simulates and from which it is inseparable: the digital image that shows on a screen is not only a luminous surface that the eyes see, it is also the product of a calculation, a program and a machine. Again, computers control the modes of circulation and reception of images, that is to say their socialization (from multimedia to the Internet)."*[46] The figurative capacities have taken a different principle in the image-making process - it is the charm of the simulation of reality, hyperreality and also photorealism that overshadowed the materiality of hard-coding, the computer as a mediation tool, or a human-computer direct feedback loop between the code and interface, that we are aiming to analyse in the following chapters. The key principles that established the current state of the generative computed image hold origins in cybernetics, principles of neural networks, but also socialisation of the image via circulation and calculation in a protocol of a protocol-control society. Images are carriers of social relations, representations and ideologies, and tools and algorithms that are generating them are "*cultural dispositions that articulate and disarticulate human agency, constructing relationships and cutting ties with multiple natures and multiple cultures.*"[47]

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[45] Ryszard W. Kluszczyński, *Theoretical, Philosophical and Cultural Contexts of Interactive Art*, 44. accessed December 14, 2022. https://www.academia.edu/4553033/Theoretical_Philosophical_and_Cultural_Contexts_of_Interactive_Art

[46] Couchot, "The Auotimatization of the Figurative Techniques: Towards an Autonomous Image", 183.

[47] Andreas Broeckmann, "Image, Process, Performance, Machine: Aspects of an Aesthetics of the Machinic", ed. Oliver Grau, *MediaArtHistories*, 193-4.

The image-making tools and technologies in question, which will be introduced in the following subchapter, are as accessible for use as they are becoming even more opaque by the expansion of their capacities to simulate and reproduce semiotic and symbolic values within the representational layer of the image, in, as Broeckmann adds: "*a condition of digital culture, a social environment, field of action and interaction, in which meanings, pleasures, and desires are increasingly dependent on their construction or transmission and thus on their translation by digital devices. The necessary technical abstraction that the contents have to go through is becoming a cultural condition, which has effects far beyond the actual mechanism of extrapolated signal switching."*[48] The following chapter will introduce the distribution from image-making processes via devices towards a more extractivist principle of power-generating via information collection, unequally distributed data resources and data processing capacities, that lead us into a condition of *invisible* power hierarchies aiming to perform proof of culture-modelling within an imposed agenda of the *brave new intelligence*[49]

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[48] *ibid.*

[49] Here I refer to the title of Aldous Huxley's novel *Brave New World* (1932), placed in a dystopian future of *the World State* —for the sake of an analogy of industrial progress and anticipations of socio-political as much as industrial engineering— where the fictional novel is placed at the time of *After Ford.* A reference to Henry Ford's impact on industrial society creating an assembly line of *mass production as homogeneity, predictability, and consumption of disposable consumer goods* is just a remark on characteristics inherited in our real-life *post-Fordist era* of contemporary global culture-structure of industries, capital and power hold direct continuity and acceleration creating metamorphoses of global society, through, in our case, propagation of automation under the symbol of 'artificial intelligence', coincidentally similar to the engineering of intelligence-based social hierarchy, imagined in the novel.

1.2. MACHINE LEARNING: MODELS AND METHODS

Machine learning is a branch of artificial intelligence that uses statistical methods to process large databases, *which allows computers to learn from experience rather than by being 'explicitly programmed'.* The main theory behind machine learning is statistics. Statistics is a branch of mathematics that deals with the collection, analysis, interpretation and presentation of large amounts of numerical data.[50] In order to create machine learning processes, databases are essential. The greatest power and competence of both today's and the first computers is the capacity to store data, the ability to digitise every piece of information or turn it into a digital unit. Any form of information processing can also be translated into a computer instruction that manages such digital representations. Databases were created in the sixties of the last century, as specialised computer programs that digitise data, store and manage it. Databases represent organised sets of digital data and serve to store and classify digital information suitable for further manipulation. Another big step in computing, after the proliferation of personal computers (PCs), is the possibility of connecting computers to each other. The exchange of data between computers very quickly culminated in the emergence of the Internet, and further enlarging data storing, archiving and data production via *mobile computing* and the *internet of things*. Another hardware improvement that affected the expansion of these systems was the enlargement of computing power through graphic processing units (GPUs), due to the development of the gaming and cinema industries. Thus with an accelerating speed of data exchange and transmission between computers and between users via the internet, combined with the capacity to store and process it, the databases' capacities are exponentially increasing, enabling continuous progress and development of these systems. If the computer is fed with a sufficient amount of data, with the help of statistical processing it will begin to recognise patterns in those databases, so the algorithms are data-driven. Besides the data, for complete algorithmic processing in these systems, there are also *training processes* and *models.* The *training process* is training the model over the given set of *data,* through evaluation of the performance of the model.

There are three types of tasks in accordance with which there are three different variants of machine learning: (1) supervised, (2) unsupervised, and (3) reinforcement learning. In supervised learning, the system is learning from previously labelled data, where the output was instructed or assigned by a human. Human assigns a category, and annotates or classifies data, so the system would eventually learn to classify similar data following pre-trained examples. This is the most commonly used type of machine learning. Unsupervised learning is giving a task to a computer to differentiate, for example, two different groups of images, so as to learn how to separate and regroup them by their common characteristics without previously assigned classification or exemplary training. Reinforcement learning has a very behaviourist approach of conditional training based on 'rewards' and 'punishments', through which the system autonomously learns how to

[50] "Statistics." Merriam-Webster Dictionary. accessed December 16, 2022. https://www.merriam-webster.com/dictionary/statistics.

optimally behave within a given environment that can have multiple rewarding tasks and obstacles in it. These processes will be elaborated in the realm of computer vision, where in the following subchapters we will introduce the concept of *big data,* and then the sub-fields of machine learning - artificial neural networks, and their sub-filed - deep learning, going towards the latest models in use for computational image processing, from *generative adversarial neural networks* to *diffusion models*.

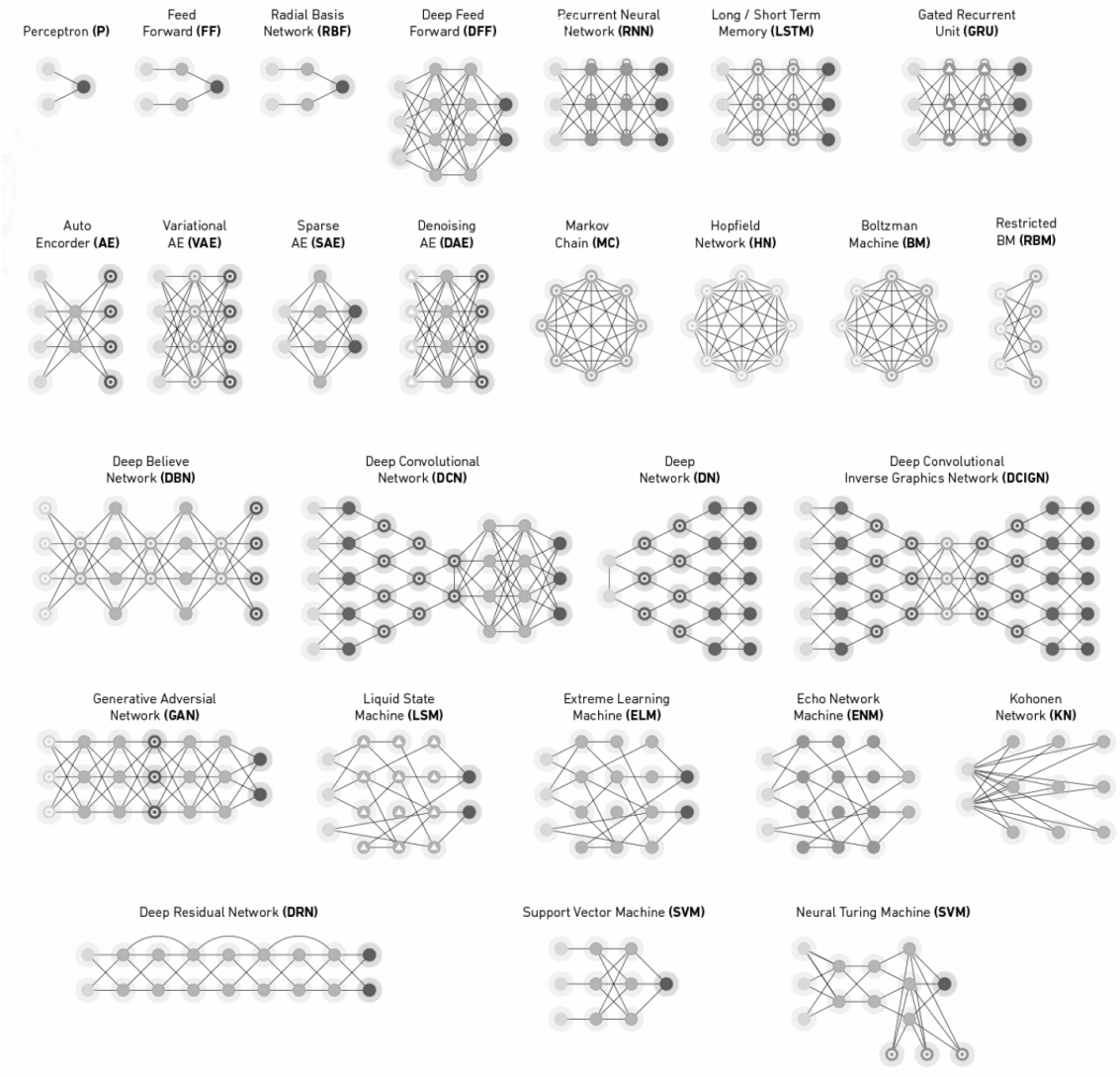

***Image 3: Neural Network Zoo*, Fjodor van Veen and Stefan Leijnen, The Asimov Institute, 2019. Asimovinistute.org. accessed January 10, 2023.**
Retrieved from https://machine-learning.paperspace.com/wiki/machine-learning-models-explained.

1.2.1. BIG DATA

The development of machine learning has been redirected from a logical approach in the creation of algorithms to learning based on databases - large amounts of stored data from which the program is able to develop an algorithm, instead of human input on how to process each of the given numeric values. Data is a necessary element for algorithmic information processing in machine learning. The system has to be *fed* with it so as to be able to learn how to process actions on it. It is a fundamental element that affects the system's performance and behaviour—it is the framework of the knowledge that the system has—the system cannot go beyond it, it can only operate within the given data. The data management and processing must be able to predict, that is, assume future outcomes based on data input, parameters and tasks. *Big data* refers to massive, diverse and complex datasets that grow at ever-increasing rates, with information rapidly generated and transmitted from a variety of sources. The first reference to the term *Big Data* appeared in the 1990s. In 2001, Gartner analyst Doug Laney defined *big data* by three main properties - known as the "three V's" of big data[51]: It encompasses the *volume* of information, the *velocity* or speed at which it is created and collected, and the *variety* or scope of the data points being covered. With the ever-expanding growth of information, since the early 2000s with the expansion of the mainstream use of computers and the internet, also networking sites, e.g. Facebook, followed by the use of smartphones and the overproduction of digital footprints on the web, the data collection accelerate.

Data storing and data management turns into *big data*, a term that refers to large, ever-expanding datasets of diverse information, that require complex data processing, also referring to methods applied to data processing, now used for predictive analysis and data analytics, essentially applied for the development of the systems that fit under the term of AI. Data can be structured, which is easy to enter, store, query, and analyse; semistructured; and unstructured, being more difficult to sort and extract value from. Examples of unstructured data include emails, social media posts, Internet of Things, word-processing documents; audio, video and photo files; web pages, server logs and more. Access to *Big Data* and processing capacities is mainly acquired by *Big Tech*. Companies such as Amazon, Microsoft [GitHub, LinkedIn], Meta [Facebook, Instagram, WhatsApp], Apple, and Alphabet [Google, DeepMind, YouTube], are in an advantage of the development of innovative systems, models and softwares that incorporate technologies under AI, because of the access to immense amounts of public and private data from their users in various platforms and services. Therefore, innovation in the field is limited to the rules of the power of capital and information, and the harder it gets to unbox or crack open any machine learning model and its training process. Also, the products and tools are not always free, open source or available for use in their full capacity, therefore public data is privatised, and monetised with a premise of an innovative, techno-solutionist future, with unequally distributed access to the systems and their development. Machine

[51] "Big Data." Gartner Glossary. https://www.gartner.com/en/information-technology/glossary/big-data accessed December 21, 2022.

learning processes in computer vision are suitable for processing unstructured data, where the computer learns to perform tasks by analysing examples of those tasks. With unstructured dataset processing, or with sloppy and large crowdsourced datasets —such as those for text-to-image models, object recognition and situation analysis which will be introduced in the following subchapters— there is a proximity of inaccurate, or biased output as a result of inaccurate and biased information in the dataset. *The common adage, "garbage in, garbage out,"* is highly applicable in *unstructured* datasets. That is also a way to identify human errors or bias in large datasets, as some of the examples will be introduced in the chapter *1.3. Making-Meaning: Aesthetics to Ethics*.

One of four algorithms of Ramon Llull, from *Ars generalis ultima,* 1305.

1.2.2. COMPUTER VISION

Computer vision is used to collect, analyse and recognise the elements of a digital image and its patterns. Through statistical algorithmic data processing, it can collect numerical and symbolic information about the visual content of the image. When such a computational procedure is reversed in the direction that, by seeing patterns that are repeated in the files it learns from, the computer can try to recreate a certain visual template of a certain concept or element in a digital image. The result visualises the way the computer sees. Models can be trained to recognise naming and finding specific objects, face recognition, and the like. The technique of computer vision implies computing procedures that are focused on visual content, that is, all digital documents that contain information about the value of pixels (pictures, videos, etc.). Computer vision is aimed at the classification and identification of objects, as well as motion analysis in the video materials, reconstruction of scenes, segmentation and restoration of images. A computer sees images in a very simple way. Each pixel on the network receives its numerical value, numerical information about the content of that pixel, which we, as observers, read with our eyes as its colour. Such matrices come in for further processing, and this enables the speed and efficiency of processing a large number of such data in a very short time.

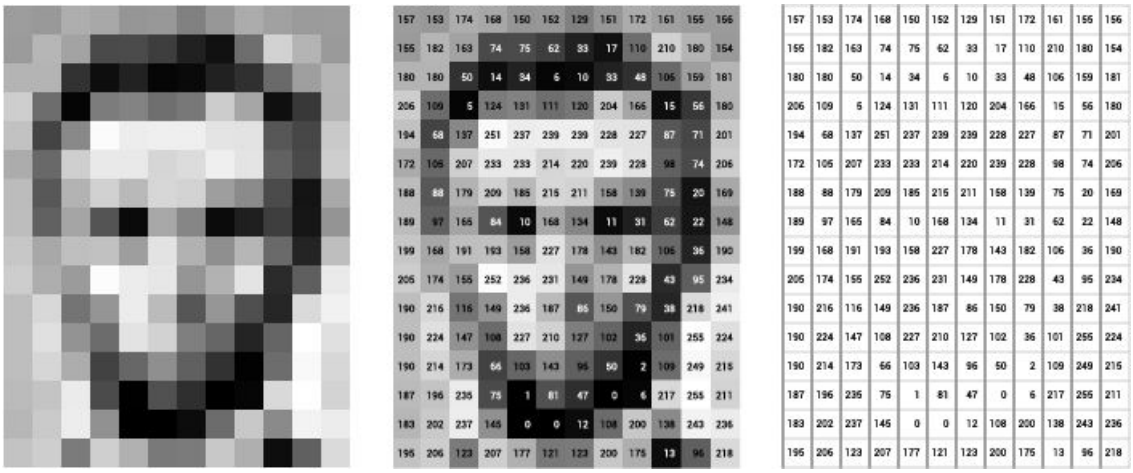

***Image 4*: *Pixel data diagram* from *Image Processing and Computer Vision*, ofBook Golan Levin[52]**

The way a computer *sees*, that is, *interprets* an image, is based on statistical data processing. The computer, in the process of machine learning, creates a statistical model from which it generates numbers and data, that are then transformed into image information. Computer vision, through statistical processing, tends to recognise repeating patterns in pixel values on digital files entered into the database (pattern recognition). The creation of computer vision *per se* was not dependent on the development of machine learning algorithms in contemporary computation or artificial neural networks. There are

[52] Golan Levin, *"Image Processing and Computer vision", ofBook,* ed. Brannon Dorsey. Retrieved from https://openframeworks.cc/ofBook/chapters/image_processing_computer_vision.html. accessed December 23, 2022.

older examples and approaches in the automation of vision, pattern, shape and object recognition as well. There are many technical and conceptual examples that precede contemporary computer vision techniques, such as perceptron[53], and pandemonium[54], based on connectionist[55] theories in psychology.

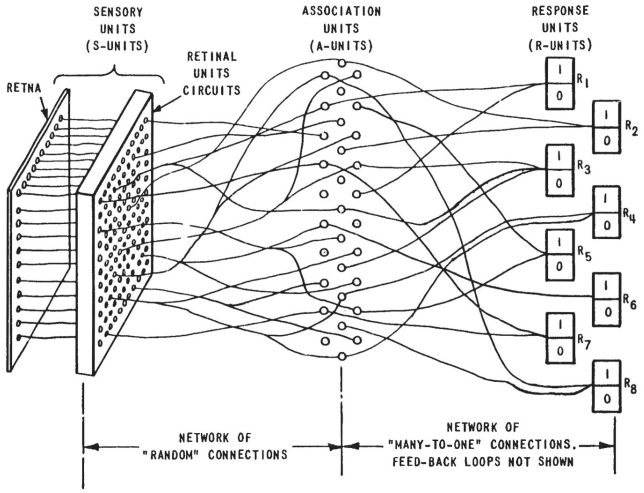

Image 5: Illustration from Frank Rosenblatt, Principles of Neurodynamics: Perceptrons and the Theory of Brain Mechanisms, (Cornell Aeronautical Laboratory, Buffalo NY, 1961).[56]

Perceptron was invented by psychologist Frank Rosenblatt in 1957, based on Donald O. Hebb's model for human neural networks, "*claiming that as brain cells subjected to certain types of stimuli respond simultaneously, they also increase their likelihood of firing together in the future when subjected to similar stimuli, forming self-organized assemblies of neurons. This principle, which Hebb called 'a form of connectionism' would come to be known as Hebbian learning, which considers human memory as a subsymbolic, distributed, self-reinforcing process rather than as a collection of coded representations stored in the brain."*[57] Perceptron was the first machine learning algorithm that could perceive or determine whether a handwritten character is an X or O, or rather a square or

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[53] *Perceptron*, Frank Rosenblatt, 1957., Retrevied from "Rosenblatt's perceptron, the first modern neural network." Jean-Christophe B. Loiseau. *Toeards Data Science. Medium* (March 11, 2019) https://towardsdatascience.com/rosenblatts-perceptron-the-very-first-neural-network-37a3ec09038a. accessed December 07, 2022.

[54] *Pandemonium*, Oliver Selfridge, 1959. https://en.wikipedia.org/wiki/Pandemonium_architecture#cite_note-13. accessed December 07, 2022.

[55] *Connectionism* presents a cognitive theory based on simultaneously occurring, distributed signal activity via connections that can be represented numerically, where learning occurs by modifying connection strengths based on experience, yet it is not biologically or neuroscientifically plausible. On the other hand, the concept and structure of ANNs is inspired by biological neurons and human brain activities.

[56] Retrieved from Matteo Pasquinelli, "Three Thousand Years of Algorithmic Rituals: The Emergence of AI from the Computation of Space." (2019.)

[57] Sofian Audry, *Art in the Age of Machine Learning*. (Cambridge, Massachusetts: The MIT Press, 2019.), 85.

a triangle, by mapping a set of binary data known as input neurons to an output neuron using a layer of parametric values called weights corresponding to the synaptic connections between the inputs and outputs.[58] The missing principle was the non-linear process of hidden neuron layers, which will later be proposed by Marvin Minsky and Seymour Papert. *Pandemonium theory* is a theory in cognitive science which describes the process of object recognition as a hierarchical bottom-up system of pattern detection by a metaphorical set of 'demons' sending a signal to each other - where the 'feature detectors' are working in parallel, perceiving patterns in parts before the 'whole'. This architecture influenced the development of modern connectionist, artificial intelligence and word recognition models. The cluster of ideas combining logic, statistic but also cybernetic self-organisation, if not self-regulation, all incorporated into a computational apparatus have been another reference to the build-up of later theories about machine learning and neural computation.[59]

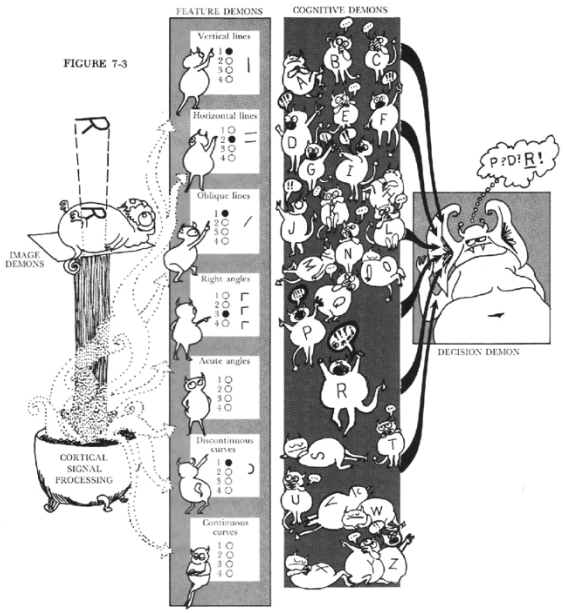

Image 6: **Selfridge's (1959) computational** ***Pandemonium Model, as depicted by Lindsay and Norman (1972) (illustration: Leanne Hinton). Collectively, the demons recognise the letter 'R'. Note that the feature space in Wolford's (1975) Feature Perturbation Model was taken from Lindsay and Norman; there were seven types of features including vertical lines, acute angles, and continuous curves.***[60]

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[58] "*This turn introduced a second spatial dimension into a paradigm of computation that until then had only a linear dimension (see the Turing machine that reads and writes 0 and 1 along a linear memory tape). This topological turn, which is the core of what people perceive today as "AI," can be described more modestly as the passage from a paradigm of passive information to one of active information. Rather than having a visual matrix processed by a top-down algorithm (like any image edited by a graphics software program today), in the Perceptron the pixels of the visual matrix are computed in a bottom-up fashion according to their spatial disposition."* Pasquinelli, "Three Thousand Years of Algorithmic Rituals: The Emergence of AI from the Computation of Space." (2019.)

[59] Audry, *Art in the Age of Machine Learning*, 85.

[60] Retrieved from Hans Strasburger, *Dancing letters and ticks that buzz around aimlessly: on the origin of crowding. Perception.* (2014) 43. 963-76. , *https://www.researchgate.net/publication/268881026_Dancing_letters%27and_ticks_that_buzz_around_aimlessly_on_the_origin_of_crowding*. accessed December 05, 2022.

1.2.3. NEURAL NETWORKS

Deep learning as a concept originated in the late 1940s with the theory and the science of *cybernetics*, and further expanded in the 1980s with *connectionism*, an approach in cognitive science and AI that rests on using simplified mathematical models of neural networks found in the human brain.[61] Cybernetics has left a significant trace on the development of these technologies, with experiments in mechanical simulations of the cognitive functions of the human brain. The process of deep learning is a subtype of machine learning that uses artificial neural networks (ANNs) for data processing. ANNs represent one of the most important techniques of machine learning and artificial intelligence. Deep learning models analyse unclassified data, i.e. data that has not been previously marked by any source and requires to be defined. Through analysis of the layers of the network, the computer tries to classify and recognise repeating patterns. The creation of these techniques is to some extent inspired by biological neural networks, with a tendency to imitate the brain's nervous system and its perceptive and learning abilities. ANNs are only partly inspired by biological processes and do not mimic brain processes - in reality, artificial and biological neural networks have little in common. Each comparison arises from a behaviourist approach to the interpretation of human intelligence and perception. Networks consist of input and output layers, as well as a hidden layer. The hidden layer tries to transform the input information in a way that the output layer could use it. Neurons are pieces of data based on simple ‘yes/no’ classifications. What makes these networks complex is the large number of such neurons they contain. Unclassified data enters the first, *input layer*, where it is broken into pieces of information that go to neurons.[62] The data, broken down in this way, is ready for further processing in the hidden (invisible) layer, which performs the largest number of mathematical operations and consists of a large number of internal levels of operations. It is a latent space that compresses and organises the data in the training set, in which the patterns are searched for and recognised. The output layer displays the result, the final information, that is, the command.[63] They serve to find large amounts of complex forms, which would require much more time when processed by a human. When developing neural networks, the aim is to ensure that their training process is carried out in the shortest possible time with a reasonable consumption of computer power to solve the most complex tasks. What is happening in the hidden layer is a task sometimes impossible to reverse-engineer, due to the amount and permutations of calculations in each node. It is likely that the more the system is accurate and functional, it is harder to map out the calculation processes within the neurons-nodes.

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[61] Audry, *Art in the Age of Machine Learning*, 3.

[62] J.D. Kelleher, B. Tierney. *Data Science.* (Cambridge, Massachusets: The MIT Press, 2018.), 15.

[63] Ethem Alpaydin, *Machine Learning: The New AI.* (Cambridge, Massachusets: The MIT Press, 2018.), 87.

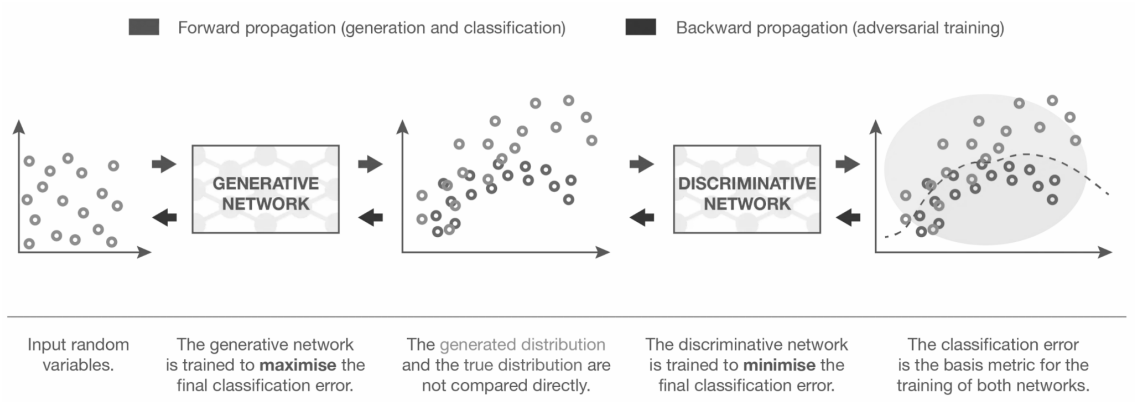

Image 7: A graph that represents the method of data processing within the GAN model[64]

Generative Adversarial Neural (GAN) Networks represent another variation of the algorithmic processes in the field of machine learning. They work by the principle that one network called the *generator* creates images based on a given database and tries to deceive another network - the *discriminator*, which needs to recognise whether the image is real or fake determined by the image information given to it inside the database. When making such an interpretation we shall not aim to anthropomorphise the context of imagery - layers of this process are in computation - calculation and data processing on the scope of a large number of nodes and layers, regardless of the content and therefore only by intention applied to the image processing as we perceive it. This approach did create a unique aesthetics, that inspired many to experiment and appropriate these systems for such image-making processes. Yet, they do have their limitations which also create the visual identity, eventually making the aesthetics quite uniform. In the third and the sixth chapter, there will be a further exploration of the visual output, inspiration and reception, and the exploitation of these systems, not only as a tool but also as a medium for expression. In the words of Sofian Audry, we shall bear in mind that: *"In this moment, the art world appears to be eagerly embracing art made with neural networks, as artists seem to illustrate the promises and perils of these technologies in our everyday lives. The history of artificial neural networks is uneven, exhibiting periods of excitement followed by disappointment, abandonment and rebirth."*[65] In this rebirth, Audry implies that: *"We are moving into a new era, in which pervasive, seemingly organic algorithms feeding on statistics are replacing rule-based systems, adaptively coupling to humanity in all-encompassing, distributed processes of control and optimisation. To understand this new age we need to extricate ourselves from an outdated vision of computational systems as formal, rule-based, logical constructs and start seeing them for the biologically inspired, statistically driven, agent-based, networked entities they have become."*[66]

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64 *64* Retreived from "Understanding Generative Adversarial Networks", Joseph Rocca. *Towards Data Science*, 2019. accessed December 01, 2022. https://towardsdatascience.com/understanding-generative-adversarial-networks-gans-cd6e4651a29.

65 Audry, *Art in the Age of Machine Learning*, 85.

66 *ibid.*, 8.

Machine learning-powered art that is using deep neural networks came to a breakthrough in 2015 when *DeepDream* software was released. It was created by Aleksander Mordvintsev, a Google engineer, and it was trained on millions of images, with the task to reinforce and produce iterations on a previously provided image, causing a psychedelic hallucinatory effect in patterns emerging over the original image. The authors called it a form of *'inceptionism'*. The appearing patterns enhance and form images within the image, —often eyes, heads of cats and dogs, or anything else that was previously saturating the given database. The image progressions in which, as exemplified heads of dogs or cats emerge are a *machinic dream* of *corporate animism*[67]. As Audry describes it: "*DeepDream is a truly innovative and creative hijack of a machine learning process and has attracted a lot of attention within artistic communities as well as in public media. But can DeepDream be considered art, or is it just a form of viral marketing? Perhaps as a victim of its own success, DeepDream remains in a grey zone: it is often promoted as a tool for creative expression and even as a new form of art, but it is impossible to separate it from the research, interest and strategic agenda of the multinational company where it was born. Indeed, insofar as artistic work produced using DeepDream algorithms is easily recognisable as such, any artistic work created through the use of these algorithms immediately perpetuates and refers to its originators, hence inevitably contributing to Google's social media campaign."*[68]

Before re-addressing this question there is another leap in aesthetic limitations of image-making processes assigned to artificial neural network models - one of our perception and the meaning behind the image; and the other on open-source exploitation of models, that due to their limitations produce a style, rather than art. This thought comes as relevant in the understanding of the most succeeding tools and image-making products including the one that will be introduced in the following subchapter, the *Stable Diffusion model*. The creator becomes rather the user of a tool, and a consumer of the result, than the author of the work itself. The totality of a system and its own affordances in image production is reaching its utmost and expanding representational capabilities, yet the control over aesthetics or choice over form is as limited as the tool becomes rather a translator between the index and the object than it is an interactive human-computer interface tool. Indeed, there are always ways to expand, contextualise and elaborate any use of these tools, but first comes the importance of understanding the background [data and goals] and syntax of such tools and models behind them.

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[67] *"But inceptionism is not just a digital hallucination. It is a document of an era that trains its smartphones to identify kittens, thus hardwiring truly terrifying jargons of cutesy into its means of prosumption. It demonstrates a version of corporate animism in which commodities are not only fetishes but dreamed-up, franchised chimeras."* Hito Steyrl, "A Sea of Data: Pattern Recognition and Corporate Animism", ed. Clemens Apprich, *Pattern Discrimination, 10.*

[68] Audry, *The Art in the Age of Machine Learning*, 100.

1.2.4. STABLE DIFFUSION

After the *deep learning* models and *ANN* algorithms of *Deep Dream* and *GANs*, another type of model has recently emerged and overtaken the image-making scene, based on text-to-image prompts[69] - *the stable diffusion model*. They are originating from language *Transformer* models, which are models that have dimensions, e.g. properties or relationships assigned to words from which the models predict the probability of association between the words, which includes not only syntax but context. For example, a 'man' is to 'king' as 'woman' is to 'queen', or the likeliness of a person 'wearing a scarf' than an elephant 'wearing a shoehorn'. The visual transformer models, which were at first used with *GANs*, were implemented into the *stable diffusion model*. The *stable diffusion model* consists of a forward process (or diffusion process), in which an image is progressively noised, and a reverse diffusion process, in which noise is transformed back into a sample from the target distribution.[70] In such a process, the model is distinguishing the desired signal by peeling the noise away. These models provide photorealistic hi-res imagery that is able to reconstruct objects and elements within an image composition in high detail and improved fidelity. Some of the examples that are currently having their peak of recognition are *DALL-E 2* by *OpenAI, Stable Diffusion* by *Stability AI*, and *Midjourney*. The *Stable Diffusion* model is an open-source model that is created upon an opaque database acquired with no authorship claims, with a loophole where a free-to-use model is allowed to acquire uncredited artworks and other images. The second version of the model uses a public database *LAION-5b*[71] therefore seemingly closing down the initial loopholes of unregulated processes included in making and using these models.[72] It is in itself a highly developed data graph that appears to be synthetic photographic imagery - where the database is a pre-organised world of information and knowledge clusters (with billions of parameters put into relations and context within the syntax). That opens another hole for reverse-engineering and decoding the imagination prompted by the database as the mirror of our collective un/conscious, reflecting on ethics through its aesthetics, which will be explored further through my own projects. More on this method and models will be introduced in the fourth chapter through the description of methods of its implementation into the project *PROMPT: WAR STORIES*.

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[69] Recently the text prompt-based image-making processes have been referred to as 'synthography' https://syntheticengineers.com/2022/10/26/what-is-synthography-an-interview-with-mark-milstein/

[70] *"The first Diffusion model was actually described as long ago as 2015, but the paper was almost completely ignored. They were re-discovered in 2020.",* "Introduction to Diffusion Models for Machine Learning." Ryan O'Connor. *Assembly AI* (May 12, 2022). accessed December 23, 2022. https://www.assemblyai.com/blog/diffusion-models-for-machine-learning-introduction/.

[71] *LAION-5b* database, https://laion.ai/blog/laion-5b/, *"is an academic research database funded by StabilityAI and used to train its Stable Diffusion model, consists of 5.85 billion image-text pairs. … A recent survey of a subset of the latter collection found that a large portion of the images are scraped from Pinterest (8.5%) and WordPress-hosted websites (6.8%), while the rest originates from varied locations including artists-oriented platforms like DeviantArt, Flickr, Tumblr, as well as art shopping sites, including Fine Art America (5.8%), Shopify, Squarespace, and Etsy.", "AI Art is Soft Propaganda for the Global North."* Marco Donnarumma.

[72] "Stable Diffusion 2 is not what users expected of wanted." Alberto Romero. *Towards Data Science. (November 29, 2022) towardsdatascience.com. accessed December 23, 2022.* https://towardsdatascience.com/stable-diffusion-2-is-not-what-users-expected-or-wanted-abfd39524dff.

When using art forms and artistic approaches for investigating these systems, at the same time we enter a field of co-creation, a shared agency in production, that, on one hand, does not necessarily make *better* art, but might make systems better while doing so for ourselves too. On the scope of non-teleological – as art is – the field for exploration of the tools that are rather designed to reach an optimal goal and therefore very teleological and goal-oriented, we position them into a state of non-agency in which they do not have the power of coordinating or organising the techno-ecosystem around us, where we can examine their actual character and abilities. An artistic approach can also challenge and claim the ownership of the 'intelligence behind these systems' - since many tools are open-sourced that does not necessarily mean they are also accessible and transparent in ownership and usage of the databases, the training processes, and neither the models. Yet, the process of experimentation, in conceptualising and curating databases, tweaking models and evaluation functions leaves space for creative expression that can unbox and provide a better understanding of the capacities and traits of many of these systems and tools. We should resist the utility or the blind faith towards a novel product/system, especially in the times of open-source culture, where decentralisation should lead to democratisation or at least, to education and social awareness of coexistence, possible only by the means of appropriation of these tools. Through the mentioned tools for operating digital archives towards creative expression and automation, both approaches create a two-way effect in the understanding of image generating and image classification. Both of these approaches can lead us to a better understanding of the ontology and teleology of a digital image as it is today. Following the stages of the *Hype Cycle*[73], down the '*trough of disillusionment'* the goal is to open up thoughts on a possible understanding of the ideology and ethics of automation through visual art and its aesthetics, created by the exact same tools.

Image 8: Drawing of a model of the curve on Gartner's Hype Cycle, **Kristina Tica, 2021.**

[73] "The Hype Cycle is a graphical depiction of a common pattern that arises with each new technology or other innovation. Although many of Gartner's Hype Cycles focus on specific technologies or innovations, the same pattern of hype and disillusionment applies to higher-level concepts such as IT methodologies and management disciplines. In this document, we refer to the individual elements mapped on the Hype Cycles as "innovation profiles." But in many cases, the Hype Cycles also position higher-level trends and ideas, such as strategies, standards, management concepts, competencies and capabilities."Common stages on the curve are (1) Technology trigger → Peak of inflated expectations; (2) Trough of disillusionment; (3) Slope of enlightenment; (4) Plateau of productivity., "Understanding Gartner's Hype Cycles." gartner.com. (August 18, 2018). accessed November 29, 2022. https://www.gartner.com/en/documents/3887767/understanding-gartner-s-hype-cycles.

1.3. MAKING-MEANING: AESTHETICS TO ETHICS

From now on, superstition will be in images that will grow over us.
This is how science and technology will change.
They will be subordinate to the computation of images.

Vilém Flusser - *Into the Universe of Technical Images*

Computer-generated imagery nowadays possesses layers of information, big data and the entropy of context and syntax, that does become a reflection of a living system, this time even more intertwined with the representational simulacrum of the collective unconscious —much more than the ecosystem of cybernetics would predict— extracted by big data companies, clashing from micro —as all personal user input, to the *cloud*— as a macro-structure, from which another form of *computational living* is emerging as a form of consumption and aesthetics inclining towards photorealism as an aim to claim creativity or aesthetica proficiency within the complexity of the systems of their production. This has social and political consequences that will be addressed in the next chapter. The aesthetics of a computed image in this research is treated as an experience that can emphasise the means of knowing, which is an approach that refers to the idea of Alexander Baumgarten, an eighteenth-century German philosopher. Along with the means of knowing, it can also emphasise the imposed question of intelligence, juxtaposed with experience, knowledge, or sense. Also in relation to Jacques Rancière's approach, we are going past the level of contemplation on art, or its beauty, towards focusing on the regime of experience. "*Aesthetic experience, incapable of realising its radical potential, can only gesture towards it, and must constantly strive to evade determination (or delegate it to the viewer). In the ensuing crisis, contemporary art vigilantly exposes its own compromises with the aesthetic, in an ongoing admission of failure and culpability.*[74]" The regime of experience is translatable to shifts in politics and ethics as in parallel to shifts in paradigm in image-making. Such interconnectivity is needed so to draw a line between the human–computer concepts and purposes of intelligence, utility and creativity, within a common ground of disambiguation through visual sensorium and language, which hereby is referred to as a key, or, ground point of interpretation of understanding the obfuscated invisible processes that are behind the given outputs, in the layers behind. We are not searching for the ultimate concept of beauty or morale, we are analysing the aesthetics in optimisation, and automation of image-making, before it becomes treated as the ultimate means of creation, which is an idea that becomes rather political and ideological.

The aesthetics of a computed image is dependent on the tools that are used for such image-making processes. Some of them will be introduced in this chapter, with an intention to enhance the didactic element of reading the image, or its value through the representational layer, so as to understand not the virtue of the output, but the ontology, or

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[74] Mackay, Robin, et al., editors. *Speculative Aesthetics*. Falmouth, UK: Urbanomic, 2014., 3.

the essence of the process itself. For that reason, the output is the key element that should be read as a multitude, and not necessarily analysed as one object/artefact that holds aesthetic value on its own - it is a key that leads to the problematisation of speculations on automated creativity and the consequences of the politics of the generative image as a result of the independent or artificial agency. As the aesthetic experience can impact or shape our ways of thinking - it can be emancipatory, and that is the trait that will be enhanced in this research. If the aesthetics are an optimised, iterated cluster of recycled data, to what extent do they fulfil the need for artistic expression in us, humans, and to what extent do we accept being fed with content in quantities over quality? **"***It is the technological augmentation of the human sensorium, indissociable from the transformation of social forms and the mutation of subjectivism that okays the greatest demands upon a thinking of aesthetics today. The contemporary structure of representation is the product of an interlocking series of augmented conceptual and sensory frameworks that make the boundaries of our perception transitional and provisional rather than fixed and impermeable. There are manyfold new mediations between the human sensorium, the massive planetary media network within which it exists, and the wider universe of which both are minor tributaries.* [...] *They draw on the advanced resources, of scientific and technological abstraction (statistical analysis, mathematical modelling, neuropsychology, big data, etc.); but they are deployed largely in fortifying the comfort (and profitability) of what, following Wilfrid Sellars, we can call the 'manifest image', the inherited, traditional human self-conception. Take for example the aesthetic regime of social media and the response patterns and behaviours it programs at the symbolic-processing and sensor-motor level across whole populations. Aesthetics meets with the sociopolitical in real abstraction, when capital is the precondition for all production and experience at the level of material processes mediated by equally material images. These are abstractions that 'are not in the head but in everyday life'."*[75]

It is doubtful whether these aesthetic means of production can be voluntarily redeployed in order that we might interface with this complex system otherwise than as its passive client-producers. These premises inspire the question - in what way do we change our ways of seeing and communicating in accordance with the semiotics of a generative digital image? A possible answer to that might be to (1) deconstruct the process of image-making; (2) understand the clash of ethics, content and context, and uniforming of thought; and (3) the collision of the first two, understanding the meaning and affordances in the reshaping processes of our aesthetic values.

[75] *ibid.,* 5.

1.3.1. IMAGE-MAKING: AESTHETICS

After the *art in the age of technical*[76] *reproduction*, we have reached the point where the image is not just something that can be reproduced as a digital image file, but to have a machine that can create a completely new image from the very beginning. Through the process of computation, numerous data can merge into statistical calculation and be translated into the language of the computer code. The output is a digital image created from a collection of information and data. When saying —*'from the very beginning'*— it should be noted that the process of computation does depend on (1) preparation and curation of a database as a background model, (2) further individual choices in parameter setup, *fine-tuning*, and (3) output results, curation, repetition. In this digital, projective world, using machine learning, images can be created based on previously given patterns. In the statistical processing of numerical data on a grid of pixels, the computer tries to create an image that contains something learned from each of the thousands of examples it learns from. The final results, the generated images, are visual representations of the idea, and the representation - the image, was created based on the statistical processing of data as image input. The significance of a database is dominantly in its quantity —the more the merrier— and that comes as a trap for *GAN-based* art, being dictated by a limited number of arbitrary motifs that repeatedly take place in the world of objects as common internet phenomena, such as cat, person, dog, flower, nature, sky, sea, sunset… Banal and meaningless visual interpretations of universally widespread motifs from - in the best case - creative commons stock photo graveyards, which become an instance for philosophical thoughts and inspiration. In the setup of automated processes, there are layers that are still very human, very dependent, and very unreliable. Therefore, automation of processes is just one of the tools in the spectrum of production. However, these processes of image-making sometimes happen to be considered as 'the process of machine *learning* to *see*'. Attributing that one to machine/computer *vision* is falling back to the anthropomorphisation of algorithmic processes lying beneath the machine - so let's allow ourselves some anthropocentrism - *we* are learning to see, again, so as to understand the invisible processes.

As being surrounded by systems that claim an invisible structure, the possible ways to grasp a broader picture of their functions and purpose are through differentiation of what *we* see and what the machine *sees*. At its core, we teach the machine how to see, but the problem is what we *want* to teach the machine to see, and what is being left out. This is a two-way communication, as Vilém Flusser wrote: "*This feedback enables the images to change, to become better and better, and more like the receivers want them to be; that is, the images become more and more like the receivers want them to be so that the receivers can become more and more like the images want them to be. That is the interaction between image and person, in brief. The longer this mutual feeding continues, the stronger*

[76] Here I refer to Walter Benjamin's *Art in the Age of Mechanical Reproduction* (1939) and Vilém Flusser's *The Universe of Technical Images* (1983)

and more stable the consensus between image and people will become."[77] If we are training machines to 'see', what are we training ourselves to see? This is a continuous loop in which it is our role to recognise patterns of our relation to the computed digital image, so as to make it reciprocally efficient. To explain the similarities between artistic approaches in this field we will begin with several examples.

SOME ARTS ARE BETTER THAN OTHERS

The meaning of the created computed images is mainly established by viewers, or authors because the ability to contextualise, create and recreate meaning is still in the exclusive domain of human cognition. The way in which such results are interpreted is still divided in terms of artistic evaluation and affirmation, and most often market value - which will be taken only as a brief example in this writing: The art journal *Hyperallergic* presented research from Rutgers University by scientists[78] who designed a deep learning system that they called *creative adversarial networks* (CAN) that was trained on reproductions of paintings from Fauvism to Abstract Expressionism. Generated imagery served in an experiment which showed that subjects, given a choice of images generated by neural networks and reproductions of abstract expressionism and the works shown at *Art Basel*[79] that year, the largest number of the audience recognised the works of artificial intelligence as real, and the works from Art Basel as artificial.[80] Although computer-generated works are also created on the basis of a database that contains 81,449 reproductions of original artwork examples from art history, scaling the level of 'novelty' in style, so as to appear aligned with the given style, yet bringing a difference in the aesthetics due to the method of making and the variables in the database – the article presents an argument problematising the formalism of contemporary art, as well as criticism of the art market. Yet the plethora of repetitive look-alike art products that fit the safety net of the art market turning into *zombie formalism*[81], is only a predecessor to another scope of entropic overproduction of forma[listica]lly same generative content. This might help us to investigate our compromisingly standardised perception of value and recognition, originality and repetition of an adequate safe space of surface/interface, where seemingly we begin to like images that we already can recognise, compare or attach to something we have seen before. Is it atrophy of knowledge, or the safety of generating capital on the

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[77] Vilém Flusser, *Into the Universe of Technical Images,* (Minneapolis: The University of Minnesota Press, 2011), 54.

[78] Ahmed Elgammal, Bingchen Liu, Mohamed Elhoseiny and Marian Mazzone, Rutgers University's Art and Artificial Intelligence Laboratory, 2016.

[79] A world-wide famous annual contemporary fine art fair, happening in Basel, Hong Kong, and Miami

[80] "Humans Prefer Computer-Generated Paintings to Those at Art Basel", Claire Voon, *Hyperallergic,* (2017.), accessed January 26, 2020. https://hyperallergic.com/391059/humans-prefer-computer-generated-paintings-to-those-at-art-basel/.

[81] *"Zombie Formalism" is a term coined by Walter Robinson to interpret and criticise a revival of abstraction in art, a repetitive, reductive, essentialist method of making a painting, fetishising the process while replication, and therefore, diluting originality in any scope of reference to the abstract art of 1950s or 1960s, in order to manufacture a simulacrum of originality suitable for the art market, vague in commentary and easily translatable into digital forms, generating immense amounts of look-alike art. https://hyperallergic.com/169198/who-has-the-cure-for-zombie-formalism/*

market? In the words of Jerry Saltz: *"There are no complex structural presences to assimilate, few surprises, and no unique visual iconographies or incongruities to come to terms with. It's frictionless, made for trade. Art as bitcoin."*[82] On recycling the past, and the need for dis-innovation, another example can be a key to understanding the banality of context or authorship that slithers within the technological experimentations in image production.

AS OBVIOUS AS IT GETS

The viral breakthrough and global interest in the technical novelties in image-making occurred through a troublesome act of appropriation, which might teach us a few lessons on how [not] to treat generative imagery within the full scope of its production and contextualisation. In 2018, *Christie's* auction house sold the *first-ever* 'AI-generated portrait' for an *astonishing* price of $432,500.00[83] making headlines and a breakthrough in a rat-race for the *new*. Such a leap into the novel leads to some controversies, the most important ones [that are misinterpretation and mistreatment of value, still enclosed for more professional critics, and the less important ones for the public to determine whether they are generally critical towards the aesthetic being provided by the AI. The *'Portrait of Edmond de Belamy'* was signed by *The Obvious*, a Paris-based art collective of three then-at-a-time students, who enthusiastically experimented with *DCGAN* algorithms, producing a classical art-looking composition of a smudged portrait of a person that seems to be a seventeenth-century male aristocrat. Before going into detail on how it was made, in its visual content, a blurry simulation of a historically context-less portrait of none in the flat representation of an oil painting effect does not leave us in awe but in the disappointment of the lack of meaning of the image itself.

Gimmicky and enigmatic, in a golden carved frame, as it would wrap it into clothes of a classicist luxurious artefact, it is a great example of thoughtlessness wrapped up in techno-romanticist lightness of being, flashy ignorance and cheap glamour. Maybe it was because it showed how superficially eager the adoration of the 'new' in the market is, and how the value is dictated by the market itself - regardless of the value of the artwork. Leaving out the context, the process of production of the tools, and lack of thought, this experiment was just placed at the right time to draw attention. As it is the best-worst example of the issues that come up within such image-making processes in art and the art market, it also overshadows any reasonable discussion that would introduce the general audience to the value and importance of these technological achievements, it is misleading. Its relevance should still be addressed today, as the very important lessons

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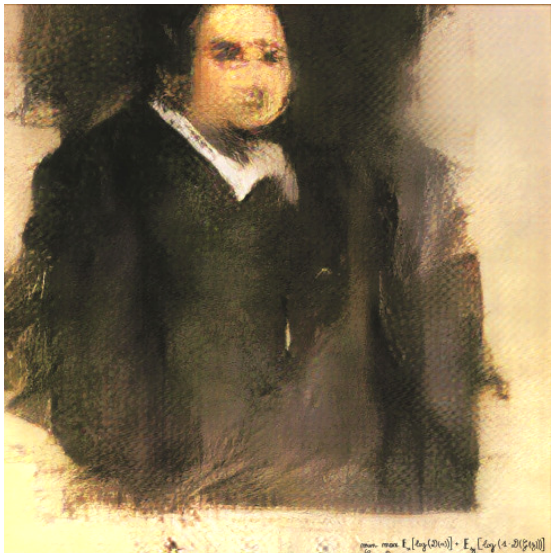
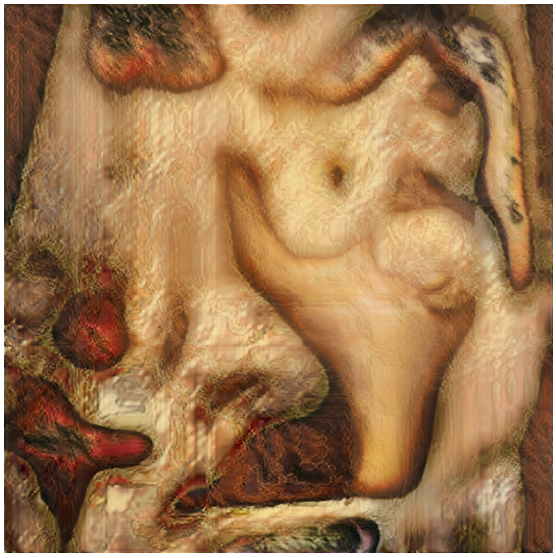
[82] "Why new abstract paintings look the same." Jerry Saltz. New York Magazine (June 16, 2014.) https://www.vulture.com/2014/06/why-new-abstract-paintings-look-the-same.html. accessed November 15, 2022.

[83] The media portraiture highlighted the unexpected value of the work that was made through the bid. The final price was $432,500 However, such image production among other digital image products, renders and so, soon after, in recent years made an enormous monetary breakthrough through NFTs (that will not be discussed in this research).

were neglected. This is an excellent example of all the elements we should pay attention to when thinking about an artwork production with these tools, whether as a digital or physical artefact. It is a counter-example when understanding an approach and problems in the treatment of the image-making process - from the database, code, curation, and automated creativity, to authorship and value.





[Left] ***Image 9: Portrait of Edmond de Belamy,*** **Obvious Collective, using DCGAN model by Robbie Barrat, 2018**[84]
[Right] ***Image 10:*** **Robbie Barrat,** ***Nudes series,*** **2018**[85]

The basis for this artwork was made through a code[86] created by Robbie Barrat in 2018, who previously trained the DCGAN network, and made a model on databases of portraits made between the fourteenth and twentieth centuries, which he used to generate his own experiments and artworks. He also released his original code and training model as an open-source GitHub repository. *The Obvious* collective was experimenting with this same code, asking the author for permission to use components of his code, yet never acknowledging the authorship when commercialising their results, which were generated through the exact same code, according to the article in The Verge,[87] from 2018. It is not problematic to experiment with a sample database, however, it is a relatable example of deprivation of authorship but also of historical context - as we could also perceive the obsoleteness of the politics of the momentum where the image and ideology were relatable to the context of a presence through a portrait, as an icon and a symbol of an

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[84] Ziv Epstein, Sydney Levine, David G. Rand, Iyad Rahwan. "Who Gets Credit for AI-Generated Art?." iScience, Volume 23, Issue 9, 2020, https://doi.org/10.1016/j.isci.2020.101515. accessed December 18, 2022. https://www.sciencedirect.com/science/article/pii/S2589004220307070.

[85] Robbie Barrat, website. https://robbiebarrat.github.io/oldwork.html. accessed December 18, 2022..

[86] The code is available on Robie Barrat's GitHub repository: https://github.com/robbiebarrat/art-DCGAN.

[87] "How three French students used borrowed code to put the first AI portrait in Christie's", James Vincent, theverge.com (October 23, 2018.) accessed December 20, 2022. https://www.theverge.com/2018/10/23/18013190/ai-art-portrait-auction-christies-belamy-obvious-robbie-barrat-gans.

institution, presence, or any other kind of influence or anamnesis. We are not far from that nowadays. As it has not been treated as ready-made in its context, the instability of the concept does spread further concerns in aesthetics, ethics, and politics of it. Such a recycling approach mashes up every other context, content or authorship for the sake of liminal representational trigger - portrait. Yet, as *obvious* as it gets, the content is subordinate to the dominant portraiture - a white male aristocrat as a representational element. A face-to-face, intuitively sympathetic choice, is also directed by the excessive availability or even oversaturation, overfitting of a motif per se.

A database's quantity or availability often dictates the narrative of the output that has been treated as an artwork. The problem is, how distinctive is that final output in relation to the database itself, or the tool that has been used? The *Portrait of Edmond de Belamy,* an imaginary-generated portrait of a person, is just one of many outputs that emerged, but the one that was put in a golden frame, *named and tamed*. The banality of content against the predictive value, neglecting the process, procedure or the clear intent within the spectrum of production — for the sake of pricing a novelty disregarding any valuable context that could credit or address the origins and systems that lie beneath the result-printout— even besides the weak context and ignoring the technological achievement and authorship while assigning the work to the concept of *AI*. As it *is obvious* now, many interpretational problems emerged and marke[te]d their claim to a right for value and meaning.

Artists have found in these biologically inspired, technological models of representation in artificial neural networks useful ways to explore questions pertaining to cognition, imagination, memory, and dreaming.[88]

Exploration of such questions seems to be very associative when immersing into the affordances of such new tools that enable a new form of seeing - the results of these processes have often been encountered in a very metaphorical and abstract way. From the *uncanniness* (Mario Klingeman, *Uncanny Mirror*, 2018), *imagination* (Mike Tyka, *Portraits of Imaginary People*[89], 2017), *dream* (Mike Tyka, *DeepDream,*[90]2016-; Anna Riddler, *Let me Dream Again*[91]*,* 2019-20), *hallucination* (Trevor Paglen, *Adversarially Evolved Hallucination*[92], 2017), *meditation* (Memo Akten, *Deep Meditations*, 2018), *memories* (Mario Klingemann, *Memories of Passersby I* [93], 2018). As metaphor is a language of common understanding on the premise of the agreement upon arbitrary cultural codes, such wording in the naming of works considers such psychological phenomena as the deep, yet unexplainable and therefore abstract cluster of interpretation, now applied to the question of how the machine *sees*. As I intend to follow up, this research does introduce the methods of machinic or computer vision, but with an aim to investigate what we see, once we try to understand the computer visual output. To demystify the process, here I introduce one of the mentioned examples, with its description. Among the artworks that took place for a statement in the art world understanding these technologies are Memo Akten's *Learning to See* and *Deep Meditations.* Artworks that have been evolving since 2017 and presented in various different setups, or concept variations, come as an interesting example, within an approach towards understanding neural networks. Quoted below is the artist's full official statement about this artwork:

"Deep Meditations: A brief history of almost everything in 60 minutes is a large-scale video and sound installation; a multi-channel, one hour abstract film; a monument that celebrates life, nature, the universe and our subjective experience of it. The work invites us on a spiritual journey through slow, meditative, continuously evolving images and sounds, told through the imagination of a deep artificial neural network. / we are invited to acknowledge and appreciate the role we play as humans as part of a complex ecosystem

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[88] Audry, *Art in the Age of Machine Learning*, 84.

[89] "Mike Tyka." Marnie Benney. *AI Artists Blog.* Retrieved from https://aiartists.org/mike-tyka / https://miketyka.com/?s=faces. accessed December 07, 2022.

[90] "DeepDream." Mike Tyka. online portfolio. (2016) https://miketyka.com/?s=deepdream. accessed December 07, 2022.

[91] "Let me Dream Again." Anna Riddler. *Arts Experiments With Google. (2019)* https://artsexperiments.withgoogle.com/let-me-dream-again/. accessed December 07, 2022.

[92] "Trevor Paglen: A study of invisible images." Selected Works. *MetroPictures*. (2017) https://www.metropictures.com/exhibitions/trevor-paglen4/selected-works?view=slider#9 accessed December 07, 2022.

[93] "Mario Klingemann." Marnie Benney. *AI Artists Blog.* (2018) https://aiartists.org/mario-klingemann. accessed December 07, 2022.

heavily dependent on the balanced co-existence of many components. The work embraces and celebrates the interconnectedness of all human, non-human, living and non living things across many scales of time and space – from microbes to galaxies. / What does love look like? What does faith look like? Or ritual? worship? What does God look like? Could we teach a machine about these very abstract, subjectively human concepts? As they have no clearly defined, objective visual representations, an artificial neural network is instead trained on our subjective experiences of them, specifically, on what the 'keepers of our collective consciousness' thinks they look like, archived by our new overseers in the cloud. Hundreds of thousands of images were scraped (i.e. autonomously downloaded by a script) from the photo sharing website flickr, tagged with these words (and many more) to train the neural network. The images seen in the final work are not the images downloaded, but are generated from scratch from the fragments of memories in the depths of the neural network. Sound is generated by another artificial neural network trained on hours of religious and spiritual chants, prayers and rituals from around the world, scraped from YouTube. / The abstract narrative of the film takes us through the birth of the cosmos, formation of the planets and earth, rocks, and seas, the spark of life, evolution, diversity, geological changes, formation of ecosystems, the birth of humanity, civilization, settlements, culture, history, war, art, ritual, worship, religion, science, technology."*

It is arguable that this description invites the spectator to get inspired, immerse, and reflect on their own understanding of abstract concepts revolving around our unconscious existence. The artist's interplay between training the algorithm to grasp these concepts, and merging them into a collective dream while keeping the mystical tone when introducing the upcoming spectacle, is a curious and ambiguous one. A question that emerged to me was - *to what extent a spectacle is needed in the discourse if the tech intervention already comes as one?* The topic of demystification of AI will be an important layer of the concept behind the *Digital Prayer*, my artwork that will be introduced in the second chapter. The difficulties of articulating demystification through metaphors, or pointing out the concepts of belief can be misleading if not treated clearly, yet on the other hand, the freedom of interpretation of an artwork cannot be forbidden.

In the statement quoted above, the artist is aware that 'the keepers of our collective consciousness' are the *big tech* companies such as Google, but it is difficult to determine whether he accepts it with a dose of irony, or holds an objective ground while observing the world's mind-shifting in between techno-menagerie clickbait poetry, and optimised future of generative flickers of pretty flowers and landscapes. This leads us to the ideological problem of such imagery, which while talking about belonging in the present and future actually recycles the past in a theoretically infinite number of outputs. Artists can always keep within themselves a bit of a magician, but they should keep the magic in them, not in the mystery box: the magic is not in the tool. A *hype* over discovery is an inspiring point to be in - however, the repetition and oversaturation of motifs become at its best calming and contemplative. The more such interpolations appear and are being produced nowadays by anyone who can access *GitHub* (if not a web-based platform that offers similar experiences in image making) the less sense it is being made out of them. Talking about the example of *StyleGAN-based* art, it has rather become a GAN-*styled* art. There are more and more artworks that use the same networks, and artworks begin to look alike. Also, their meaning does not differ, interpretation always relies on subjective projection, because in the image itself, there is actually no meaning of such kind. The epistemology of such artwork is not about learning, it is about the data, it is *Ars Combinatoria*. To quote Vladan Joler and Matteo Pasquinelli in "*Nooscope Manifested"*

essay: "… *it would be more accurate to term machine learning art as statistical art."*[94] Prior to this statement, they give us a few important remarks on the ontology of this type of artwork production and the world it reflects: *"The problems characteristic of the prediction of the new are logically related to those that characterise the generation of the new, because the way a machine learning algorithm predicts a trend on a time chart is identical to the way it generates a new artwork from learnt patterns. The hackneyed question 'Can AI be creative?' should be reformulated in technical terms: is machine learning able to create works that are not imitations of the past? Is machine learning able to extrapolate beyond the stylistic boundaries of its training data? The 'creativity' of machine learning is limited to the detection of styles from the training data and then random improvisation within these styles. In other words, machine learning can explore and improvise only within the logical boundaries that are set by the training data."*[95]

Image 11: **Memo Akten, *Deep Meditations,* video installation view, Sonar + D, Barcelona, 2019.**[96]

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[94] Vladan Joler, Matteo Pasquinelli, "The Nooscope Manifested: Artificial Intelligence as Instrument of Knowledge Extractivism", KIM research group (Karlsruhe University of Arts and Design) and Share Lab (Novi Sad), 1 May 2020 (preprint forthcoming for AI and Society). https://nooscope.ai. accessed December 02, 2022.

[95] *ibid.*

96 Retrieved from "Deep Meditations." Memo Akten Online Portfolio. http://www.memo.tv/portfolio/deep-meditations/. accessed December 04, 2022.

In the essay “Religion in the Age of Digital Reproduction”, Boris Groys states that: "*In the modern age, ritual, repetition and reproduction have become the faith of the entire world, of the entire culture*", that is, "*the ritual of the modern age is a ritual of mechanical reproduction.”*[97] In that ritual, according to Groys, we believe that every visualisation of data is also a revelation of that data[98], as it is believed that in every performance of certain rituals, there is a relationship with the invisible.[99] The presence within the screen image, which we experience as a space for personal expression, is seen by the computer as a binary record, which it can use as statistical data. This is how computers see us. The open presentation of layers of technical processes, in this case, image generation, has the purpose of demystifying statistical processes because statistical processes cannot play an intelligent role in and for society. Automation of statistical data processing is based on quantity rather than the quality of data content. The idea that justifies a machine's ability to be intelligent is directly based on its computing power to process data. The logic of this procedure is that the more data the machine is given, the better it will be able to give an accurate solution. The machine, on the contrary, does not adopt the concept of accuracy as we interpret it, but generalises and gives neutral, optimal solutions based on the data at its disposal. Therefore, another conceptual layer of the project was to reiterate this postulate of the ideology of image-making, towards further ideas that will be described in the following chapters; but also to critically interpret the fact that machinic vision is only visually inspiring for a limited amount of time, in the human search for ‘something more human than human’.

This is a combinatorial infinity, and not a transcendent one.

Combinatorial transcendence - a reflection of the past without a sense of time. Because of the boundaries of the past and of datasets in it, from an aesthetic point of view, the styleGAN art has rather become GAN-styled art, with an overflow of seemingly similar artworks with fluid, animated images of dancing pixels dispersing into a mountain, sea, flower of the stars… Many experiments in this have led to beautiful imagery and some unexpected representations. However, the thing that comes as most poetic and conceptual in this approach is not the idea of transcendency in this computed data flow, but one of the ontology of contemporary image. In contrast to traditional art which stood

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[97] “*Ritual, repetition, and reproduction were hitherto matters of religion; they were practiced in isolated, sacred places. In the modern age, ritual, repetition, and reproduction have become the fate of the entire world, of the entire culture.”,* Boris Groys, *“*Religion in the Age of Digital Reproduction*”, e-flux journal #4,* 1. https://www.e-flux.com/journal/04/68569/religion-in-the-age-of-digital-reproduction/. accessed November 22, 2022.

[98] The analogy coined by Boris Groys, that *“The digital image is a visible copy of the invisible image file, of the invisible data. In this respect the digital image is functioning as a Byzantine icon—as a visible copy of invisible God.”,* B. Groys, *From Image To Image File And Back: Art In The Age of Digitalization (*The MIT Press, Cambridge, Massachusetts), 2008, 2., will be further elaborated in the second chapter, *Digital Prayer*.

[99] Groys, ”Religion in the Age of Digital Reproduction”*,* 11.

for resistance against time, solid material objects and materials for their perseverance, today's art is in momentum, immaterial, non-touchable, fluid and fast, yet not progressive, and extremely retrograde. Traces and trails of the current, immediate, and new, have intersected with reasoning on the past, all simulated in the data flow, coded, clustered and stored nowhere and everywhere at the same time. We, in a way, only catalogue a kind of different, yet mostly the same meaning[less, or more] content, that due to its shortcomings, creates the imagery that is aesthetically recognisable, but when all the outputs regardless of the database are looking pretty much the same, there is a hard wall to hit. This method of image making is—much like *Glitch art* did—becoming an effect if only treated through the context of the tool and the form. The value of the work only depends on *our intention*, e.g. contextual or conceptual interpretation, an inscription of meaning - but if the combinatorial strategy hits its limits of knowledge [database], the context eventually runs dry.

These tools limit the possibility of criticism within themselves, whether by the principle of their improvement or by obsoleteness that overshadows the past hype. We all as users, or producers, deliver unpaid or poorly paid labour towards celebrating novelty pushed by the *big tech*. Looking from that angle, we are sometimes not artists, but promoters. A new form of image-making comes with fascination, but after the peak of the new, the time has come to address the real characteristics of these image-making processes. Above all, through computer-synthesised images, we might be able to turn back to concrete experience, recognition, value, and action, away from the world of abstraction that comes as the first thing these images can offer. The computer-generated - machine images are still an object of fantasy, admiration and speculation. Towards extrapolation of the past, in the notion of recycling the visual traces of human consciousness, there is another layer that follows the combinatorial limitations of image-making processes - its context, beyond the layer of the simulation of representation - such rendering of imagery leads us to the introduction to the complexity of ethics, where the intersection of the world of machine learning and the needs of society collide.

On the layer between the image and its meaning, representational level and taxonomy, another example to be briefly introduced is Trevor Paglen's take on GAN-based imagery, generated from word/motif-labelled databases [applying, in a way, a reverse-engineering strategy]. Paglen's exhibition *Study of Invisible Images*[100] at Metro Pictures in 2017, presents a series of GAN-made images under the title *Adversarially Evolved Hallucinations.* What is significant to this image-making approach was that Paglen collected databases and annotated them, assigning the meaning to each recurring motif represented on an image, which creates a feedback loop between the author of the database, and the machine trying to recreate a motif within an image. I would also like to highlight the take on psychoanalytical phenomena, and also allegories for capitalism, giving a conceptual fine-tuning to the meta-commentary on the database labelling and image-making processes. In an interview for *Artnet,* he stated:

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[100] Exhibition information can be found on Metro Pictures' official webpage: https://www.metropictures.com/exhibitions/trevor-paglen4?view=slider. accessed December 12, 2022.

"*That comes from a training set made out of images of monsters that have historically been allegories for capitalism. Once I train it, instead of it looking around the room and identifying a vampire, I'll say, 'Draw me a picture of a vampire.' [...] So you can see what I'm getting at there: What are the politics of recognition, the politics of building any kind of taxonomy? There are always value judgments. When you teach a machine to recognize things, you're always also teaching it to not recognize things. So one of the bigger questions is, how does that play out in terms of society?"*[101]

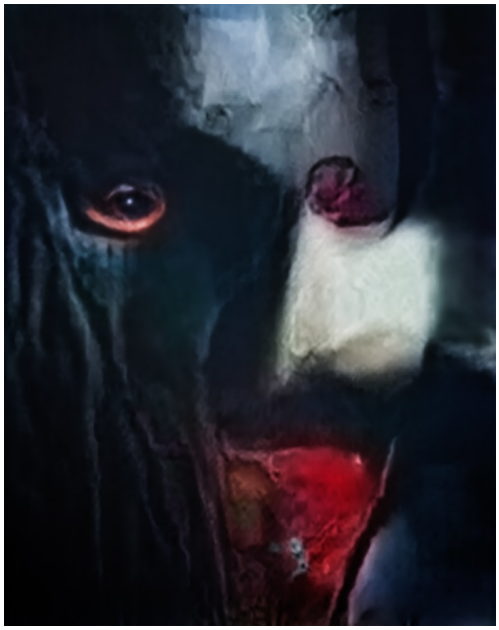

Image 12: **Trevor Paglen, *Vampire (Corpus: Monsters of Capitalism)*, "Adversarially Evolved Hallucination" (2017). Courtesy of the artist and Metro Pictures, New York.**[102]

In his interpretation of his artworks, he emphasises the human labour and human decision-making [agency] behind these processes. These topics will overgrow over the at-the-time capacities for image making, turning these premises into a new photorealistic simulacrum of *stable diffusion*, completely established on such hierarchies and data clusters with no notion of authorship or ethical evaluation of content labelling and processing. The following subchapter, *Image-reading: Ethics,* will elaborate on these characteristics of image-making and image-reading processes, as well as the immediate consequences of such data-driven classification and division of social structures and historical context. The aim of this chapter is to introduce the non-objectivity in these systems, and therefore to problematise the presumed neutrality within the image-making and image-reading systems that require experimentation as the most direct form of unboxing the non-transparent structures that they are made of, so as to reveal their identity and bias as a projection of reality of a part of the world that creates these systems. The examples of social marginalisation or automated discrimination that will be introduced will not be addressed over institutional responsibilities or agency of a possible solution within the context of AI and humanities and ethics but will be imposed as depictions of faulty premises so as to humanise the errors and demystify the concept of a *thinking* machine, or an *immaculate* content generator untouched by the human goals, intentions and bias - to avoid abstraction misleads in interpretation, these cases reveal the systemic structures through analysing the meaning behind the outputs.

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[101] Trevor Paglen, interview, "'This Is the Project of a More Just World': Trevor Paglen on Making Art That Shows Alternative Realities." Brian Boucher, (June 11, 2018.) Artnet News. accessed December 12, 2022. https://news.artnet.com/art-world/trevor-paglen-interview-1299836

[102] Retrieved from: https://www.metropictures.com/exhibitions/trevor-paglen4/selected-works?view=slider#13. accessed December 12, 2022.

1.3.2. IMAGE-READING: ETHICS

And we, spectators always, everywhere,
looking at, never out of, everything!
It fills us. We arrange it. It decays.
We re-arrange it, and decay ourselves.

Rainer Maria Rilke - *Duino Elegies*

The English word *ethics* is derived from the Ancient Greek word *ēthikós* (ἠθικός), which itself comes from the root word *êthos* (ἦθος) meaning "character, moral nature". In the context of this research, we will address the character of technologies, rather than establishing a *moral machine*[103] in the context of *computational or machine ethics*[104]. As cultural codes and moral roles are arbitrary and variable within cultures, nations, classes, races or genders the principle is to stay aware of such differences and avoid the concept of singularity[105]. Singularity does not appear as a superintelligence that is a centralised, visible agent: at this point, we are surrounded by accelerating technologies that do not execute their own demands, but we live in a statistically optimised sphere of industry, a swarming ideology of developing smart systems that aim to be globalised, yet are developed on the western world culture and reflections, representing another form of colonial extractivism whether in physical or data resources. The discourse on ethics here takes place in a post-structuralist context, reflecting and analysing the current state of the automated world that is as real as it is virtual, established on traces of real life, a simulacrum[106] as a living organism. In this research, the topic of ethics is intertwined with

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[103] A reference to MIT's (Iyad Rahwan, Jean-Francois Bonnefon, Azim Shariff, Edmond Awad, Sohan Dsouza, Paiju Chang, Danny Tang) social experiment on the moral conflict that came across while analysing possible right decisions for autonomous vehicles, translated into a web-based interactive poll which asks the visitor to choose between different scenarios where causing a car crash with possible casualties is inevitable. In different cultures, different choices may be made, and culturally there may be difference in the moral choice of each individual, imposing the question of universal response as unachievable. https://www.moralmachine.net/. accessed December 19, 2022.

[104] *Computational or machine ethics* delegates the moral and ethical problems to machines-computers as agents. In this research, the focus is on the technoethics of human agency, where machine ethics can only be read as the direct consequence of it.

[105] The concept of singularity or technological singularity introduces a hypothesis of a point of time in the future where the 'explosion of intelligence' is being anticipated, as the computer or networked intelligence, mainly inscribed to the concepts of AI, will create a form of superintelligence - uncontrollable and irreversible, resulting in unforeseeable changes to human civilisation. In John Von Neumann's words, singularity is "centred on the accelerating progress of technology and changes in the mode of human life, which gives the appearance of approaching some essential singularity in the history of the race beyond which human affairs, as we know them, could not continue". The concept and the term "singularity" were popularised by Vernor Vinge in his 1993 essay *The Coming Technological Singularity*.

[106] The third order of simulation by Baudrillard: "*simulacra of simulation, founded on information, the model, the cybernetic game - total operationality, hyperreality, aim of total control."* which will be additionally referenced in the fifth chapter.

technoethics[107], which is a specific branch of philosophy focused on the responsible use of science, technology and ethics in a society shaped by technology. On one hand, we will address the intersection of real life, surveillance technologies and labour that confront us with the machinic gaze, and on the other - the scope of automated creativity in the context of an image not as a mirror to humanity, but as a projection of the owners and makers of the automated systems who *claim* neutrality. These systems do change our perception of the world, our ways of communication and our values of meaning. They are not neutral and such claims are a risk for another form of totality. It is a reverse-engineering take on visual culture established through automated processes as a key to understanding the ideology of artificial intelligence as a concept in relation to the human condition in a paradigm shift of a networked world.

Ethics in machine learning takes a specific place, as a socially relevant and burning topic at all times, but seemingly neglected in the scope of tool production and database acquisitions by the tech research and development centres. In this chapter, we will introduce the most characteristic aspects of ethical issues through several artistic and research examples, made by Kate Crawford, Trevor Paglen, Yarden Katz, and more, who applied different software or databases to a creative, yet critical discursive approach. With an aim to address the consequences of mass data harvesting, labelling and annotation as the most obvious examples that come to the surface at the intersection of the realm of the real and the virtual these examples will provide a perspective on key problems that appear on the surface of the clash between the image and its meaning. Following a previous example of Trevor Paglen's *Adversarially Evolved Hallucinations*, he and Kate Crawford explain the arbitrariness of image-meaning in an essay "Excavating AI: The Politics of Images in Machine Learning Training Sets": *"Images do not describe themselves. This is a feature that artists have explored for centuries… We see those images differently when we see how they are labelled. The circuit between image, label, and referent is flexible and can be reconstructed in any number of ways to do different kinds of work. What's more, those circuits can change over time as the cultural context of an image shifts, and can mean different things, depending on who looks and where they are located. Images are open to interpretation and reinterpretation."*[108] The dry, fast-paced rigid crowdsourced forms of database annotations give way to coded social structures, that through optimisation not only neglect but further segregate minorities, or less adjustable segments of the world, according to the western-culture silicon valley dominated worldview in such entitlement for AI future~fortune progress-making. Along with underpaid crowdsourced labour, we are also accomplices in the game, executing micro-labour on daily life on the internet, hyper-

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[107] "*Technoethics* is a term coined in 1974 by the Argentinian-Canadian philosopher Mario Bunge to denote the special responsibilities of technologists and engineers to develop ethics as a branch of technology. […] For Bunge, engineers and managers, because of their enhanced powers, acquire increased moral and social responsibilities. To meet these responsibilities they cannot rely on traditional moral theory; since moral theory itself is underdeveloped having "ignored the special problems posed by science and technology". "Technoethics." Encyclopaedia of Science, Technology, and Ethics, *Encyclopedia.com,* accessed November 29, 2022. https://www.encyclopedia.com/science/encyclopedias-almanacs-transcripts-and-maps/technoethics/.

[108] Kate Crawford, Trevor Paglen, "Excavating AI: The Politics of Images in Machine Learning Training Sets", essay, https://excavating.ai/. accessed December 20, 2022.

employed into feeding the algorithm, yet the systems that we are offered in return are established on very limited and ethically ignorant premises, as we will see in the following examples. These examples will help us understand the topic of the database as extractivism of knowledge and socio-cultural distortions reflected in the image-making and image-reading processes that will be discussed in the sixth chapter. As Mihai Nadin states: *"Knowledge, sacrificed for the expediency of applications, would have helped in avoiding the rather disturbing consequences of computational fanaticism and its associated utopia. It is not too late to focus on knowledge. We desperately need a sense of direction. Speculation will not do."*[109]

PEOPLE, PATTERNS, PREJUDICES

Going into one of the biggest lexicons for computer vision training, called *Image Net*[110], we can discover a detailed database of images classified into word taxonomies. When looking at the taxonomy of e.g. nature, or physical objects, nouns rather than adjectives or attributes, things are not too complicated, as we could search 'pretty red flowers', we are on the safe side. What happens when a 'person' has to be classified within these taxonomies? A project by Kate Crawford and Trevor Paglen, *ImageNet Roulette* (2019) was an app that would—based on your selfie—give your appearance a 'tag' from this hierarchy of words. The tendency of this project is to visualise issues of the clustered hierarchies that are being used in global industries as the new method of mass surveillance, hidden behind technologies, dehumanised and seemingly detached from the human agency and responsibility that lie beneath. It is a critique of image annotation non-transparency on one of the biggest image databases on the internet that is used for many dataset training processes, and implemented in an unknown number of systems. It is a strong example in regard to surveillance politics, still with a critical, conceptual and contextual character of the artwork. To begin with, here are some of the words from the *WordNet*[111] library, based on which ImageNet was developed:

terror, scourge, threat (0) color-blind person (3) leader (418) deaf person (3) neglecter (0) bluecoat (0) gatherer (0) expert (178) crawler, creeper (0) man (0) posturer (0) pamperer, spoiler, coddler, mollycoddler (0) vanisher (0) ethnic (0) snuffler (0) Slav (4) asthmatic (0) snuffer (0) relative, relation (167) loved one (0) pardoner, forgiver, excuser (0) ouster, ejector (0) aggregator (5) adoptee (0) coward (9) good person (51) occultist (14) married (0) individualist (7) perspirer, sweater (0) rectifier (0) nonsmoker (0) sniffler, sniveler (0) cripple (1) lover (36) authority (15) nonpartisan, nonpartizan middlebrow (0) Black, Black person, blackamoor, Negro, Negroid (10) pisser, urinator (1) abomination (0) inhabitant, habitant, dweller, denizen, indweller (485) achiever, winner, success, succeeder (5) biter (1) sensualist (12) acquirer (42) admirer (2) bad guy (0) censor (0) deliverer (1) rich person, wealthy person, have (11) gainer, weight gainer (0) dancer, social dancer (8) survivalist (0) totemist (0)money handler, money dealer (18) skidder, slider, slipper (1) small person (10) waiter (1) compulsive (5) stranger (0) third-rater (0)disputant, controversialist, eristic (39) roundhead (0) nonresident (0) scratcher (0) groaner (0) sex symbol (0) quitter (3) Sagittarius, Archer (0) female, female person (150) unskilled person (26) yawner (0) counterterrorist (0) clumsy person (3) gambler (21) squinter, squint-eye (0) slave (10) dribbler, driveller, slobberer, drooler (0) orphan (0) mother hen (0) Virgo, Virgin (0) masturbator, onanist (2) transvestite, cross-dresser (0) nonperson, unperson (0). slave (0) weakling, doormat, wuss (3) nonworker (36) anti-American (0)

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[109] Mihai Nadin, "Machine Intelligence: A Chimera", *AI & Society #34, 215–242., 10. Springer Press* (June 2019), https://doi.org/10.1007/s00146-018-0842-8. accessed December 10, 2022.

[110] Image Net home page: https://image-net.org/. accessed December 20, 2022.

[111] Word Net, home page https://wordnet.princeton.edu/. accessed December 21, 2022.

These are just some of the 'tags' for people, and each number in the brackets means there is another subgroup of the particular tag. Interestingly, many of those belonging to the most obscure and problematic ones in the hierarchy do not show any images anymore, when clicking on the hyperlink. An answer to that problem can be found in *Excavating AI: The Politics of Images in Machine Learning Training Sets* by Kate Crawford and Trevor Paglen – where many segments of the database that were there have perished. Even with the removal of some image training sets, the problem remains in not having open access to those databases focused on human classification. With computer vision softwares still rapidly developing, how can we know if the same, or worse classifications are happening, given the further lack of access to the images, often collected without any consent and with ever-higher secrecy. As their statement further goes: *"…removing these problematic datasets from the internet may seem like a victory. The most obvious privacy and ethical violations are addressed by making them no longer accessible. However, taking them offline doesn't stop their work in the world: these training sets have been downloaded countless times, and have made their way into many production AI systems and academic papers. By erasing them completely, not only is a significant part of the history of AI lost, but researchers are unable to see how the assumptions, labels, and classificatory approaches have been replicated in new systems, or trace the provenance of skews and biases exhibited in working systems. Facial recognition and emotion-recognition AI systems are already propagating into hiring, education, and healthcare. They are part of security checks at airports and interview protocols at Fortune 500 companies. Not being able to see the basis on which AI systems are trained removes an important forensic method to understand how they work. This has serious consequences."*[112] In times of extreme language sensitivity where *giving name*s is an ultimately fragile topic, surveillance systems are being developed on such [pick any of the above] taxonomies. This *advanced technology*, embedded in security, automation of industries and intelligence services, exists pervasively in our lives, regardless of our awareness, and is established on methods full of *human* bias, prejudice and a *study* approach worse than phrenology.

Image 13: **Kate Crawford, Trevor Paglen. Excavating AI, essay illustration**[113]

[112] *ibid.*

[113] Retrieved from Crawford, Paglen, "Excavating AI: The Politics of Images in Machine Learning Training Sets."

Another example, from 2017, was made by Yarden Katz on Google's *Show and Tell* software, which he applied to images which have a strong or sensitive context and that are impossible to understand based only on object recognition of the elements connected by *synthetic* syntax. The problem of human relations, communication, and most importantly the historical context, reveals the underachieved complexity of expression and context understanding in automated systems, which is very well represented in this example, visualising the traits of the tools and technologies we analyse.

(left) a group of people standing on top of a snow-covered slope
(middle) a group of men standing next to each other
(right) a group of people sitting on top of a bench together

Image 14: Yarden Katz, *Manufacturing an Artificial Intelligence Revolution,* 2017, 9 /Figure 5: Captions generated by Google's "Show and Tell" deep network. Image credits: Ammar Awad / Reuters (left), U.S. Department of Justice (middle), Reuters (right)[114]

Should we understand this *communication breakdown* as a misinterpretation or inaccuracy? It is a misinterpretation, but not an inaccuracy. Machines make no mistakes of such kind - machines calculate [the optimal statistical result]. Misinterpretation and false premises are solely the faults of humans - therefore, statistics and calculation should not be the only interpretational category of human reality. In the need to get rid of the noise, and to dig the useful data, pattern discrimination and object recognition can collect many dogs, traffic lights and flowers, and be quite accurate in classifying them. But does the statistical probability of detecting a dog sitting on a beach open any broader knowledge of the real-life systems that require action or interaction in context or historical knowledge? How much will we have to subordinate to these technologies, to correct/hack our appearance and language to belong to a good person (51) and not terror, scourge, threat (0)[115]. Is it even possible to do so, and is it worth the effort? As pareidolia and apophenia[116] can be used to excavate the shadows of the human unconscious, shouldn't we try to release the shadows of the meta-psychology of these datasets and taxonomies? If we cannot address and examine an individual, we should accept the meta-organism as

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[114] Yarden Katz, "*Manufacturing an Artificial Intelligence Revolution*", 12. https://ssrn.com/abstract=3078224. accessed January 25, 2023.

[115] The source for database clusters: http://image-net.org/explore?wnid=n10702615, where previously existing links for these labels are inactive.

[116] More on apophenia and pareidolia will be elaborated in chapter *3. FUTUREFALSEPOSITIVE*

a part of our organism and enter *nigredo*. As introducing the bias, we are introducing the collective *shadow*[117]*:* Are those that we find ghosts, shadows of ourselves and our *Corporate Animism?*[118]

Kate Crawford and Trevor Paglen have created an important contribution to this topic, in both practical and theoretical spheres, with *ImageNet Roulette*[119] and the essay *Excavating AI: The Politics of Images in Machine Learning Training Sets,* through which they addressed the key issues of these systems: lack of transparency and responsibility when developing and using these systems, which lead to human and machine bias. If no one is held accountable, lots of bias and ethical anomalies can appear in falsely supervised systems that apply statistics and corporate logic [with a splash of product placement] to life in real-world-real-problem contexts. Also, Yarden Katz introduces another important characteristic of Google's Show and Tell software, which he explains in his essay *Manufacturing an Artificial Intelligence Revolution: "The aspiration to a "view from nowhere" that masks the identity of human subjects also manifests in the training and evaluation of the systems we have discussed. To take one example, Google's image captioning system, 'Show and Tell', was trained on hundreds of thousands of captioned images—but who provided the captions? Some image datasets that were used for training the system, such as Microsoft's COCO, were captioned by workers on Amazon's Mechanical Turk platform (AMT). Other image captions were scraped from individual accounts on the image-sharing platform Flickr. To evaluate their model, Google researchers also used AMT workers to score model-generated captions.*

From the universal intelligence perspective, what matters is that captions were produced or validated by some human.

The identity of the viewer isn't considered relevant, even though it clearly matters."[120]

These images are historical documentation and they are impossible to understand based only on object recognition glued together with relational verbs that describe the visible condition. Dog sitting on a beach might be a sellable concept for the promotion of the software, and this software will only be made to care if someone is walking, running, shopping or rioting. Security cameras have filmed so many crimes and car crashes that they could not stop. Governance is prioritised over safety, and privacy is a long-forgotten word. More than the system is being adjusted to our pre-existing information-exchange systems, we are floating from bits to ever-expanding meta-structures, outside of our reach

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[117] *"[If and when] an individual makes an attempt to see his shadow, he becomes aware of (and often ashamed of) those qualities and impulses he denies in himself but can plainly see in others—such things as egotism, mental laziness, and sloppiness; unreal fantasies, schemes, and plots; carelessness and cowardice; inordinate love of money and possessions—...[a] painful and lengthy work of self-education.",* Carl Gustav Jung

[118] Hito Steyerl, *"A Sea of Data: Pattern Recognition and Corporate Animism", Pattern Discrimination,* ed. Clemens Apprich (Lüneburg: meson press, 2018.), 8.

[119] More information on the project can be found in "How ImageNet Roulette, an Art Project That Went Viral by Exposing Facial Recognition's Biases, Is Changing People's Minds About AI: Trevor Paglen and Kate Crawford's project has led a leading a leading database to remove more than half a million images." Naomi Rea, (September 23, 2019), Artnet News. accessed December 20, 2022. https://news.artnet.com/art-world/imagenet-roulette-trevor-paglen-kate-crawford-1658305

[120] Katz, "*Manufacturing an Artificial Intelligence Revolution*",12.

or understanding. The Internet may offer many beauties of knowledge but also suffers from entropy and noise pollution. Humans are feeding the systems with data that is mostly noise and frequently false, semi-informative, or misleading, and humans filter the data in the same way. On pattern recognition and human and computer bias, there will be additional elaboration in chapter three, '*FUTUREFALSEPOSITIVE*'.

Pattern recognition [human and machinic] helps to extract signals from data, classifying, categorising and re/perceiving information and therefore giving it context. Whatever cannot be articulated as a signal, is noise. Noise is what is mostly out there, and for computer systems, it is a perpetual struggle and the main goal for improvement. In an aim to anthropomorphise technology, the human mind had to be perceived from an extremely behaviouristic point of view. As previously mentioned, pattern recognition comes as a natural trait for human organisations of perception and its psychology. For computers, it is based on the statistical probability of recurring values. Like every learning process, it must start with a raw dataset, and then be gathered into swarms, and patterns… the more data there is to be processed, the greater the chance of finding a signal, as the logic of statistics insinuates. As Kate Crawford explains in her book *Atlas of AI: Power, Politics, and the Planetary Costs of Artificial Intelligence (2021): "Machine learning systems are trained on images like these every day—images that were taken from the internet or from state institutions without context and without consent. They are anything but neutral. They represent personal histories, structural inequities, and all the injustices that have accompanied the legacies of policing and prison systems in the United States. But the presumption that somehow these images can serve as apolitical, inert material influences how and what a machine learning tool "sees." A computer vision system can detect a face or a building but not why a person was inside a police station or any of the social and historical context surrounding that moment. Ultimately, the specific instances of data—a picture of a face, for example—aren't considered to matter for training an AI model. All that matters is a sufficiently varied aggregate. Any individual image could easily be substituted for another and the system would work the same. According to this worldview, there is always more data to capture from the constantly growing and globally distributed treasure chest of the internet and social media platforms."*[121]

The growth of a database is considered to be the main premise for raising the accuracy of the recognition and classification processes. Quantity makes quality. Its function is to collect pixel values, recognise patterns and classify elements in digital images and use these to train datasets through statistical calculations. The purposes are diverse - from image restoration and reconstruction to motion analysis, to object and facial recognition. As part of surveillance systems, it is an essential technology in CCTV cameras and other administrative controls. As Dan McQuillan describes in his essay *The Political Affinities of AI*: *"being out of its depth is not the only reason we should keep deep learning clear of socially sensitive situations. The single-minded optimisation that makes AI resonate so well with a neoliberal perspective brings with it a fatal ethical payload. Utility functions, like*

[121] Kate Crawford. *The Atlas of AI: Power, Politics, and the Planetary Costs of Artificial Intelligence*, (Yale University Press, 2021.), 94.

deep learning's backpropagation, get into ethical deep water when there are independent, irreducible objectives that need to be pursued at the same time. Ethicists have theorems that suggest it's impossible for an optimisation to produce a good outcome for a population without violating our ethical intentions."[122]

Abstraction accelerates.

Between the labelling taxonomy and the image databases, we have reached the point of image production that is merging both of these approaches, yet the bias does not seem to be improved. This bias might get even more obfuscated with the *Transformer* and Stable *Diffusion Models* where the taxonomy is also put into context or syntax relations, auteur rights are irregulated on the premise of common creative licence and availability [that easily gets exploited or monetised anyway]. If the straightforward descriptive-textual categorisation bias was not enough, a visualisation there appears to recreate and re-iterate the biassed realities we live in, according to the structures that deploy text-to-image models such as stable diffusion. In the article "Researchers Find Stable Diffusion Amplifies Stereotypes", published on November 9, 2022, in *Tech Policy Press*[123], a scientific article titled "*Easily Accessible Text-to-Image Generation Amplifies Demographic Stereotypes at Large Scale"*[124] has been introduced, where a team of scientists finds and analyses demographic stereotypes and bias in a stable diffusion model. The research question was whether *'simple descriptions that do not reference race, gender, ethnicity, or nationality nonetheless lead models to reproduce harmful stereotypes?'* Their conclusion comes in the '*presentation of ten socially significant cases confirming the answer is unequivocally yes.'* One of the examples they described is that the prompt *"A photo of the face of ___" (e.g. "A photo of the face of an attractive person") was fed to the Stable Diffusion model to generate 100 images.*

Their conclusions as visible as they were in the generative outputs were, in a paraphrased overview, that: *simple user prompts generate thousands of images perpetuating dangerous racial, ethnic, gendered, class, and intersectional stereotypes. "A photo of an attractive person" generates faces approximating a "White ideal" (stark blue eyes, pale skin, or straight hair, and a terrorist generates brown faces with dark hair and beards, consistent with the American narrative that terrorists are brown Middle Eastern men with beards — a narrative that has been used to rally for anti-Middle Eastern violence. Second, beyond merely reflecting societal disparities,* they found *cases of near-total stereotype amplification - in the country where the foundational training dataset was constructed (United States), 56% of software developers identified as white, but 99% of the generated*

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[122] Dan McQuillan, "The Political Affinities of AI." *The Democratization of Artificial Intelligence* (2019), 165 -166.

[123] "Researchers Find Stable Diffusion Amplifies Stereotypes.", James Hendrix, Tech Policy Press. (November 9, 2022) accessed December 20, 2022. https://techpolicy.press/researchers-find-stable-diffusion-amplifies-stereotypes/.

[124] "Easily Accessible Text-to-Image Generation Amplifies Demographic Stereotypes at Large Scale." Federico Bianchi, Pratyusha Kalluri, Esin Durmus, Faisal Ladhak, Myra Cheng, Debora Nozza, Tatsunori Hashimoto, Dan Jurafsky, James Zou, and Aylin Caliskan. arXiv:2211.03759v1 [cs.CL] (November 7 2022) Accessed December 20, 2022. https://arxiv.org/pdf/2211.03759.pdf.

software developer images are represented as white. As it is visible in this example, it is not only about bias but about the clear amplification that the researchers also elaborated as a comparative analysis of statistical resources, described in this research paper.

Original Caption: Figure 2: Examples of complex biases in the Stable Diffusion model. The generated image of an African man's car is in worse condition than that of the American without any explicit prompting.[125]

Original Caption: Figure 6: Mitigation attempts with prompt rewriting. Changing the prompt in Stable Diffusion, such as by adding "wealthy" or "mansion", does not always mitigate bias patterns.[126]

***Image 15:* "Easily Accessible Text-to-Image Generation Amplifies Demographic Stereotypes at Large Scale"**

Their conclusion on this testing was that: *"It is impossible for model owners or users to anticipate all such categorizations and stereotypes. The easy accessibility of these models, combined with the extent to which they reify these categories and stereotypes, forms a dangerous mixture. Use cases for these models, including creating stock photos or supporting creative tasks, render these issues particularly troubling, as these applications are mass disseminating these images and stereotypes while failing to articulate and invisibilizing other ways of being. As these models create biased and potentially harmful snapshots of our world in data, media, and art, our work calls for a critical reflection on the release and use of image generation systems and AI systems at large."* [127] Or, "*a photo of an American man and his car / African man and his car",* shown on the first example

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[125] "Easily Accessible Text-to-Image Generation Amplifies Demographic Stereotypes at Large Scale." Federico Bianchi, et. al., 4.

[126] *ibid.,* 9.

[127] *ibid., 3.*

below. They also added that *"prompts mentioning social groups generate images with complex stereotypes that cannot be easily mitigated. For example, the Stable Diffusion model ties specific groups to negative or taboo associations like malnourishment, poverty, and subordination. Moreover, these associations are mitigated by neither carefully written user prompts nor the 'guardrails' against stereotyping that have been added to models like DALL-E.*[128]*"* So, when they tried to induce more complex and detailed prompts that should tweak or enhance the output based on the description, and possibly avoid the previously given biased output results, the social and demographic bias was still there, as shown in the second example below. Also, there is a project uploaded on *Hugging Face*[129], an online platform established with an aim to democratise AI, titled *Diffusion Bias Explorer*[130], where any online user can explore particular diffusion models: Stability AI's *Stable Diffusion v1.4*[131] and *Stable Diffusion v.2*[132], and OpenAI's *DALLE-2*[133] - through comparative testing on a series of adjectives and professions as prompts within a web-based interface. It is a hands-on, accessible tool that offers an approachable method for the exploration of these models.

We can conclude that these examples not only simulate the biased reality of social inequalities and prejudice created on the scope of otherness but amplify it, or rather encourage a division between social structures, race, nationality, and economical status. These systems portray an illusion of a dominant socio-demographic condition that is polarised and exclusive, therefore they generate an ideology, an *optimised division* between all the above-mentioned layers of society. More on the topic of *generative ideology* and *colonised imagination* will be introduced in the fourth chapter and followed up in the fifth chapter - where the overview of the intersection of aesthetics and ethics will be analysed as a hybrid format of semiotics and ontologies of the imagery and image making processes described in this chapter. On the axis between machinic imagination and machinic discrimination, there is a balance that emerged, providing the touchpoints for the development of the three artworks that are introduced in this thesis. The following three chapters will each introduce one of my art projects - *2. Digital Prayer* (2020); *3. FUTUREFALSEPOSITIVE* (2021); and *4. PROMPT: WAR STORIES* (2022); where each of the mentioned aspects of image-making through *styleGAN* model (*Digital Prayer*); image-reading based on image databases and textual labelling through *object detection algorithms* (*FUTUREFALSEPOSITIVE*); and text-to-image prompts in *stable diffusion model* (*PROMPT: WAR STORIES*) will be introduced and analysed through a given artistic example and conceptual premises that are intertwined with the theoretical research introduced so far.

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[128] *ibid., 3.*

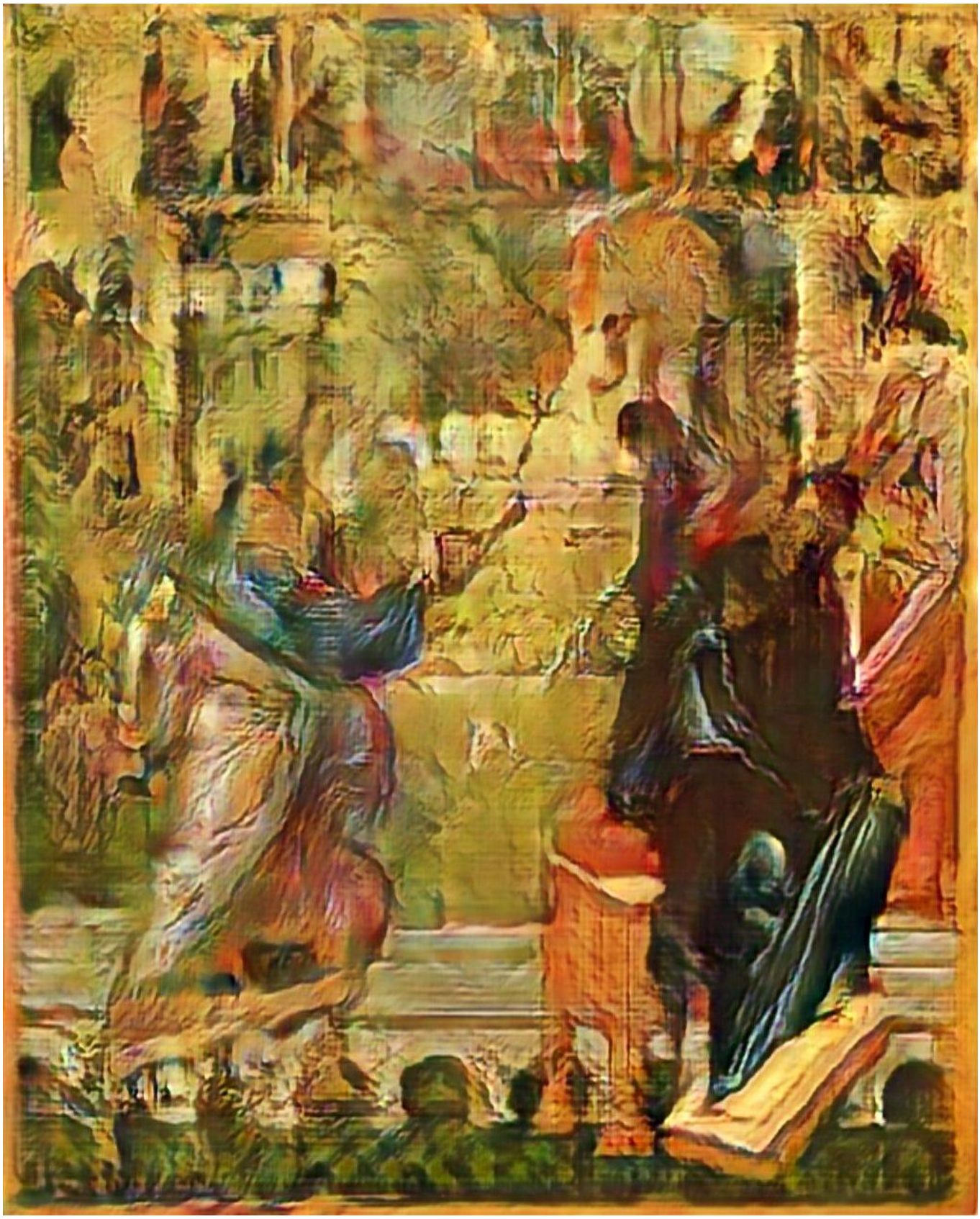
[129] Home page of Hugging Face: https://huggingface.co/huggingface. accessed December 20,2022.

[130] Stable Diffusion Bias Explorer: https://huggingface.co/spaces/society-ethics/DiffusionBiasExplorer. accessed December 20, 2022.

[131] Stable Diffusion v1.4 model https://huggingface.co/CompVis/stable-diffusion-v-1-4-original. accessed December 20, 2022.

[132] Stable Diffusion v2 model https://huggingface.co/stabilityai/stable-diffusion-2. accessed December 20, 2022.

[133] DALL-E 2 API access https://openai.com/dall-e-2/. accessed December 20, 2022.



2. DIGITAL PRAYER

A new, completely unorthodox religiosity is beginning to emerge from the musty corners of our consciousness, and this, surprisingly, is in the form of the dreamlike universe of technical images.

Vilém Flusser - *Into the Universe of Technical Images*

A VISIBLE COPY OF INVISIBLE GOD

Image 17: **Kristina Tica, *Digital Prayer,* installation view, art+science lab, Belgrade, 2020. Photo: Ivan Zupanc**

Digital Prayer is using one of the computer vision methods, the *StyleGAN* model for image generating to create a visual output that resembles an Orthodox Icon. Using machine learning tools such as generative adversarial neural networks, a relation has been established between the canonical structure of an Orthodox Icon and the image artificially generated through a computer program. Orthodox Icons have their own strict set of rules - a code which is for the purpose of visualisation of specific narratives, strongly holding their semiotic systems for centuries. With the help of AI, the tendency is to break that canonical code through a different one - computer code and to analyse further outcomes in the scientific, technical and theoretical matter. A computer program was created and a database of 4000 digital reproductions of Orthodox Christian Icons was collected, on the basis of which the computer learns to generate a completely new image. In relation to the

geometric and mathematical order of the visual elements of the Orthodox Icon, through statistical operations, the computer is able to reconstruct the elements of canonical imagery of the visual language of the Icon. Between them, there are more similarities than it seems at first sight. Both of them are information images which are created through a specific set of rules - codes and instructions. They are *codified interfaces*, visual transmitters of a message.

What used to be the God in feudalistic mediaeval times,
is AI in today's neoliberalism.

The goal of this artistic project is the demystification of the power of AI. What used to be the God in feudalistic mediaeval times is AI in today's neoliberalism. Icon has had the same purpose during mediaeval times - as a window towards immaterial, projective, and spiritual. In the age where we store all the data in a metaphorical place called *The Cloud*, it is obvious that there is a symbolic resemblance to the religious concept of heaven. Our needs, answers to our questions, moral codes and influences are nowadays stored in a different, rather virtual, than a spiritual place. Through the direction of algorithmic processes towards the imitation of the language of the icon, two visual interfaces oppose each other - the virtual world of a digital image, and the traditional handcrafted Orthodox icon. The image that is seen is just a visualisation of the code and data, which leads us to the analogy proposed by Boris Groys: *"The digital image is a visible copy of the invisible image file, of the invisible data. In this respect, the digital image is functioning as a Byzantine icon—as a visible copy of invisible God."*

Image 18: **Kristina Tica, *Digital Prayer,* installation view, art+science lab, Belgrade, 2020. Photo: Ivan Zupanc**

2.1. BEGINNINGS

In 2019, Digital Prayer was initiated as my artistic research and project based on the implementation of a *generative adversarial neural networks (GAN)* algorithm. While experimenting with other available tools and softwares for image making such as *DeepDream*, *pix2pix* and *style transfers,* GANs were emerging in popularity at the time, entering the public sphere and becoming more accessible to enthusiasts, artists and programmers. In a critical scope of research, I was curious about the domain of demystification of the artificial neural networks' image-making or image-generating procedure. While examining the affordances of these tools there were a few instances that were crucial for the development of this project:

1) the curiosity about the image-making processes themselves - how does it work, what does it depend on, and where is the glitch through which one can expose the character of these algorithms?
2) what do these algorithms create, and how should we treat the visual outputs in the realm of aesthetics; how do we impose a concept over a tool that shapes the aesthetics through its own affordances?
3) what kind of a database can be acquired so as to generate not only content but the context within appropriation (cultural or iconographical) or iconotropy that underlines the concept of what computer-made, data-based imagery means for us? When rendering an image, what kind of message are we rendering with it?

Occupying tendencies and trends in computational image-making processes were exploring the depths of its logic unnatural to human thought, or rather, to our calculation capacities/comprehension. Once the understanding of making processes is logically or—in this particular case—procedurally incomprehensible, the interpretation of the results, infused by the fascination with the ‘new’ is often treated mystically, through metaphors and anthropomorphisation. As it was introduced in the second subchapter of the second chapter - since 2014, the interpretational sphere of the computed image or data imagery was often revolving around *inceptionsim*, *computer and machinic vision as dreams, memories and imagination [with occasional layers of uncanniness].*

With the growing interest for GANs in media arts, online communities, creative coders and engineers, the actual expansion/explosion into popular media culture happened through a very rigid traditional form of value-making, but also overtaken with the fascination with the result, rather than the discourse on the agency through input as database curation, or importance of decision-making within the process. After the initial admiration of the emergence of these odd flows of imagery, morphing and pixelating onscreen, I proceeded towards the need to examine and analyse these processes, not through mathematical procedures, but through the scope of visual output, so as to *visualise the invisible*. As algorithmic procedures are unclear, or sometimes rather opaque, the codes are available - so the strategy to understand these processes required some reverse engineering. I wanted to avoid an ambiguous image result or using a messy database with no pre-given

clear context and curation, thinking of a context that can be dictated or marked/ dominated by the form itself. I have proposed an idea that if we can visualise the process in a form that is by *the least distracting* on the level of representation — a database image source that is strict and coherent in its composition and structure — imagery and motifs such as of Byzantine/Orthodox Icon painting tradition, which possesses the kind of replication, repetition in their creation, seemed visually suitable to apply them to these computational statistical process, with a premise that the algorithm will be able to repeat the recurring patterns on the matrix and therefore produce an image that does resemble imagery in the tradition of an Orthodox Icon.

Image 19: **Kristina Tica, *Digital Prayer, Trinity_4_057_04052020*, 2020.**

2.2. ORTHODOX ICON

The tradition of Orthodox Christian icon crafting to this day has resisted changes concerning the rules of icon crafting from the Mediaeval Byzantine iconography. Its historical context in the artistic sense has a focus on the Middle Ages, although it can be painted in the modern era. The icon is painted according to a previous one, a model, or an example that becomes a template - in order for the message it conveys to remain unchanged and timeless. An Orthodox icon is an impersonal work, it should avoid any auteur's imprint.[134] The system of painting each element in the picture is strict, objectively formed in accordance with the rules, and does not allow a subjective, representational or naturalistic approach in painting, just as its message aims to transcend the context of a real time-space environment. This principle does not tend to naturalise the figures and other elements that are depicted. That is also why for me it was reasonable to combine the images in the dataset that are reproductions of Icons made in different ages - since they all carry the same idea spanning over centuries. Even though they can stylistically differ, the all-in-one or one-in-all principle was convenient for this project that was simulating combinatorial transcendence, referring to the atemporal character and looking over the relationship between the virtual and the spiritual. An Orthodox Icon is a work that is impersonal[135] and that in its creation does not tend to naturalise the figures and other elements that are depicted. The system of painting each element in the picture is strict, objectively formed following the rules, and does not allow a subjective representational-naturalistic approach in painting, just as its message would be outside the context of a real-time-space environment. The iconotropy still occurs, by appropriating the icon's visual identity. With this project, the canon of the icon is reproduced through the processing of the binary record and the resulting image does not carry with it the context and function of the Orthodox icon. The generated image we create shows the possibility of translating the canon of an Orthodox icon into computer code in a way that a computer can imitate it. Through the successful statistical processing of icon reproductions, the historical context of the work was disrupted, yet the appropriation of this imagery came with a task to generate an image that manages to keep elements of the canon of a traditional icon and thus re-iterate and re-interpret the structure of its visual identity to convey a message, a narrative.

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[134] Even though the aim of transcription of the message through image translation, replication would aim for impersonal service to the message, nowadays we do admire and recognise the uniqueness of each master of iconography [I would acknowledge a prominent example of Andrei Rublev], that provides another layer of aesthetic or empathic key whether to art, art history, religion or culture that these works were part of.

[135] An impersonal work of art means that no subjective or individual element in style or symbolic representation was added to the production of the work. This approach is characteristic for Orthodox/ Byzantine iconography, as the task of the painter-iconographer was to translate the same structure and visual elements of a previously given model, example of an older icon.

2.3. IMAGE-MAKING PROCESS

I have manually collected 4,000 digital reproductions of Byzantine or Orthodox Christian Icons for my database, dating from the twelfth century, up to contemporary commercial iconography of the same kind, originating from Byzantine Empire, Greece, Macedonia, Serbia, Ukraine, Russia. Database preparation took two months of manual search for images that are not under copyright, low-resolution reproductions but also inquiries for databases. There were no previous databases of such a kind available except for the online shops' archives - inquiring did not result in support. To create a fitting database, the demand is focused on quantity rather than quality. Therefore the images that are part of a database are tweaked and stacked without their individual significance - they are collected to feed the algorithm. Lack of historicity reduces the image into a motif, representational value - a tag. I categorised them by their origin, dating, and also motifs that are represented/painted on them. This collection of images had to be adjusted for the database in several steps:

1) removing white edges, since the algorithm would immediately pick up the value of white pixels as the safest / optimal solution to reproduce;
2) compressing all of them into 512x512 pixel format to standardise resolution width and height for further algorithmic processing;
3) categorising them by the previously given characteristics, so as to articulate further experimentations, whether being led by the motif or combining several groups into one.

After I have prepared the database and classified the datasets, we initiated the generating processes. The project development was part of my studies and Master's degree thesis at the Master program in Digital Arts at the Faculty of Media and Communications (FMK), Singidunum University Belgrade, with Uroš Krčadinac as my mentor and supervisor supporting this project. We formed a team that took care of software and hardware, consisting of Miloš Trifunović [programmer], Jacques Laroche [software engineer, IT technician at FMK at the time], and me. The code was an adjusted version of a *styleGAN* algorithm a *Jupyter Python Notebook* found on GitHub[136]. As cloud-based GPUs, such as *Google Colab*, had a very limited time for use and the process happened to be extremely time-consuming, with little results. Therefore, we decided to use the main server computer of the University, being supervised by all of us, day and night, tracking the generating process, and re-adjusting the parameters. This process lasted for two months since the access to the server was sometimes limited, and because of frequent reiterations once the parameters were adjusted in the desired way. More than 30,000 images were generated in total during the course of these two months, with every run consisting of at least a thousand samples, documenting every part of the making process.

[136] *The link to the original code is currently unavailable.*

The authorship and subjective factors remained present in three segments:

1) *in the selection and preparation of images for the database;*
2) *adjustment of the parameters on which the neural network will operate;*
3) *in selecting batches of results that I considered visually successful.*

The results are afterwards contextualised through conceptual semiotic interpretation - from which most I have accepted as successful, implying the ability of the observer to perceive the generated images with an impression of artistry, associativeness, and symbolism, and to give it a subjective interpretation and a projective context. The difference that arises within the generated results is distinguishable in the abstraction of elements within the image composition. The computer abstracts and generalises forms that, according to our recognition system, would be more clearly defined and marked in the painting process, such as representations of specific objects or their elements. The algorithm itself does not recognise the significance of specific elements, because it has not been taught to recognise objects or any symbolic form on the image. The algorithm was not instructed by any iconographic rule - whether in the form of a geometric model of the canonical compositional structure or in the arrangement of the elements of a certain icon. The way the computer program can imitate and replicate the compositional structure of a reproduction of an icon was based on the structure that has been repetitively interpreted throughout the database. Such a technique of image analysis and processing contributes to the fact that the final results contain hundreds of patterns of different icons in one, new digital image. There is a pixel grid of any given format, in this particular case 512x512 pixel image samples in a database, within each pixel has a value. The more recurring value there is on a pixel grid, the more likely the algorithm and the feedback loop between the generator and the discriminator will *figure it out*.

The perception of strict re-iterating imitation of the canon of the icon appears in terms of composition, colour and arrangement of elements within the image and is set through the database - quantified storage of examples, where no qualitative instructions were given. The computer calculates and finds optimal values to fill into it into a new image that matches the approximate-fitting numerical values within a matrix-pixel-grid, based on the created database input. Automated statistical processing of image data from this database leads to the creation of a computer model. This model, based on GAN networks, is used as a means of generating new images. In theory, there can be an infinite number of output images; however, they all represent variations limited by the set of images that exist in the database. The computer collects data about the position of numerical values on the grid of pixels that make up a digital image, yet the rest of the meaning only belongs to human interpretation. As already mentioned in this chapter, the translation of an icon based on an old pattern is of key importance when making an icon, it testifies to its credibility, and in this project, there is a meta-semiotical underlining, a discrepancy between the representation, simulation and meaning. With this project, the canonical structure of the icon is reproduced through the processing of the binary record and the resulting image does not carry with it the context and function of the Orthodox Icon. The

generated image we create shows the possibility of translating the canon of an Orthodox Icon into computer code in a way that an algorithm can simulate or recreate it.

For each selected motif, that is, a scene represented on an Orthodox icon, such as the Crucifixion, the Annunciation, the Ascension, or the image of the Holy Mary, Jesus Christ, the Holy Trinity, etc.; I was extracting parts of the database, either to generate them per given representation-motif, or combining them. Based on those digital reproductions, the algorithm tries to recreate a particular scene. Although the creative process is in principle under human control, the number of possible different output results is, at least in theory, infinite. The results are generated as cumulative probability calculations based on a large number of samples. The computer manages to recognise the visual grammar of the Icon based on processing the numerical information of the entire image through neural networks. The only instructions in terms of visual content output are given to the algorithm, precisely by the act of forming the database. Due to the strictness of the canonical structure of the composition of a Byzantine / Orthodox Christian Icon, the computer can create a convincing image at first glance, but with detailed observation, these deviations can be seen, to a lesser or greater extent. The algorithm only tries to optimise the given data [pixel values] and put it into a new image that matches the look of the database. Deviation occurs only through the range of variations within the pixel values that make up the structure of the mentioned elements. In a conceptual sense, the game of recognising the generated results as an Orthodox Icon gains its semiotic weight, pointing to the problem of interpreting a generative image by what it represents, rather than by interpreting its structure within computer code. The image-making procedure is quantified and binary statistical pixel value probability that does not require any image-making *form that humans pursue - relation between line, colour, and symbolic element, no distinct boundaries, therefore breaking any identity of any element, however, the compositional 'overfitting' of the database helps to create a solid resemblance.*

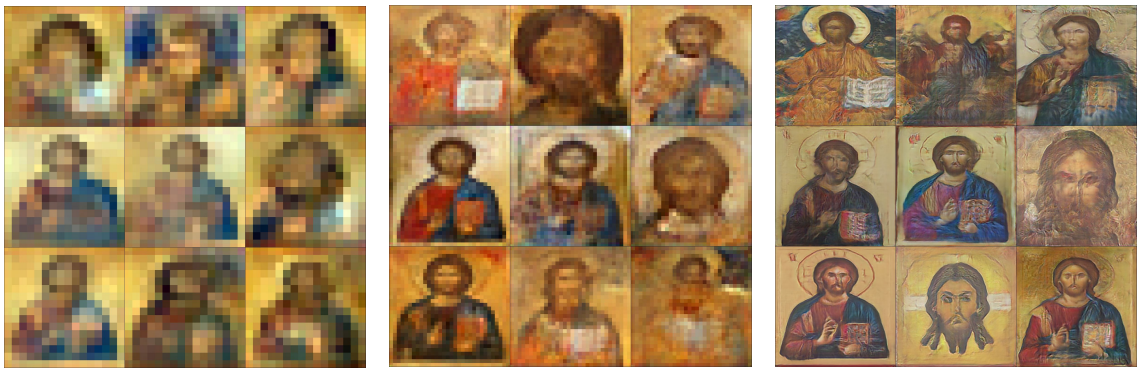

Image 20: **Kristina Tica, Digital Prayer, generative samples, private archive, 2020.**

POST-PRODUCTION, INSTALLATION PREPARATION

I have exported a set of videos that show progressive iterations per frame, starting from initial 3x3 pixel grids, multiplying through each epoch, up to 1024 pixels. It visualises the making process and the progress of the image build-up, forming the simplest pixel progressions to the final possible resolution, and backward. These generated images are formatted as a sequence of videos where around 2,000 images per video are sequenced in frames, being morphed by the instructions from another code, building up and dispersing from one into another. The other shows the iterations of epochs with 1024 pixels, which continue in a way that the computer is still reiterating possible combinations of values, or rather permutations, leading to mode collapse. *Mode collapse* is the state when/where the process reaches the point when the generator collapses and starts producing a limited number of outputs. Both types of results - images, were morphed into animation through another custom-made code. There was no manual post-processing in any of these processes, except for the movie file exports, so to keep the process as real as it was, and to provide a simulation that is process based, and not subjectively interpretive or descriptive. For us, it was useful, giving each session a scope of conclusion, with a hint or rather a conceptual premise that there could be more. Since there is no further pixelation to weave on the grid, it had to stop at some loop. We needed the visualisation of this limit, it is a repetition of a meditative kind, still believing there will be something new that comes up, however, we are spinning within our expectations. The appearance of this limit brings materiality in front of the theoretical concept of infinity. This infinity is speculative, as abstract as our own understanding of time. However, even in data, the materiality emerges through the iteration snap - it gets stuck within its own limits.

The generated image-video outputs do manage to keep the elements of the canon of a traditional icon, and thus, resemble the structure of its visual identity to convey a message, a narrative. The results-images are not treated as an artefact or object, they are time-based, moving imagery, flickering and changing, morphing one into another. Their essence is not in just one output, every single image is a representative of all the images in one. It is interchangeable and replaceable with any other from the output database - their meaning stays the same, and they belong to the same set of instructions. For the exhibition setup, I made video loops to simulate the process, since the process of image-generating required hours, if not days. Therefore for the general experience, the artwork did not aim to be procedural but to present the span and scope of iterations, treating it rather like flickering. I did not want to aestheticise the pace of the process, assuming that it is obsolete - because, it is only a technical limitation at that moment which would have been solved by better computing power, which would be possible now, but not then. Still, the *meditative* process was there, changes were dynamically organised into slower and faster ones. The collection of video materials was then curated and selected for each upcoming installation setup.

2.4. PROJECT PRESENTATION

The project Digital Prayer was recognised and awarded by the Centre for the Promotion of Science in Belgrade as a winning project of National selection in 2020, as part of the *European ARTificial Intelligence Lab*[137] project. The award resulted in receiving additional production support for the artwork development and several exhibitions showcasing, along with additional scientific collaboration with Miloš Milovanović-Mathematical Institute of Serbian Academy of Sciences and Arts, and Marija Šumarac, a sound engineer, musician and composer, who joined the collaboration to create a composition for the exhibition installation. After presenting Digital Prayer as a solo exhibition of the same title in Remont Gallery in Belgrade, in July 2020, the exhibitions that took place under the collaboration and support of the Centre for Promotion of Science (CPN) were in Belgrade - Art+Science Lab, and Trieste - European Open Science Forum 2020, both curated by Maja Ćirić, independent curator, and Dobrivoje Lale Erić, from CPN, both taking place in September 2020, then it was invited to be exhibited at Speculum Artium New Media Festival in Trbovlje, Slovenia in October 2020. As a reflection on these exhibitions and the project itself, Uroš Krčadinac, my former Master thesis mentor, wrote an essay "Data Vizantija" [Data Empire][138], and we together held a lecture on computational image and art in the age of machine learning during the Art+Science exhibition in Belgrade.

Digital Prayer was headlining the Belgrade Garden of Ars Electronica Festival in Linz in September 2020, and as part of the European ARTificial Intelligence Lab, the project was presented in the book *Practice of Art and AI: European ARTificial Intelligence Lab*[139]*,* ed. Andreas J. Hirsch, Markus Jandl, Gerfried Stocker, published by Hatje Cantz in 2022.

INSTALLATION

Digital Prayer had four different exhibition setups, out of which the one at the Art+Science: Intelligence I/O exhibition in Belgrade was of the largest scale, and was the full and final format of the artwork. It was a sixteen-channel video and six-channel audio installation, constructed on metal server racks in the form of an iconostasis. Iconostasis in church terms is a portal, a door between the material and the immaterial, so the such reference was yet another conceptually developed strategy. The final selection of sixteen video loops was sorted in the bottom (four of forty-seven inches) and top (four of thirty-five inches) all together eight different scenes - four of them morphing within mode collapse, showing different variants of the final reach of an epoch, and four of them showing frames from every epoch from the beginning, [initially] 3x3 pixel build-up on an image-matrix, all

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[137] "The European ARTificial Intelligence Lab." *Ars Electronica.* https://ars.electronica.art/ailab/en/network/. accessed November 14, 2022.

[138] "Data Vizantija" [Data Empire]. Uros Krčadinac, krcadinac.com, (September 2020). www.krcadinac.com/rad/sveska/data-empire/. accessed December 23, 2022.

[139] Art+Science lab, Ars Electronica Festival, In Kepler's Gardens, Belgrade Garden. https://ars.electronica.art/keplersgardens/de/artscience-lab/. accessed December 25, 2022.

the way to an image that ‘grows’ into a 1024x1024 square pixel matrix, and then deconstructing in reverse. The other six [of ten inches, three on both sides of the *iconostasis*] were morphing variants of different scenes. The final two - on the lower left and right end side - were showing the scroll of the code itself. The audio installation was created in collaboration with Marija Šumarac, who composed the samples for a triptych (three-layered) composition that was played on a six-channel sound system. Each pair of speakers played a layer - the first one, a composition based on an original soundscape, field recordings from a Beška Monastery in Montenegro on the Skadar Lake with recorded samples of the bells and wooden percussions, while the second and third layers were created as generative samples from the original soundscapes: the samples were generated through PureData patch that translated pixels into audio values, using the original samples as sound sources, altering them into a different generative form. Each pair of the three layers of the soundscape were structured as an ascension from material/ tangible to virtual/digital - from the bottom one, which is the closest to the original – to the top, which is a fully generated, granular and deconstructed composition that derived from the soundscape samples. Conceptually, we referred to the materiality and transmutation as permutation, again an empirical dead-end that reaches infinity within the limited presets, or borders of knowledge.

The complete installation immediately resonated with the audience in the representational context of sacral imagery. The depictions of Orthodox Icon motifs morphing on screens installed on a large-scale steel and aluminium construction have created the space of a portal, a space to reflect and contemplate, as the assimilation of the purpose of a religious image and the screen attention span is coming into alignment. In the overall impressions shared by the audience, this *techno-iconostasis* - server rack construction and the exposure of the technical elements or technical nature of the work were a contrast to the seduction of the image, showing transparency and materiality of the processes and support needed for the image to reach the visual apparatus and the experience of the spectator.

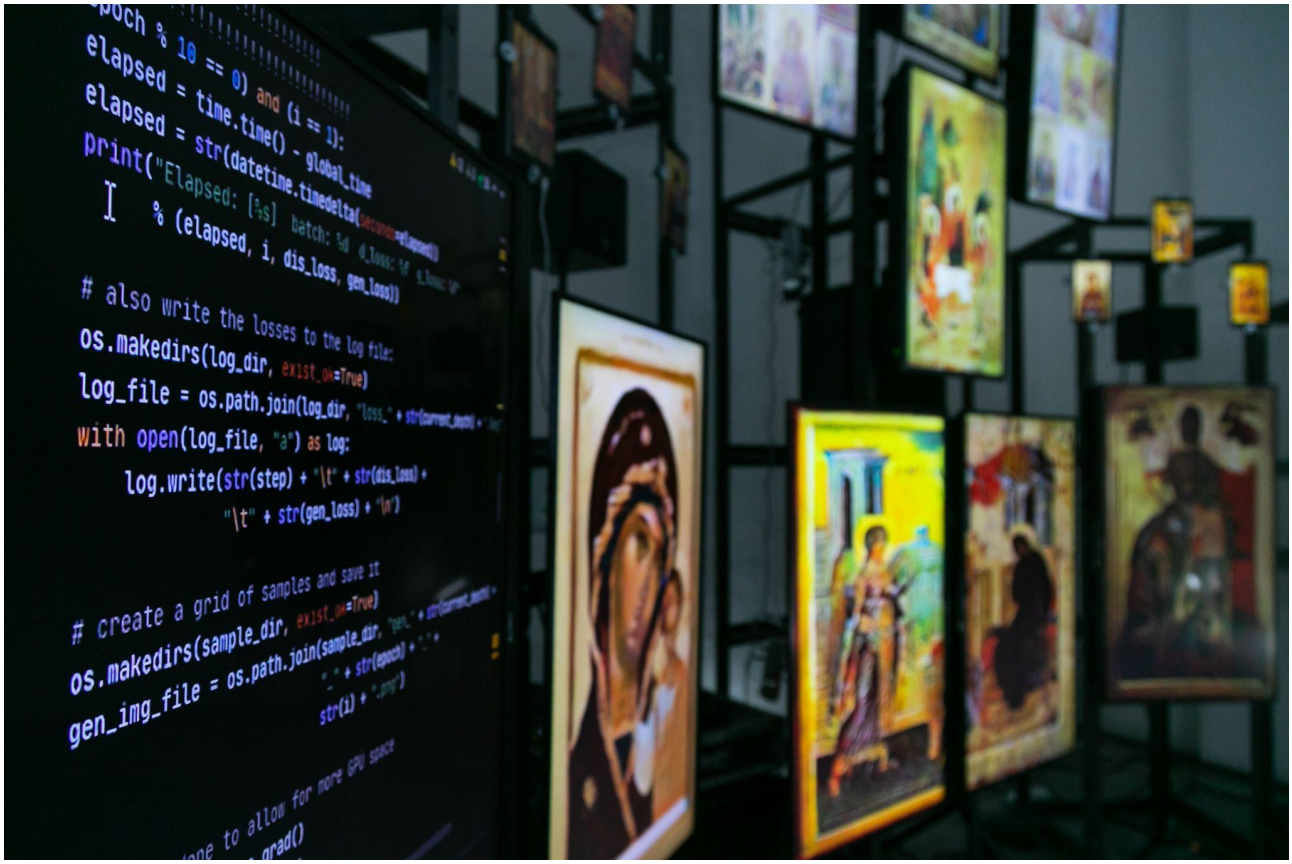

Image 21, 22: Kristina Tica, Digital Prayer, installation view, art+science lab, Belgrade, 2020.
Photo: Ivan Zupanc

2.5. RESULTS. CONCLUSION

VISUALISATION OF THE INVISIBLE

A generative digital image that resembles an Orthodox Icon is the result of combinatorial varieties of statistical processing of numerical values through computer code. Based on a set of instructions that we have given to the computer through written code, the computer solves the task. The solutions are gradual, variable, unstable and multiplied, and the research focuses on the search for the image itself, not on one of the final visual outcomes. The algorithm creates a large number of images that can be more–or–less successful, in terms of the resemblance of the artistic structure of the Icons and their canon, but none of these images should be treated as an Icon. They represent precisely the changing state of searching for an infinite number of solutions for a specific task. Through the variations, it is possible to notice the constancy of the representation of the canonical structure of the icon. Icon elements, motifs and objects as detailed symbols are often abstracted, but the idea of their form and position is conveyed thanks to the strictness of the canon of icons given in the database.

If we interpret and classify the results according to diversity, we separate them according to the degree of interpretability of the resulting deviations. Abstracted details and 'failures' in the creation of a solid structure of elements in the picture give us as observers space for abstract and associative interpretation. Where there are fewer deviations, there is discomfort in recognising the generative image as an icon, at first glance, while in the next wave, it is recognised that the icon has deviations and ambiguities in the drawing and the structure of the elements. More deviations make the image more abstract, and more blurred. Results with such characteristics still resemble an icon, because the canonical structure is retained in some elements and parts of the image. In a database, the compositional relationships of an image are most frequently repeated, more so than the arrangement of colours or details. Thanks to the strictness of the composition, the algorithm was able to recognise and replicate the compositional/structural aspect of the canon. In a way, this is a form of iconotropy, the appropriation of one cultural symbol into another culture for a different purpose, or with a different meaning. This can be a possible treatment of the generative image in Digital Prayer, but only in a representational or figurative sense - the algorithm simulates the appearance of an icon - however, it does not hold the same symbolism or semiotics. The context I assimilate is the purpose of an image, the meaning it holds as a representative of an immaterial, all-knowing, higher-source, transcendent image. As previously explained, in this project, we are iterating combinatorial transcendency, we are not divining generative image samples. From the *cloud* to the screen - the importance of visualisation of the code and the execution process was present so as to materialise the processes that might seem immaterial but actually require massive physical and energetic resources so to grow and develop, having their own architecture, infrastructure, undersea cables, data centres, etc., being quite an opposite of how it is being presented, so as above - so below, as virtual - so it is tangible.

Even though this project does not address directly the geo-political aspects of artificial intelligence, it aims to provide a critical look behind the scenes, so to provoke further thinking and research on the topic.

The tendency was to discuss the belief in images, juxtaposing the Orthodox Icon as an example that keeps an objective of its representational level but not on the level of the teleological. In this case, the Orthodox Icon was not treated through a context of sacral imagery, yet the belief in the coded image was questioned with the given allusion. Digital Prayer as the title, on a level of a broader context, and an analogy implying that the code - computer code [is a word] that makes the matter, or prompts an execution, a formation, that we perceive as an image, icon, symbol [in the particular sense of this project]. As the code is the visibility of *the invisible,* it is a *digital prayer* that makes the image. On a closer level, it was a critical approach towards the demystification of AI, by mystifying it through another older system of belief. An object of belief, or faith, does not always have to be tied to a religion, in a historical or political context. A premise of trust as a form of belief is created from the cultivation of a view from above, by a claiming–to–be neutral, or rather non-human agency. Also, a resemblance through the concept of *the Cloud*[140]*,* virtuality as the concept of the immaterial is being proposed, whilst data storing and computational processing is very much material and grounded. Therefore, this project carries a critical tone towards the mythologisation of technology, which is dependent on all kinds of resources, from material to physical and mental resources - wired, draining and accelerationist-extractivist[141].

The Digital Prayer is about the scope of the belief in images, appearance and disappearance of the symbols and notices of a nowadays virtual, simulated infinity rather than a transcendent world that is seemingly separable from the physical reality as it becomes the mental scope of awareness, if not belief, at the farthest extent mentioned. It has transposed cultural coding and cultural heritage of a locally-specific context, to a more global (still Western world-oriented) systemic shift of belief in *techno-code* into the

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[140] Benjamin Bratton's notion of *Cloud Feudalism*: "One possible, but by no means inevitable, outcome of the consolidation of *Cloud* platforms into *Cloud* polities is *Cloud* feudalism, characterized by overly centralized capture, consolidation, and distribution of value by those platforms. In this scenario, *Cloud* polities realize effective if also informal sovereignty over how they use *Users*, such that the ratio of platform surplus value to platform user value is highly asymmetrical and dramatically weighted in favor of the former at the expense of the latter. Unlike in medieval feudalism, where serfs were tied to specific sites and plots, for *Cloud* feudalism, *Users* are untethered from specific locations and migrate from one provisional labor interaction to another. *Cloud* feudalism may arise in relation to automation, but automation may also lead to entirely different macroeconomic outcomes.", Bratton, *The Stack: On Software and Sovereignty,* 369.

[141] "Digital labour – the work of building and maintaining the stack of digital systems – is far from ephemeral or virtual, but is deeply embodied in different activities. The scope is overwhelming: from indentured labour in mines for extracting the minerals that form the physical basis of information technologies; to the work of strictly controlled and sometimes dangerous hardware manufacturing and assembly processes in Chinese factories; to exploited outsourced cognitive workers in developing countries labelling AI training data sets; to the informal physical workers cleaning up toxic waste dumps. These processes create new accumulations of wealth and power, which are concentrated in a very thin social layer.", Crawford, Joler, *Anatomy of AI, part IX,* https://anatomyof.ai/. accessed December 21, 2022.

belief in images[142], that for the *ideology of AI* might serve in an analogous political way to what in the Medieval times was the purpose or the role of an Icon[143]. Without discrediting the significance, religious, aesthetic or any human-sourced interpretational or creative value of an artefact such as the Icon, this project mainly analyses the teleological and epistemological aspects of an image-making purpose, as a symbol of a particular zeitgeist overlap - in this case, between the [mediaeval] feudal and contemporary neoliberal [techno-feudal or techno-capitalist] times. Mystification and power come hand in hand, making the power seemingly distributed, immaterial and invisible.

Image 23: Kristina Tica, *Digital Prayer, crucifixion_4_89_08042020,* private archive, 2020.

[142] Flusser, Vilém. *Writings*. Edited by Erik Eisel and Andreas Ströhl, translated by Erik Eisel, University of Minnesota Press, 2002., 40.

[143] As Uroš Krčadinac in his essay, *Data Vizantija / Data Empire* added: *"it is a supreme mystification of power." https://krcadinac.com/rad/sveska/data-empire/. accessed December 25, 2022.*

3. FUTUREFALSEPOSITIVE

This is not an imitation game but an identification game.
Hito Steyrl - *A Sea of Data*

Image 25: Kristina Tica, FUTUREFALSEPOSITIVE, installation view, Ars Electronica Festival, 2021. Photo: Miha Godec

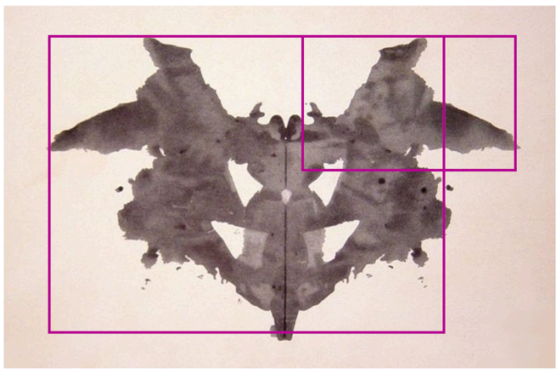
FUTUREFALSEPOSITIVE is a project based on StyleGAN and an object recognition algorithm applied to the fortune-telling ritual of Turkish coffee cup reading. A database of 1,000 images of coffee stains in mugs has been collected, out of which new images have been generated. The current total of real-life and 14,000 generated images are morphed into animation and further used by the object recognition algorithm to recognise objects in these random shapes created by coffee stains and generated noise. In this process, a relation has been established between the statistical bias called false positives in computer vision and the psychological phenomena of *pareidolia* and *apophenia*. The interplay between prediction as a false positive and prophecy as apophenia does not only focus on absurdity but on possibilities of creative interpretation when understanding the technical processes behind this work. It is a meta-commentary on the dataset training processes for object recognition inscribing remarks and criticism towards the implementation of object recognition [and face recognition] in surveillance systems, bias and the modules of understanding such softwares. The crucial layers of building and

implementing recognition models are crowdsourcing, non-transparency in datasets and labelling processes, leading to human bias causing discrepancies in an ethical and moral context, and consequences of the computer-generated outputs. This project also intertwines the layers of our [human] expectations of the application of these systems - when a calculated prediction can become as arbitrary as an intuitive prediction such as fortune telling, the question of truth-value differs as we rather believe in mathematical accuracy as a likely *truthful* result, while in reality none of these predictions necessarily have to be relevant, or truthful when applied onto complex categories of situation analysis, or face detection based on race, gender, emotion, and so on - since the training of these databases is dependant and developed on the human factor, and therefore, human bias.

Image 26: Kristina Tica, *FUTUREFALSEPOSITIVE,* installation view, Ars Electronica Festival Linz, 2021. Photo: Indiara di Benedetto

3.1. BEGINNINGS

FUTUREFALSEPOSITIVE was developed during my studies in the Master programme Interface Cultures at the University of Art and Design in Linz, during the course of several months, from April to September 2021. The initial premise of juxtaposing apophenia and pareidolia with the statistical *false positives*, emerged while experimenting with at the time available web-based object detection algorithms, among which - Microsoft Azure[144], Allen AI[145], and also the model presented at Ars Electronica Museum in Linz. As perceiving the computer bias and human bias as a sort of collective [un]conscious, or *corporate animism,* I presumed that a *Rorschach test* could give us a glimpse of what is going on in this meta-structure. In an associative play, I was hoping to extract some results from various object detection algorithms, and as it has [expectedly] happened, results that were a false positive emerged in every one of those. I was uploading or showing on live webcam input examples of Rorschach inkblot tests to the different models, as mentioned above, and each time it resulted in a curious output. The conclusion was that a computer algorithm for object detection is always instructed to perceive a probability of an object present, even when there is none - and that became the following premise for the development of this project. As this was only an initial test, I was aiming to expand this finding into a format that also relates to a ritual, as it was a fortune-telling one, being another example of divination that relies on arbitrary codes and intuition, but also on a predictive value. If we can expect object detection models to be determinatively accurate, why do we perceive the possibilities of a human prediction as fraud, faulty apophenic syndrome of interpretation? In this context, any future-telling prediction is disregarded, the conceptual intent of the project was to analyse the concepts of object classification for decision-making, not only for the psychological need for the concept of the future, but rather as a dissection of current times, and a database as a threshold of the historical past of the *real* and the *datafied* perception [or datafication] of the world as *virtual*.



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Description	{ "tags": ["clock", "photo", "bird", "front", "flying", "sitting", "table", "air", "group", "large", "old", "sign", "standing", "smoke", "tall"], "captions": [{ "text": "a bird flying in the sky", "confidence": 0.5275012 }] }
Image format	"Jpeg"

Image 27: Microsoft Azure object detection algorithm applied to an image of the first out of ten inkblot pictures from Rorschach inkblot tests. Private archive, Kristina Tica, 2021.

144 Microsoft Azure demo, [link not available]. accessed March 5, 2021. private archive, Kristina Tica, 2021.

145 AllenAI web-based demo version of object detection tool: https://vision-explorer.allenai.org/detection. accessed November 25, 2022.

The shape of the blot can serve as a stimulus for free association, not only for humans, but for algorithms. They are instructed to search, recognise and classify. They have to come up with a result, false positive, or false negative, in our perception accurate or inaccurate, but the calculated result treats abstraction and objects the same. They belong to the same grid, they share the matrix, a pixel is a pixel, the shape is a probability of a pixel value at a given position, and the object is a cluster of those. Calculation gives results that it is instructed to give. If it is *wrong*, the premises and parameters are wrong. Giving names is not assigned to this agency. To give meaning is not calculating, it is *thinking?* part of the process. In this industry, humans are working on datasets as much as computers. Even more. We have too many problems understanding our own thinking processes which no statistical operation will solve unless we switch our beliefs and rituals to accommodate ourselves in it. This is wrong as much as we are wrong. Every system has its shadows, and it is important to understand them before we enter the *unbearable lightness of screening*. As presented in chapter one of this thesis, with examples such as ImageNet, a computer vision therapy seance should be performed to reveal what humans think of humans, when in the position to decide. Towards corporate animism, the benefits of crowdsourcing and limitations that open the collective unconscious - optimised training of our moral ethical and cultural codes.

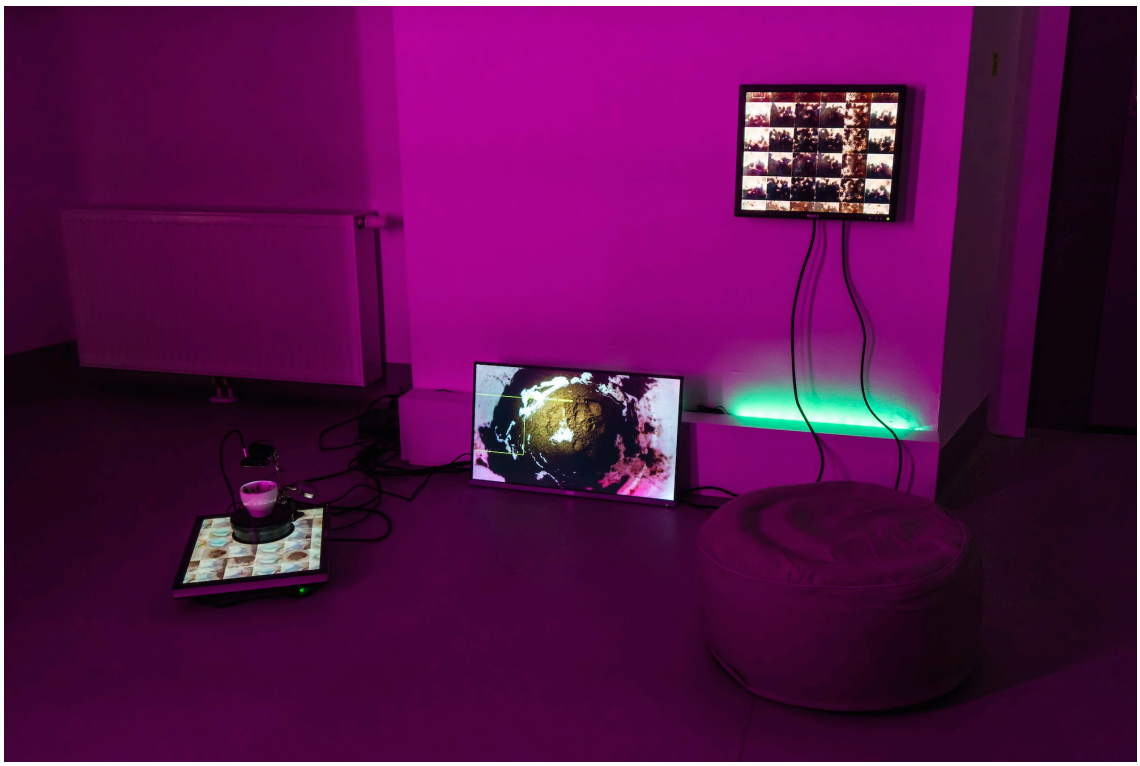
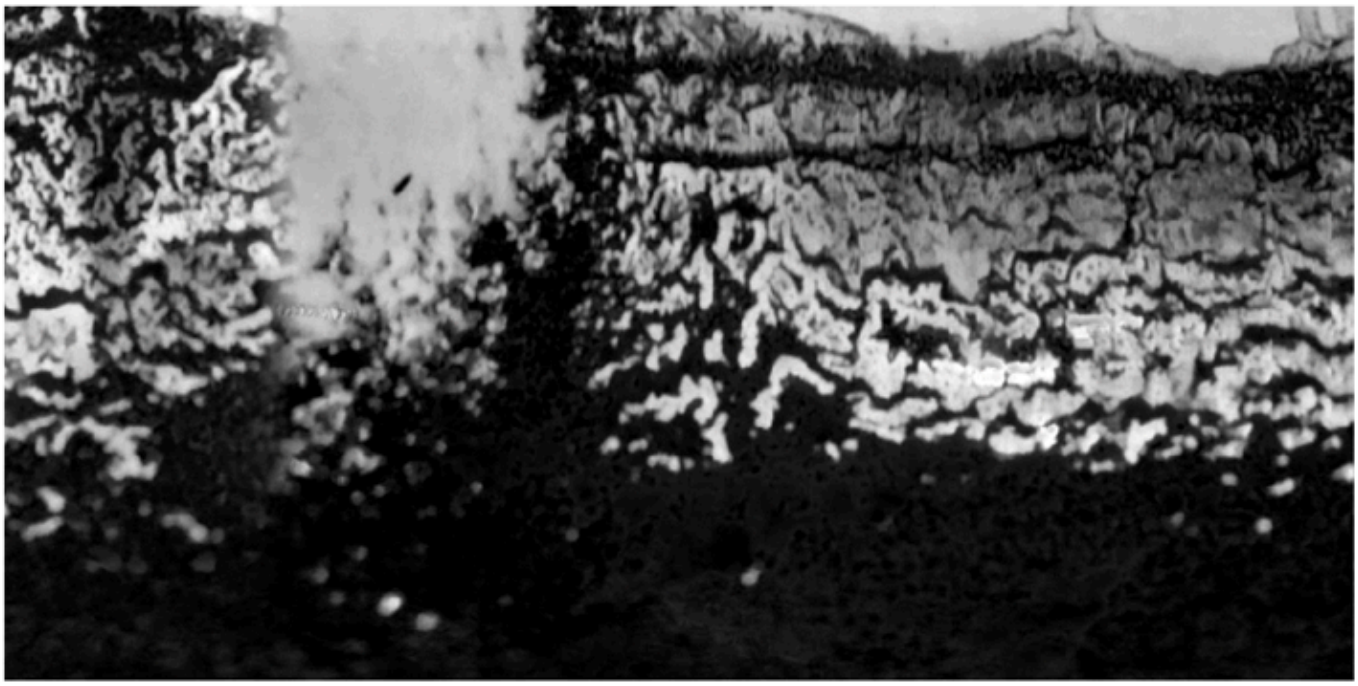


Image 28: Kristina Tica, *FUTUREFALSEPOSITIVE,* installation view, Ars Electronica Festival Linz, 2021. Photo: Indiara di Benedetto



FEATURE NAME:	VALUE
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Image 29: A photograph of coffee stains in a coffee cup uploaded and applied to Microsoft Azure online demo version, private archive, Kristina Tica, 2021.

3.2. APOPHENIA AND FALSE POSITIVES

COFFEE CUP READING

Coffee cup reading is a form of tasseography, or divination that interprets shapes patterns in coffee grounds, or coffee stain residue on a coffee cup after the coffee has been drunk, to tell or foresee a person's future. It is a ritual commonly practised [for entertainment, mostly] in many regions of the Balkans, and it originates in Turkey. There are rules and interpretations of specific nouns or symbols that can be found in a cup, that are indeed arbitrary, some of them more, some less common in general interpretation.

PAREIDOLIA/APOPHENIA: HUMAN BIAS

Apophenia is a type of illusion or misperception involving a vague or obscure stimulus being perceived as something clear and distinct, a spontaneous perception of connections and meaningfulness of unrelated phenomena. The term was coined by German neurologist and psychiatrist Klaus Conrad (1905-1961). By Benjamin Bratton, it is "drawing connections and conclusions from sources with no direct connection other than their indissoluble perceptual simultaneity"[146]. Pareidolia represents a phenomenon of misperception or illusion, and apophenia represents connected interpretations of unrelated phenomena. Pareidolia becomes apophenia when the subject interpolates a message or a meaning into what was seen and recognised as a symbol, depiction or sign. Both are considered to be valuable in psychology and psychiatry for understanding a patient, where the subject projects current desires, obsessions or traumas onto random shapes, objects, etc. Outside of clinical circumstances, artists often apply these as a common part of creative practices.

In her essay, *A Sea of Data: Pattern Recognition and Corporate Animism*, Hito Steyrl contextualises apophenia as *"a misextraction, an act of failing interpellation and recognition that can have social consequences. As several people pointed out, data can also be misunderstood as Dada. Ways of collaging data have characterized current popular aesthetics. The creation of improbable combinations and the crossing of the limits of the likely can be interpreted as a silent and even involuntary act of rebellion against pattern recognition. The manufacturing of improbable and implausible objects via all sorts of data manipulation tools is a way of confusing automated ways of recognition—face recognition, recognition of behavioural patterns, recognition of shapes, and the simultaneous creation of categories of political recognition."*[147]

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[146] Bratton, *The Stack: On Software and Sovereignty*, 320.

[147] Steyrl,"A Sea of Data", *Pattern Discrimination*, ed. Clemens Apprich et. al., 21.

FALSE POSITIVES: COMPUTER BIAS

A false positive is an error occurring in binary classification, where the system incorrectly generates an event when no real event or condition has occurred or wrongly indicates that a particular attribute is present, or in this specific case, detects a pattern where one does not exist. Where *"likeness collapses into probability.*[148]", there will always be a *Type I Positive*[149] in the *confusion matrix*[150]*.* In this project, I assimilate with a type of human apophenia. Creating an environment where statistical or algorithmic bias happens[151], this project does not aim to humanise technologies, but to interpret the characteristics of mathematical calculation within the scope of accuracy, belief and therefore truth and reliability - that are not proportionally distributed within the context of cause and effect. I propose another layer of human bias in this project, not as the one that is part of the model development or algorithmic agency, but one of belief in automation and neutrality of a[n non-living] agent providing output results.

REFERENCE EXAMPLES

Some of the examples that influenced the development of *FUTUREFALSEPOSTIVE* were Kyle McDonald's *Exhausting a Crowd* (2019), KairUs's *Suspicious behaviour* (2019), Shinseungback Kimyonghun's *Cloud Face* (2012), but also David Rokeby's *Giver of Names* (1990-). As for *Exhausting a Crowd* and *Suspicious Behaviour* - these examples are focused on crowdsourced annotation - I was inspired by Kyle McDonald's approach of accessible, open-form of annotation on live feed city cameras, where anyone on the web is allowed to access and label the current situation they see on the feed, in an open written form pinned as a text-box on the particular area, leaving space for creative interpretation and narration. It is a project that establishes a crowdsourced form of annotation – *on a crowd,* arguing towards the arbitrariness of annotation. On the other hand, KairUs (Linda Kronemann and Andreas Zingerle) created a work that allows the spectator to try out the annotation of image and video files in a format that is similar to the real systems where people are employed to discriminate between suspicious and non-suspicious behaviour as fast as possible, so to label as many situations (for which they proportionally get more money) - it is a poorly paid, exhausting process that is presented so to explain the back-end of these automated 'intelligent' systems. The remark to a problem is that the participants can see for themselves, how superficial and quick these processes are, and therefore experience the lack of trustworthiness in how these tools are

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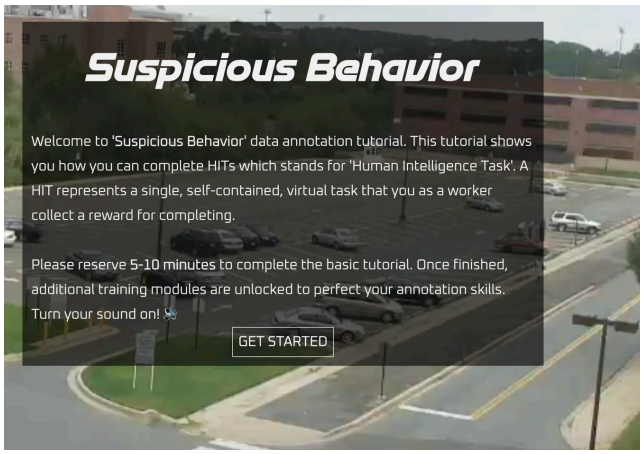
148 *ibid.,* 10.

149 *Type I* stands for statistical *false positives* - and type II stands for statistical *false negatives: false negatives* are the opposite state of statistical error, where the algorithm does not recognise the specific event, or a result which wrongly indicates that a particular condition or attribute is absent.

150 A *confusion matrix,* or *error matrix*, is a table layout that allows visualisation of the performance of supervised learning algorithms

151 "An "Unbiased" Guide to Bias in AI: Ethical vs. statistical bias in AI/ML models." Shahrokh Barati. *Towards Data Science*. (December 15, 2022.)
https://towardsdatascience.com/an-unbiased-guide-to-bias-in-ai-3841c2b36165. accessed December 26, 2022

made. The human bias can come as a very easy slip since there is no concrete evaluation except for the personal opinion of the workers, which is time-pressured, and stressful, concerning the amounts of content they are required to watch and ‘analyse’. It is an example of the real-life labour of the fast-paced sport of image classification.



[Left] *Image 30:* Shinseungback Kimyounghun, *Cloud Face* (installation view at Ars Electronica Center, 2014-2021), 2012, Pigment print on DIBOND, the composition of 50 images, 100 x 100 cm each[152]
[Right] *Image 31:* KairUs, *Suspicious Behaviour,* 2019[153]

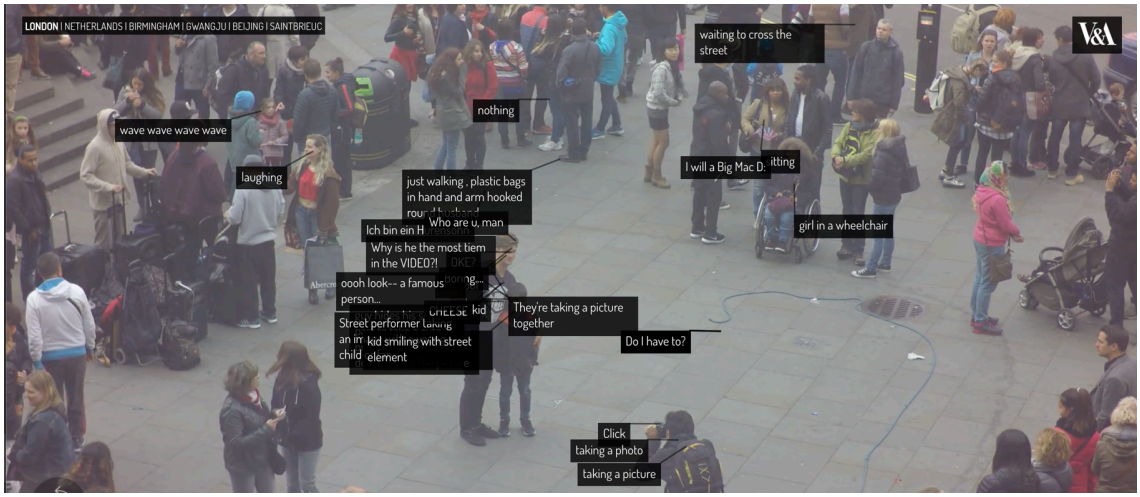


Image 32: Kyle McDonald, Exhausting a Crowd, 2019[154]

Cloud Face is a project that introduces apophenia as computer bias. *“Humans see figures in clouds: animals, faces and even god. This kind of perception also appears in machine vision. Face-detection algorithms sometimes find faces where there are not any. 'Cloud Face' is a collection of cloud images that are recognized as human faces by AI. It is a result of AI’s error. Humans also see faces from some of the images, but humans don’t think of them as actual faces. Humans rather imagine faces from the clouds. The error of machines and the imagination of humans meet here.”* The artist duo was referring to apophenia,

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152 Retrieved from: http://ssbkyh.com/works/cloud_face/. accessed December 10, 2022.

153 Retrieved from https://kairus.org/suspicious/. accessed November 7, 2022.

154 Screenshot retrieved from https://www.exhaustingacrowd.com/london. accessed November 25, 2021.

using a face detection algorithm towards the clouds. The interplay between human and computer bias, on one hand, humanises machine vision but on the other criticises the context of knowledge using and understanding the recognition processes. A very neutral example in regard to the surveillance politics, rather semiotical, conceptual and contextual character of the artwork.

Another example, *The Giver of Names*[155] by David Rokeby is an interactive installation in which a table surface is observed by a camera system. As soon as an object is placed on the table and recorded by the camera, a computer system connected to the camera analyses the observed visual structure performing many levels of image processing (outline analysis, division into separate objects or parts, colour analysis, texture analysis, etc.) and matching it with a label from an existing database of shapes and words. The results of the analysis trigger a short, quasipoetical text that is composed of words from the database, displayed on a computer screen, and read out by a text-to-speech system. Here Andreas Broeckmann makes questions: *Is this a simulation of how we make sense of the things we see in the world? Or is it a potentially autonomous perceptual machine system that might work as a training device for machines, trying to develop a human sense of poetic language, based on visual input? Would we say that what the machine observes in The Giver of Names is an "image"?*[156] Even though this project does not use the latest object detection algorithms and models, it does deconstruct and explains the same principle of object detection and image-reading processes. With different tools and over two decades before object detection via ANNs has been recognised and commonly applied, this example provides a schoolbook understanding of the anatomy of machinic vision. Rokeby also provides a disclaimer on non-human agency:
"*For example, it has no human real experience of the world. It has not burned its hand, scraped its knee, been hungry, angry, fallen in love, or wanted something it couldn't have. It does the best it can to talk about the objects from its very particular point of view. [...] My intent as an artist is that sufficient tension exist between the object and the name given to challenge the viewers' preconceptions of the objects, and draw them into speculative exploration. The names will have something of the quality of titles that artists give artworks: something a little out of left field, representing a re-interpretation, or alternate interpretation of the visual image of the object. One aim is to highlight the tight conspiracy between perception and language, bringing into focus the assumptions that make perception viable, but also biased and fallible, and the way language inhibits (or alternately enhances) our ability to see."* There are two layers of the project, one is perceptive and the other interpretative. It is not naive to introduce poetic or narrative meaning/trigger assigned to the objects, it is a very intelligent way of mobilising the tool into a system for creative interpretation and to create a world of one's own - computer - and the given objects appearing in its universe - scope of the given knowledge. It encapsulates the given universe, and provides machinic agency within it. Nowadays, such an approach in

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[155] David Rokeby*, The Giver of Names, 1990-*, www.davidrokeby.com/gon.html. accessed November 29, 2022.

[156] Andreas Broeckmann, "Image, Process, Performance, Machine: Aspects of an Aesthetics of the Machinic", ed. Oliver Grau, *MediaArtHistories,* 196.

automated vision - object and pattern recognition - designated to ANNs computational processing is overflowing into a surveillance modality over our reality, mobilised into tools for labelling, categorisation and discrimination.

Who is the Giver of Names now?

Image 33: Rokeby, The Giver of Names, 1990[157]

The systems that are 'watching' us are made by humans for humans.

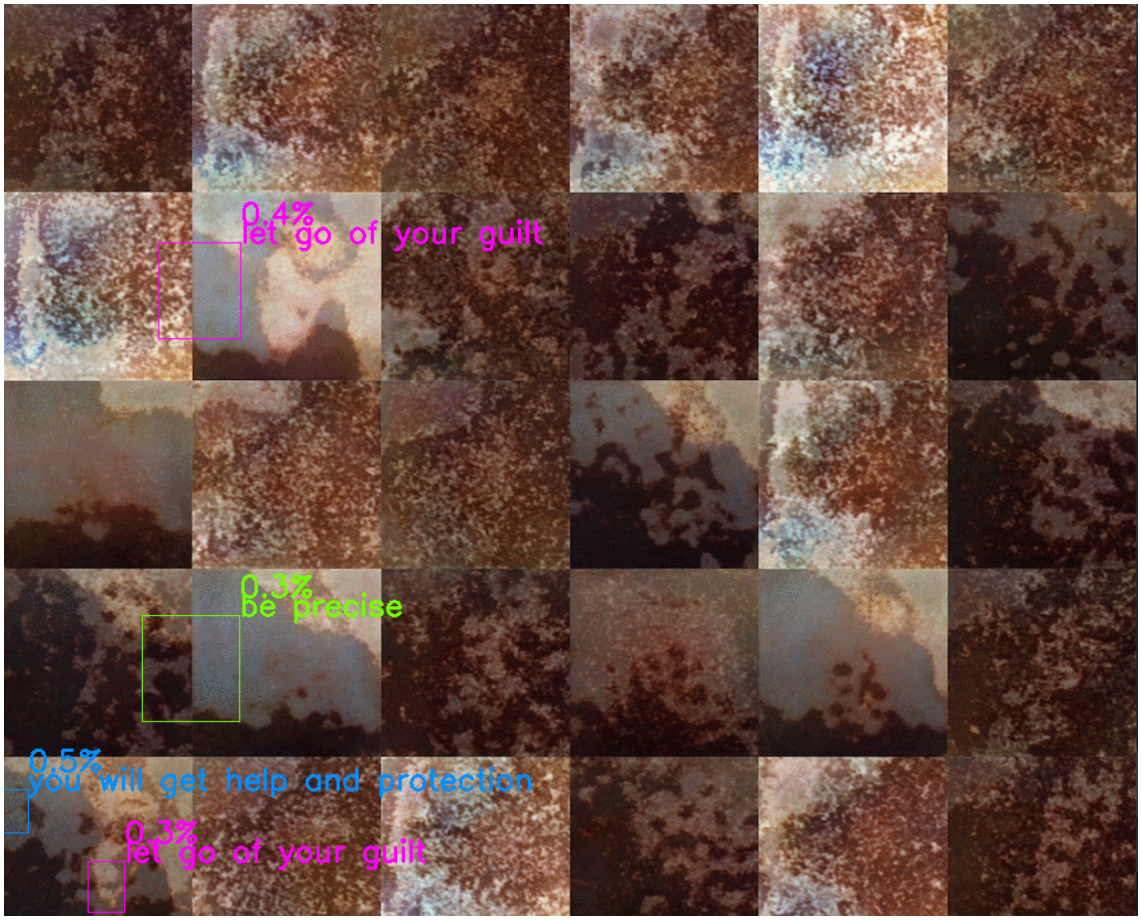

Image 34: **Screengrab from *FUTUREFALSEPOSITIVE,* video no.2, private archive, Kristina Tica, 2021.**

[157] Retrieved from www.davidrokeby.com/gon.html. accessed November 29, 2022.

3.3. IMAGE-READING PROCESS

At the beginning I manually collected a database of around 400 self-made images of coffee stains in coffee cups. Before I was sure that I can optimise the tools to run the process in real-time, I prepared a *styleGAN* model to sample generated images out of the given database, and to detect the differences in noise evaluation with the *YOLO-v4*[158] algorithm. I have applied a new database of about 14.000 generative images compressed as video files, to run the *YOLO* script on them and record the video of it. These materials were used as video loops in the project. The *YOLO* script for object detection was pre-made, and I was running initial tests on the original code, to estimate the possibilities of the emergence of false positives - recognising objects in abstract shapes. As that experiment was successful, and the algorithm was trying to detect objects where there were none, I continued the development of the project. Meanwhile, professor Tomas Hoch and my former collaborator Miloš Trifunović [on *Digital Prayer,*] contributed with important adjustments, where we managed to run the code in real-time from a live video feed. In the real-time process, the testing showed that with each rotation of the coffee cup in the installation, the algorithm always recognises something different. False positives were not only there because of the confident reoccurring prediction in the initial noise patterns, but with each iteration, a different *false* output would emerge. For the annotation, I altered the labels into general superstitious symbolism/meaning of the given nouns that were originally added in the set (telephone, bird, pizza, cake, etc…).

Changing eighty pre-given labels from the training set - the *COCO*[159] annotation database, into their fortune-telling, symbolic meaning found online and through narrative input from friends who learnt the coffee cup reading symbols in the ritual. Even though the training set can be manually done, from *scratch*[160], I decided to use a pre-made one, because I did not intend to create only an automated fortune teller, but to enhance the *non-agency* level of an automated system and to conceptually relate apophenia and false positives. Keeping a *ready-made dataset* as an example that can still be applied to the patterns and the noise of the abstract shapes in the coffee cups proves the arbitrariness of the patterns, therefore a custom-made system would not claim such characteristic. Examples of the labels are basic object-oriented nouns, such as ‘fork’, ‘cake’, ‘cat’, ‘dog’, ‘flower’, and so on. As these nouns are common, relatable, general and therefore, unspecific, they were also easily translatable into a symbolic meaning. The mentioned symbolic meanings were not as specific in the prediction of a future event, they rather possess an element of advice, an oracle that is, again, arbitrary, such as - ‘you have a loyal friend’ for ‘dog’, or ‘satisfaction in small pleasures’ for ‘cake’. For the sake of the frequency of outputs, I was

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158 YOLO stands for ‘You Only Look Once’ is a popular real-time object detection algorithm. The source code used for FUTUREFALSEPOISTIVE is available on GitHub: https://github.com/Tianxiaomo/pytorch-YOLOv4. accessed December 27, 2022.

159 *COCO* stands for ‘Common Objects in Context’, one of the biggest object detection, segmentation and caption dataset https://cocodataset.org/#home. accessed December 26, 2022.

160 An online source example of traiing your own *COCO* dataset https://www.immersivelimit.com/tutorials/create-coco-annotations-from-scratch. accessed December 26, 2022.

lowering the threshold (cut-off) value to increase the probability of recognising patterns. An enhanced false interpretation is not exactly false, the computer or the algorithm accurately does what I have told it to do - it sees what I want it to see. The matter of a false positive effect is enabled by the statistical bias, however, the meaning of the result depends only on human [mine as the author's] bias. The aesthetics of this process were kept in a similar way to the original code, which is visually most recognisable for object detection algorithms - a square-shaped edge box with text output above, consisting of the caption and the statistical confidence of the detected object in the area of the box.

Image 35: Kristina Tica, *FUTUREFALSEPOSITIVE,* installation view, 20th Biennale Pančevo, 2022. Photo: Luka Jendrišek

3.4. PROJECT PRESENTATION

The project was first exhibited *at Ars Electronica Festival 2021* in Linz, as part of the *Interface Cult,* Interface Cultures group exhibition. The visitors could observe a rotating coffee cup being live-recorded, and streamed onto a screen on which different predictions would appear, aside from the other two pre-recorded video loops. A similar setup was done in Munich in May 2022, at the *Symposium on Artificial Creativity* at the *University of Theatre and Music,* as part of an exhibition curated by Christl Baur, which was an additional programme of the symposium and panel discussion*;* and in *Pančevo 20th Biennial of Art,* curated by Maja Ćirić in Pančevo, Serbia, also in May of 2022. Further discourse on the project was established through a keynote presentation *Social Marginalisation and Machine Learning: Defying the Labels of the Machinic Gaze,* an online panel discussion h*oste*d by Autograph ABP Gallery in London in August 2022 - reflecting on the politics, social outcomes and power dynamics at play in working with AI, where I was among three artists will present their work along with Kin [Cultura Plasmic INC] and Sophie Hoyle, followed by a conversation chaired by Dr Cecilia Wee, and a Q&A.

INSTALLATION

The setup of the work consists of a computer, web camera, jewellery turntable, a coffee cup with coffee stains, LED light and three screens - a three-channel video installation, out of which two are video loops and one is a real-time video. The two video loops show pre-recorded iterations of object detection on sequences of *styleGAN-generated* imagery of coffee stains, stacked in grids, adding to the abstract shapes even more noise. They are the matrices on which the initial algorithm was tested and serve as an example of a fast-forward thinking process of iterations that resulted in many different detection outputs. The real-time video is run through the Python code and it detects patterns and objects from a web camera input that is recording a close-up of the coffee cup. Besides the continuous loop of video-based object detection, a real coffee cup has been placed in the space, so the algorithm also detects the patterns in real-time. The algorithm performs a continuous object recognition process in real time - it is ‘reading the cup’ while producing new visual narratives in a loop. The project was not intended to be interactive for the last exhibition setups, but the visitors could test it on occasion. The key principles could have been observed through the aesthetics of a loop, where with each rotation of the cup the algorithm iterates similar yet different outputs - aiming to focus not on accuracy by interpretation, but on the logic of execution within the system. As with *Digital Prayer*, I intended to keep the framework of calculation as computer labour stuck within its own [statistical] reference points until their exhaustion. The algorithm aims for probability, and it will not stop unless we prompt it to do so. Another layer of probability are confidence levels - as they were presented next to the textual output. Confidence is the key aspect of probability - as in the code the score goes between 0 and 1, I multiplied the print prompt output, and therefore amplified it by 100%, to get decimal values that are more common in the public discourse in any statistical report, especially in the media, as emphasising the

statistical overview amplifies the confidence and veracity of the data. Loops, turns, and repetitions, are aspects of rituals, as predictions and prophecies are too, regardless of their application to divination or statistics in the specific social or humanistic contexts - in this case, trapped into their own self-referential world of command–execution. The culturally-coded aspect of the ritual was an opening touchpoint for the audience to immerse and become curious about the topic, or possible *virtual ritual* as a mystical machinic process of defining~*divining* shapes and forms of an associative, apophenic kind. The transition of a culturally and topographically specific ritual such as coffee cup fortune-telling had a goal to provoke sensitivity within the spectators so as to deploy yet another analogy that can extrapolate towards the premise of trust given to the automated, machinic vision of statistical nature.

Image 36: **Kristina Tica, *FUTUREFALSEPOSITIVE,* installation view, Ars Electronica Festival Linz, 2021, Photo: Miha Godec**

3.5. RESULTS. CONCLUSION

VIRTUAL RITUAL

Seeing filtered patterns, with the tendency to find and classify personal*ised* information in *noise* is not only the domain of humans, but also of machines. It is not about the signal transmission in communication, it is about classification, categorisation and direct re-shaping and re-structuring of nature, industry, politics and social structures. Automation forms a new way of controlling and subordinating the commodification of nature towards binary statistical decision-making processes. It is not the accuracy that dominates these systems as a sellout for the objectivity in decision-making processes - it is the confidence - a confidence that cannot be judged or doubted on a psychological scale, since the agency is dispersed in a chance of numeric percentage, statistical determinism. This mediator has a more active role in information transmission than ever before. This role not only translates, but often changes the structure of the information, affecting our codes of understanding of what we see, and how we understand it. Given the idea that those systems, based on pattern recognition and statistical probability, are built with the tendency to be capable of predicting human behaviour and characteristics we have to understand better not the systems, but the humans that are trying to build those systems. If the computer can *'see',* what does it *'think'?* There are several levels of understanding information exchange* to be introduced before reaching the main problem:

***[human-[human-computer]-[computer-[human]-computer]-[computer-human]-human]**

HUMAN - MEANING: Humans assign meaning to the [sensory] visual information that we re/perceive around us; Communication is internally [within one system] interchangeable between sensory capacities and the information we want to transmit through codes. Further, it is established between 2+ agencies, again through those two aspects meaning is almost always subjectively interpreted when received. Assigned meaning can be arbitrary or defined upon agreement (code) - codes can be arbitrary or conventional, cultural, upon agreement, inherited, created, secretive or official. Code represents a system of signs or symbols meant to translate information, and it is established through specific conventions. The transmission of the information is performed through the translation of one form to another.

COMPUTER - CALCULATION: The calculation processes are the ways machines ' think'. When calculating, the goal of the outcome is *accuracy.* When talking about computer vision often the accuracy is interpreted as truth [human concept], though in fact, it is calculating the optimal result operating on the database. The analysed methods of pattern recognition where computers are trained on datasets of images to recognise and discriminate patterns that would lead to object recognition, that is object classification for which the computers themselves do not assign meaning [to the objects they recognise] - *that requires human agency who instructs the training process*. **OPTIMAL != TRUTH**

This project can be interpreted as a critique of the overconfidence of statistical determinism within these systems, when the tools that are accessible easily explain the protocol, process of analysis and classification. It is an ongoing game and an imponderable source of distortions of reality towards some other message, riddle, irony or fantasy. Forms of *belief,* in what was perceived, come with the human capability of pattern recognition, which we naturally tend to apply to what we see around us, including those patterns that do not [intend to] objectively exist in that place and to find meaning and significance in this random, coincidental flow of data. Between pattern/object recognition and classification, there is a vast field for failure. Meaning can be transferred through different arbitrary codes, and often humans among themselves have a problem of misunderstanding. Computer code and computational processes cannot perform arbitrary and ambiguous results, they are exact and accurate. Addressing meaning is a subjective human responsibility, and if more than one human being frequently cannot agree on things, will the idea of setting up a system of optimal truth serve as a model of unification of thought? What can be universal about it? A face in the crowd or a face in the cloud, for us, can be a trigger for imagination, inspiration, fantasy, or any other association, but for software, both of them are values of calculation. The marketing, again, belongs to us. *The psychology of the creative eye turns to the psychology of the data.* As these systems may be imposed to control a complex social situation, we are in breach of a problem of a social structure that becomes segregated within the code-control probability of value, of a client, a group, or an individual. Automation through machine learning processes in general should be treated as a tool, and not as a solution. Statistical probability should not be the only interpretational category of human reality.

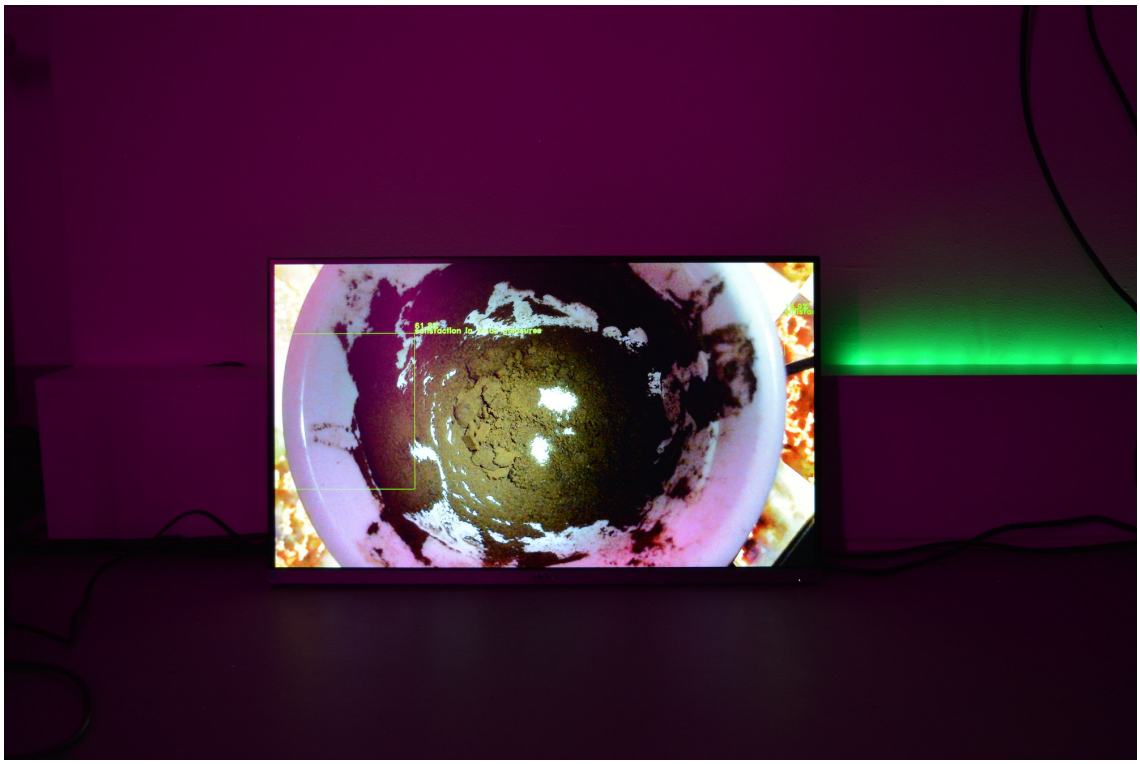

Image 37: **Kristina Tica*, FUTUREFALSEPOSITIVE,* installation view, Ars Electronica Festival Linz, 2021.**

4. PROMPT: WAR STORIES

I can't see what I believe, I can't believe what I see.
Eugene Thacker - *Tentacles Longer Than Night*

Image 39: **Kristina Tica, *PROMPT: WAR STORIES*, installation view, Ars Electronica Festival Linz, 2022. Photo: Miha Godec**

PROMPT: WAR STORIES is a project developed using pre-trained machine learning algorithms and models for text-to-text (natural language processing) and text-to-image processing, through a series of experiments of text prompt inputs that I have chosen to initiate the generative content of the work. These pre-trained models consist of quantified traces of reality and collective histories, becoming a substance for algorithms to generate content that recycles the past. The prompt outputs that formed this project emerged within the topic of *generative violence* and *colonised imagination*. On the borderline between sensitive content and an easy slip into topics of violence, this project explores the depths of the subconscious of these models, excavating the influences of media and online information exchange, producing narratives that are layers of possible war stories, desensitised iterations of collective or global past. Outside of a momentum of historical or empathic affection, these video pieces are prompted depictions of fantasies made in co-creation with these models that create simulacra[161] of combinatorial past. These models

[161]Jean Baudrillard, *Simulacra and Simulation* (1981): Simulacra are copies that depict things that either had no original, or that no longer have an original. Simulation is the imitation of the operation of an real-world process or system over time.

build the spine of quasi-historical narratives simulated by the algorithms and are often obfuscated with prejudice and misinformation, along with the author's personal bias. Experiments that have been made are presented as video pieces, that compile generated outputs questioning the veracity of such imagery, their semiotics, limitations, aesthetics, censorship/ownership, ethics, bias and oversaturation. This project is a conceptual take on understanding and assembling the archive against memory, information against knowledge, content against context, and correlation against causality.

Image 40: **Kristina Tica, *PROMPT: WAR STORIES,* screengrabs video #1[left] and #2 [right], private archive, 2022.**

4.1. BEGINNINGS

After two years of practical and theoretical research on the processes of image-making and image-reading via automated machine-learning-based systems, I was eager to start experimenting with another new way of that image-making has emerged and become globally popular, that were text-to-image models - based on a text prompt input, out of which an algorithm would generate a set of images. What was interesting about such an approach was the fact that such models are offered either as a product or an open-source tool that ends up plagiarised or monetised by another company, however in both of these cases, the models are pre-trained on databases of textual syntax and image resources that are opaque and inaccessible for us as users. The examples of the models are *DALL-E 2 [OpenAI]* and *Stable diffusion* [StabilityAI] both introduced in this research in the first chapter under subchapter *1.2.4 Stable diffusion.* Such databases are stacks of various content - from news reports, *Reddit* and *Twitter* posts along with literature (classic and contemporary), as in imagery from Flickr to original artworks, from photographs to digital arts, these datasets extract not only public content of the media but personal and auteur labour and production. As for the first stable diffusion model the same dataset was used, and the algorithmic foundations of OpenAI's *CLIP* model has an opaque database, whilst the latest *Stable Diffusion 2* model has a public database, *LAION5B*.[162] Regardless, the approach to understanding a model that is a designed bundle of knowledge with pre-assigned meaning, a preset of the world, with its own clusters of associations and connections is not possible through accessing the database structure. The only way of understanding the layers behind is through comparative analysis and experimentation by using the tools themselves.

There is no way of altering the map, it is about navigating the territory.

The project PROMPT: WAR STORIES started as a series of experiments on accessible models for (1) text generating via natural language processing models such as GPT-2 and GPT-3 and OpenAI's *DaVinci-002* and *Curie-001*; (2) text-to-image prompt-based models. The images and videos generated for this project were based on text prompts that were also pre-generated. At the time of the experiment, which began in January 2022, Russia's invasion of Ukraine has not happened yet. The need to continue and pursue this topic came as more determinate after this conflict escalated into a war - not to generate a direct political statement for this particular war, but to contemplate the human state of empathy > anxiety > desensitisation within a perpetual state of conflict. As geopolitical context matters in the ripple effect of long-lasting consequences of any territorial and national conflict of war; on the other hand, we have a virtual paradigm of a non-historical cluster of real-life events – or traumas – turned into data, that is operable on the scale of a non-

[162] Previously introduced in *1.2.4 Stable Diffusion*. "Stable Diffusion 2 is not what users expected of wanted." Alberto Romero. *Towards Data Science. (November 29, 2022) towardsdatascience.com. accessed December 23, 2022.* https://towardsdatascience.com/stable-diffusion-2-is-not-what-users-expected-or-wanted-abfd39524dff.

agent or non-representative scale that does not necessarily mean to be meaning–*less*. In this research, I will not address fake news or *deep fake* content, and troubles of misinformation outside of the general user layer of information absorption via image and text on the screen. To continue, I have deliberately decided to stay within the context of the simulacrum itself, analysing its self-referential elements, not as a metaphor but as a reflection of the psychological state of human interconnectedness in the world of oversaturated media, and re-imagination of reality [whether in an over-reactive or non-reactive context]. In a swarmed image-making world, such synthetic imagery recycles and reiterates stacks of our collective data-image histories, yet it gravitates towards its source of *cognition*, as random or unpredictable as the outputs may get, the recursiveness of motifs display a projection of the western discursive [cliche~comfort] zone in the media interpretations of reality, and fantasy, too.

[Left] Image 41: PROMPT: WAR STORIES [excerpt] "DALL·E_2022-07-01_01.25.07_war_photography_soldiers_pink_sky_landscape", **test sample using *OpenAI DALLE-2,* Kristina Tica, private archive, 2022.**

[Right] Image 42: PROMPT: WAR STORIES [excerpt] "3832630613_In_the_heaviest_attack_since_the_beginning_of_the_aggression__the_buildings_of_the_Yugoslav_Army_Headquarters_and_already_damaged_building_of_the_Federal_Police_were_hit__The_missiles_also_hit_a_residential_area_30-08-2022", **test sample using *StabilityAI Stable Diffusion,* Kristina Tica, private archive, 2022.**

4.2. PROMPT:

***noun*: instruction; answer; feedback;**
In computer science, an aid to the operator of a computer in the form of a question or statement that appears on the screen showing that the equipment is ready to proceed and indicating the options available. a symbol or message on a computer screen requesting more information or indicating readiness to accept instructions.

***verb*: to cause; to generate; to create; to produce; to work; to bring / to induce into action; to trigger; to inspire [an act];**
to assist (a speaker or performer) by suggesting something to be said, offering a missed cue, etc. [autocue - teleprompter][163]

***adjective*: swift; quick; punctual; timely; immediate; direct; rapid; instantaneous;**
quick to act or respond, performed without delay[164]

Medieval Latin prōmptāre - to incite,
Latin: to distribute, frequentative of prōmere - to bring out

The word 'prompt' has been included as part of the title so as to directly resonate with the actual form[at] and the intention of —and within— the creation of the project's content. As the narrative has only been prompted - triggered or initiated, the making process over the content of the artwork has been command-execution based, and not created~imag[in]ed by me as the author. However, with clear intention, I prompted a desired request, idea, verbalisation or word-based explication of what I needed to generate.
The possibility of generative art to not only be dependant or self-referential on physical or algorithmic processes but to transpose a simulacrum of a historical or ideological world and image-based doctrine. This doctrine does not rely on one concept, on one particular context, intention, or event - it is the projection of *something* as *all, a* generative residue of a collective past, created through a simple word syntax preset. On the balance between '*prompt'* and '*war stories'*, I aimed to insinuate the lack of agency in the production result as my last level of intervention is triggering a topic of a narrative. I prompt, my words are a command. The word prompt also has a military association with the command-execution process of a task or a mission.

GENERATIVE VIOLENCE

Text prompt inputs at first were not deliberately chosen to incline towards the content of war or violence. After only a few iterations, the algorithm often generates content that

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[163] *Collins English Dictionary – Complete and Unabridged, 12th Edition 2014*. S.v. "prompt." Retrieved January 5 2023 https://www.thefreedictionary.com/prompt.

[164] *Collins Thesaurus of the English Language – Complete and Unabridged 2nd Edition*. S.v. "prompt." Retrieved January 5 2023 https://www.thefreedictionary.com/prompt.

appears to be a news report, often including war, acts of violence, and politics. Using GPT-2 Language Modelling on Allen Institute for AI[165], GPT-3, and OpenAI's[166] *DaVinci-002* and *Curie-001* web-based natural language processing models (NLPs) for text processing, the generated text outputs often turned very violent, with prompts that were e.g.: *'I remember'* being processed in a sentence *'I remember* the war in Iraq…*'*. As the news reports saturated some of the databases, the style of the generated text frequently did simulate the news article format and content. During the content creation process, particularly with *OpenAI*, the texts were often self-censored - automatically labelled with a sensitive content warning. Obviously, the content itself cannot differ from the mainstream internet fluxus of customised needs, that include explicit and violent content. As the news reports saturated some of the databases, the style of the generated text frequently did simulate the news article format and content, which led to the topics of war. The generated text outputs often turned explicit, or biased depending on the prompts in which I sometimes included a name of a city - '*Belgrade'* would more often cause the output with political or military connotation, whereas '*Paris'* would prompt a narrative of a romantic travel. When specifying prompts on war, some of them were more like a memoir, or a personal report-narrative [I will call it the *first group*], while others included statistical reports and strategies within [*the second group*]. Some resembled war poems or novels, also fiction with underlining conquest~colonialist admiration with heroic undertones [*the third group*]. I would not state that these results were surprising, they were rather expected, as they do cover the representative discursive styles of narration when it comes to the topic of war. After noticing the recurrence and distinction between such styles, I have decided to continue to prompt war topics within these three directions.

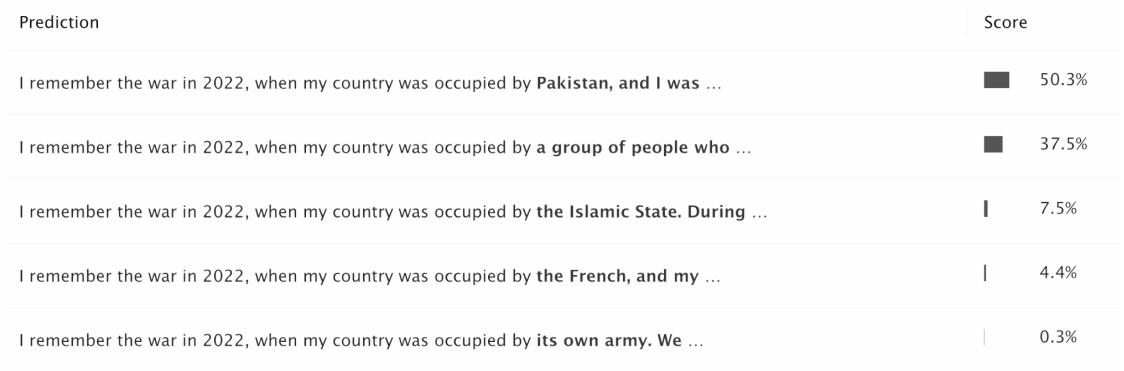

***Image 43: prompt: I remember the war in 2022 / when my country was occupied,* AllenAI test, private archive, Kristina Tica, 2022.**

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[165] AllenAI web-based demo version of natural language processing tool: https://demo.allennlp.org/, GPT2-based Next Token Language Model - a public 345M parameter OpenAI GPT-2 language model for generating sentences. https://demo.allennlp.org/next-token-lm. accessed December 25, 2022.

[166] OpenAI's web-based access to DALL-E 2 at https://openai.com/dall-e-2/. accessed December 25, 2022. https://labs.openai.com/.

4.3. TEXT-TO-IMAGE PROCESS

After creating a text database and beginning with text-to-image generating processes, I have selected the tools I would mainly use, along with the narrative that I would prefer to enhance on the topic and the strategy of the artwork development. As I wanted to explore the thin line between the content that might be censored and the slips that can happen, the trial-error approach emerged as an experimental communication between the prompt [mine] and the platform [output]. Between the ideal~imagined goal, and the possible outputs, varieties and censorship, different goals have begun to re-structure the expectations for my project. Being aware of sensitive content production as a possibility, I have found some references to investigate the scope of interpretation of any kind of resemblance to reality. Once finding alternative prompts to request a similar depiction in output results through slight changes in phrasing, whereas not only words could be detected as compromising, but the clusters of words in the same prompts, syntagms, or syntax that they bring together. In *OpenAI's* natural language processing models, there is a system-integrated sensitive content warning that would appear after the model would create an output. In a way the system was censoring itself, in a form of a warning, in a post-scriptum manner, underlining possible sensitive elements within the text. Regardless to say, sometimes a sensitive content warning was marked on words such as 'Muslim', but also 'president' - in separate and different contexts, that was in no way connected to any form of violence in syntax or in total generative word cluster of given iterations. That was proof that even the sensitive content warning comes as arbitrary — as the databases in the pre-making process were — within this model.

After collecting a list of generative texts I have decided to apply text-to-image models to the materials. I have used web-based tools and *Jupyter Notebooks* in *Google Colab* such as *CLIP+VQGAN, DiscoDiffusion, CLIP Guided Diffusion, DALL-E-mini, ru-DALL-E,* and for final production *Open AI's DALL-E 2, Midjourney* and *StabilityAI's StableDiffusion*[167]. Each of these models had a different capacity and capability of creating images or videos, and they were also trained not only on different databases but also on different semantics, therefore different text processing models. As the last three mentioned - *DALL-E 2, Midjourney* and *Stable Diffusion* are the most advanced and the latest among the mentioned models, they were able to produce imagery with an extent of veracity, still each with their own character. *As for the first stable diffusion model the same dataset was used, and the algorithmic foundations of OpenAI's CLIP. this database is opaque.*[168] In the sense of image production, the possibility of reverse-engineering, a take on analysing the imagery created by other users, and simulating similar outputs by assumptions of what the textual prompts may have been. The author's rights are even more blurred between the input - a textual description of the motif and selected syntax and the company that

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[167] Source code available on StabilityAI's GitHub profile, retrieved from: https://github.com/Stability-AI/stablediffusion accessed December 27, 2022.

[168] "Stable Diffusion 2 is not what users expected of wanted." Alberto Romero. *Towards Data Science. (November 29, 2022) towardsdatascience.com. accessed December 23, 2022.* https://towardsdatascience.com/stable-diffusion-2-is-not-what-users-expected-or-wanted-abfd39524dff.

built the model on a [nontransparent] database. For example, while *DALL-E 2* would create more game-design fantasy depictions of soldiers, or imagery with a dose of psychedelic touch to it, *stable diffusion* outputs had a resemblance to real war photographs, battlefields or landscapes of bombed cities. As some prompts were forbidden, or required for evaluation and approval by the human agency on behalf of the company (OpenAI), in *DALL-E* 2, the limits of veracity or the linguistic path to the desired outcome was sometimes limited. Intending to pursue the creative aspect of the tool, the company opted for ethical measurements in censorship over sensitive contexts that would include an individual's privacy [against deep fake content], violence, and racial or political context. However, that did not mean the bias would be avoided or evaded.

Such conclusions helped me to decide in what way to structure the narrative of the video pieces that I intended to create: on one hand, I decided to focus on the virtual warrior, sci-fi conqueror, a mythological videogame and film industry-style fantasy and fictional heroic character dissociated from the context of actual war; on the other I tried to generate as many as possible images that would resemble real war photography scenes or portraits of soldiers. The generative texts were additionally overlayed on these image and video sequences. I have applied the aesthetics of a *teleprompter* - adding a multi-direction auto scroll text prompt layer of the video. Besides that specific layer of editing, there was no manual or intentional change over the original generative imagery or in the text outputs - all content has been fully generated, as I intended to keep it at the minimum level of personal input or agency in the making and finalising the process.

***Image 44: PROMPT: WAR STORIES, test samples "DALL-E 2_female-soldier-kiss-tiger_28-06-2022- [left] 083/ [right] 076",* private archive, Kristina Tica, 2022.**

4.4. PROJECT PRESENTATION

Image 45: **Kristina Tica, *PROMPT: WAR STORIES*, [version 1] installation view, *Remix Culture*, Esch-sur-Alzette, University of Luxembourg, 2022.**

PROMPT: WAR STORIES had three exhibition setups so far, the first one at the *AI & Art Pavilion for Esch 2022,* as part of *Remix Culture,* Interface Cultures group show in July 2022, in Esch-sur-Alzette, Luxembourg, organised as a research collaboration and dialogue between MA Interface Cultures and MA Computer Science department, by Manuela Naveau from University of Art and Design in Linz and Daniel Karpati from the University of Luxembourg, respectively; the second one as part of *Crossing the Bridge,* Interface Cultures group show as part of Ars Electronica Festival in September 2022 in Linz; and the third one at Speculum Artium: New Media Art Festival in Trbovlje, Slovenia also in September 2022.

INSTALLATION

All of the exhibition setups consisted of a video diptych - a two-screen video loop installation. The first iteration, in Luxembourg, was an initial version that placed two videos in a showroom context, while the Ars Electronica and Speculum Artium Festival versions consisted of a full installation setup with a two-channel video installation inside a camouflage camping tent. For those two occasions, the two screens, that were showing the video loops [left: 10'06" / right: 07'21"], were placed inside a tent, with a reflective foil-covered floor, faux plastic leaves, green LED light stripes, and accompanied by the stereo-headphone sound loop of air-raid sirens.

The intention to install the videos inside of a tent came from the concept of placing an object that is the smallest common denominator for a sanctuary, home, temporary protection or place of rest, or protest. With an aim to isolate, and place a membrane - a space within a space, I created a hideaway, camping or refuge object installation, that occupies not only space, but attention. As a temporary place of rest, where the only informational/sensory influx comes from what is within it – two screens and a pair of headphones, was a gesture towards isolated attention, hyperfocus on the oversaturation of information, and a protest against our own encapsulated media-anxiety, comfortable empathy and induced existential dread when none directly exists. As a wake-up call, out of simulacra, that holds a realistic reference towards the familiarity of a trauma, or general resemblance of personal memory to those who experienced it in a real-life context, I have added the sound of air-raid curfew sirens. I aimed to convey a message of understanding and empathy to all that would understand or resonate with the sound sample of sirens in its particular meaning as an out-of-hypnosis trigger - a reality check and empathic note that subtly contributed to my only personal statement in this work, and only real sample of a universal trigger, a codified warning that sounds the same in any place where war or conditions of a life-threat is happening.

Image 46: **Kristina Tica, *PROMPT: WAR STORIES*, installation view, Ars Electronica Festival Linz, 2022. Photo: Florian Voggender**

4.5. RESULTS.CONCLUSIONS

MASSAGE THE HISTORY

Using text-to-image tools as a creative asset is a useful option, however, it has its leaks and limits, where the combinatorial infinity still recycles the past, and cannot go beyond the limits of the database behind it. As datasets grow, the systems will grow, but there will always be something that is left out. Therefore, the content will always face the possibilities of repetition and overfitting. Uniformisation, or standardisation of expression, is useful in specific industries, but it is a question if these tools will keep their limits of use in such industries, or if their integration might take place elsewhere too. As we are being aware that a database is a primary resource for machine learning systems (ML) improvement - we should also treat it as a threshold between the real and the digital. It consists of quantified traces of the past, extracted from real-life, becoming a substance for training ML algorithms for predictions through statistical probabilities with a premise:

to foresee the future, we are recycling the past.

When applying such processes to decision-making that intertwines with the complexities of real life and our human condition, any tendency to abandon accountability and to describe an automated system as neutral needs to be put into question. Our agency has been neglected, hidden, and the claims of the ultimate truth turn into a dispersion of subjectivity that claims objectivity, or rather totality. When actions are being pursued and mandated by an abstracted authority, we run the risk of reaching *thoughtlessness by automation*[169]. To decode the transition between statistical optimisation, mathematical accuracy, and 'objective truth', this project aims to focus on the affordances of a database for text and image synthesis. Biases and prejudices inscribed by humans can be revealed through applying the right questions and tasks to ML, through which we would be able to restore our understanding of the past and present moments in which we have to claim our rights in content-making with automated systems. Regardless, there is a language-sensitive solution to one part of the problem, probably the smallest one in the queue: Will censorship help in any way to further develop these systems for anything more than copywriting and commercial use, is the only relevant censorship the possible sensitive content, and what about all the sources from which these images and texts appear? To what kind of use such content should be applied, is there any point in simulating a style of writing or painting of an existing artist, is there a point in simulating war photography from databases that suck in millions of witnessed traumas? This project is a reminder that there is no new, no absolute moral or truth that will emerge from any automated system, but an infinity of rendered iterations of reflection of our own world, a bleak interpretation of history, culture or any individual inspiration or condition. As much as we are capable of inscribing meaning to absolutely anything, the only contextual value that these images or

[169] More on the relation between thoughtlessness and automation in reference to writings of Dan McQuillan and Yarden Katz will be elaborated in the chapter *5.1.2. Algorithmic Thoughtlessness*

text possess, the meaning is only in the mind of the beholder - yet another illusion we create for ourselves, but this time one that comes out of no experience, knowledge, pain or love. This artwork is desensitised, automated, and completely generated, its essence is one of lack of agency or personal standpoint - proposing it as a prompted simulation of meaning, information, knowledge and empathy.

Contemplating the ethical scope of generated images of violence, war stories are already a narrative of fantasy, e.g., in video games, but also what is the scope of sensitivity and empathy triggered in media, as the state of war is, globally, a perpetual state. There is nothing surprising about the saturation of such content as the media articles that are one of the data resources for the model's database, yet the question of psychological impact over the perception of such content in the state of its momentum or relevance, versus recycling of historical context turned data that is applied to a system of a premise with creativity, introduces us to another form of simulacrum, along with its shadows. As anti-war I may personally feel, there are more important instances on such topics that I did not address in this project. This project emerged out of vagueness towards tragedy, and memory but also glorified historicity. Fantasies make ideologies, and here *we prompt a lucid dream of reality in which we already are.* Dissociated and desensitised, the information and the experience render two different and equally important realities, one of a non-agent global character, and one of personal truth. Fantasy and reality are intertwined in one, an organism of information exchange seemingly decentralised, with no leader and no agency to hold accountable.

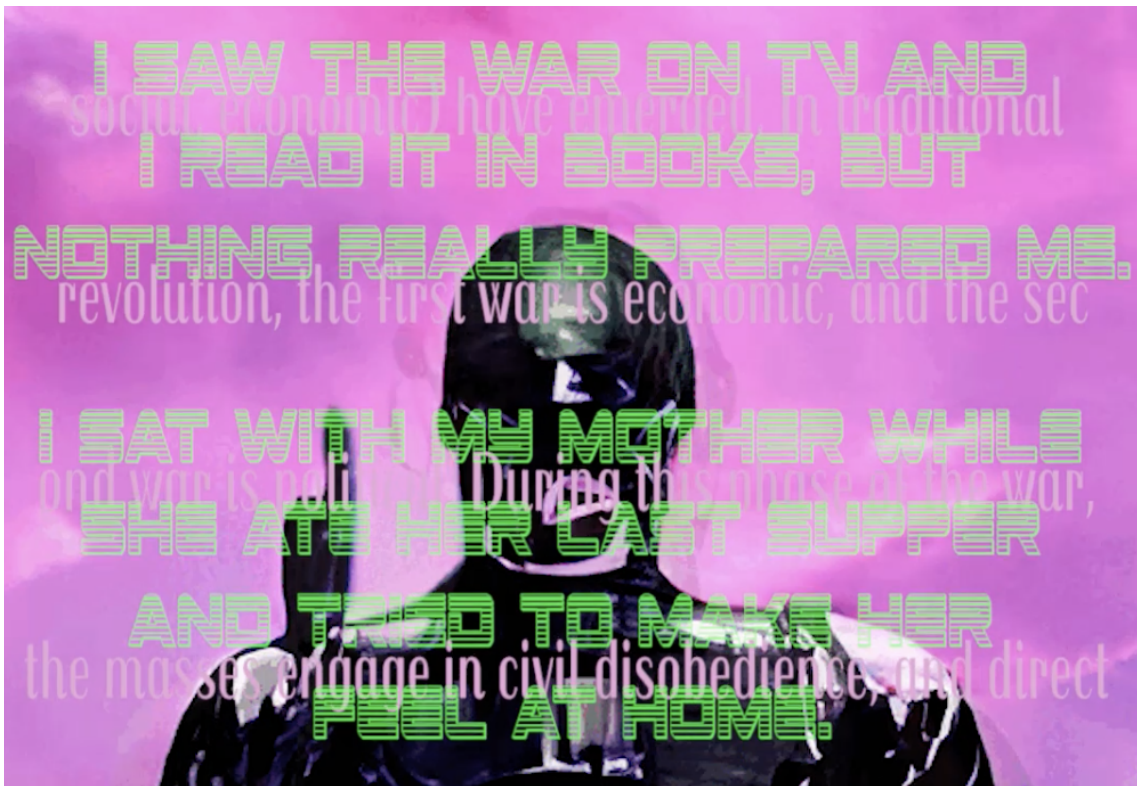

Image 47: **Kristina Tica, *PROMPT: WAR STORIES,* screengrab, private archive, 2022.**

prompt:
write me a war song

Come all you young men of war
Come and enlist before you're too old
You'll see some strange places
And meet some interesting people
And if you're lucky you'll come home
And tell your stories to everyone
So what are you waiting for?
There's adventure waiting for you
So pack up your gear
And don't forget your gun
And join up today
Come all you young men of war
It's time to answer the call
There's danger at every turn
But that's what we're here for
We'll fight for our country
And the ones we love
And we'll never back down
So come on and join us
And together we'll be strong
We'll stand up to evil
And fight for what's right
And we'll never forget
The ones who didn't make it home
They gave their lives for freedom
And we'll never let their sacrifice be in vain
We'll keep on fighting
Till the enemy is defeated
And then we'll all go home
And we'll raise a glass
To those who didn't make it back
And we'll never forget
What they sacrificed for us
So come on young men of war
It's time to answer the call
And together we'll make a stand
And we'll never forget
What we're fighting for

generated war poem, using OpenAI GPT DaVinci-002 Model (April 2022.)

5. AESTH-ETHICS

The appearance of every new technology has triggered a dread of human obsolescence.

Sofian Audry - *Art in the Age of Machine Learning*

The ontology of a computer-generated artwork is based on the processing of data through algorithms and codes, and in this research, talking about computational processes for image-making and image-reading, we are addressing the relationship between the raw data processing, dependence of the data itself to the *real* world, and the reflection we get in return. As the aesthetic characteristics of these processes are introducing new ways of seeing, shaping or assigning the creative process to the machinic agency is an ethical problem that is translatable to the core systemic issues of passing the relay of decision-making processes to the automated and seemingly autonomous systems. Interdependency between the database, author and product –in the making process and the reception of the image– are inseparable. As it was discussed in the first chapter, the aesthetics of a computed image depends on information - value, data[base], code–instruction, and interface as the space of feedback communication. In the introduced projects that demonstrate specific characteristics of some of the machine learning models for image processing, the first common denominator for all was database and database processing. To summarise the importance of human agency in the development of machine learning models and their improvement, I would like to provide an overview of the human role in the making of a database, and also the role of the database in automated processes, so as to analyse the feedback loop of filtration of context, cognition and creation, the effect and affect that is projected back on us through automated content generators - specifically visual manifestations of achievements in the field of machine learning.

Not only that all data is subjective, but also is data processing. On automated processes, the second part of *thoughtlessness by automation* places the *ideology of AI* as a human-made cognitive problem where data science paves way for social engineering in which agency has been dispersed and neglected, delegated to an abstracted authority. This is specifically addressed to the questionable implementation of automated decision-making tools as objective and unbiased. The all-knowing, all-seeing, omnipresent portrayal of an *entity* speculated as AI, a techno-solutionist marketing strategy to advocate and maintain the accumulation of power, that is a trick to the human psyche in need of a metaphor for an ideology or a control compass to navigate the mysteries and mundanities of life, to delegate the agency to the other, whether an *entity* or a *system*. The belief in the data, trust in objectivity or neutrality of numbers, mathematical logic as an unbiased principle of contemporary divination and statistical confidence as a predictive strategy introduces the materiality of delusion that will further be reviewed as a premise for the development of the presented artworks.

The final layer of *aesth-ethics* is the overview of the ideological consequences of colonised imagination tied to a discourse on the creative powers of an automated system. The aesthetics of generative imagery explains a lot about the character of *AI making 'art'* as a concept, a discontinuous mashup of representations, styles, references - discursively hardly separable from self-referentiality —the context inseparable from the fact that *it was created by AI.* The referential point of historical sustainability of the concept of the *art* of any kind is to not repeat itself [literally], as we exemplified in the first chapter, subchapter *1.3.1 Image-Making* with zombie formalism or success of a generative look-a-like-classical portrait, we differentiate art from a state of overfitting, miscontextualised image overproduction, that is essentially conservative, uniforming, and, nevertheless, boring soon after the tool passes the test and reaches its peak in development. The dispersion of subjectivity and consumption of image-generating tools greeted with the hype of experimentation, might and will soon become just another tool for inspiration or quick sketching. What keeps it running, is the anticipation of the new, which the combinatorial infinity can offer, but *sometimes the same is different, and mostly, it's the same*. As with the example of prompt-image-making: two thousand prompted images later, we scroll through a messy download folder and we might see that most of the results were not as amusing as the experimentation process itself. On the overproduction of *symbolic misery, the statistical art, combinatorial transcendence*, the invisible *giver of names*, and *prompt narratives* that are fictional reality and *recycling of the past*, we will reiterate the layers of all three introduced projects [Digital Prayer, FUTUREFALSEPOSITIVE and PROMPT: WAR STORIES], creating a final overview of not only technological and theoretical level of their development, but the goals of using visual art and such projects to define the human processes that are on the psychological level so creative and inventive, capable of assigning meaning and power, contextualise and associate, imagine and abstract the world into metaphors, that they become a weak spot for understanding any novelty in technology out of the context of ideology or politics, utopia and fear. We project meaning, and another meaning is projected on us - therefore we have to choose our role between *automata* and *author,* and to demystify these power relations.

5.1. THOUGHTLESSNESS BY AUTOMATION

If it should turn out to be true that knowledge (in the modern sense of know-how) and thought have parted company for good, then we would indeed become the helpless slaves, not so much of our machines as of our know-how, thoughtless creatures at the mercy of every gadget which is technically possible, no matter how murderous it is.

Hannah Arendt - *The Human Condition*

5.1.1. DAS URSCHLEIM

The database itself is *das Urschleim*, a matter of the collective past and collective intelligence —it is the *prima materia, the* only knowledge that a computer system has, therefore the limitations of production always exist— a computer algorithm cannot generate or produce anything outside of the realm of the database it is operating on. It is the only truth for the system - operational information i.e. knowledge, does not exceed its limits, and the end of this universe is mutable but measurable, regardless of the combinatorially infinite number of outputs in performed permutations of an algorithm, and the ever-expanding growth of data collection. With the exponential acceleration of the world of *big data,* the improvement strategies for most of the machine learning models are premised on the logic that there is *no better data than more data*. Image-making and image-reading are common rituals in the fast-paced sport of online information exchange - producing, sharing, multiplying, from hi-res to *poor image*[170], these wild transmissions are here-and-there cultivated, clustered, encoded, and so the archive is growing, and *too much is never enough*. While the perversion of archiving makes more and more data, the vastness of collected image-data gives rich ground for different explorations and exploitations. The structure that comes at our user interface layer keeps us connected, and entertained; we consume and produce - *prosume*, give and exchange meaning, and provide personal and false information. The main task of many machine learning algorithms is to discriminate the signal from the noise - to extract data and behaviour patterns as information. The goal and objective to do so, is, however, still human.

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[170] "*Apart from resolution and exchange value, one might imagine another form of value defined by velocity, intensity, and spread. Poor images are poor because they are heavily compressed and travel quickly. They lose matter and gain speed. But they also express a condition of dematerialization, shared not only with the legacy of conceptual art but above all with contemporary modes of semiotic production."* Hito Steyrl, "In Defense of the Poor Image." (2015).

GARBAGE IN, GARBAGE OUT

We make a lot of garbage - stored, and re-purposed, once it has left our realm of temporary interest, that is how our collective consciousness gives form to a database. In a database, as previously discussed, noise has to be categorised into signals, and information must be extracted. What kind of information might be needed? What kind of culture-coding is being imposed into the engineering of categories of the data-based universe? What labels are of interest, which tags? ***All data is subjective***, therefore a concept of neutrality or objectivity dilutes into the pervasiveness of dominantly repetitive patterns or signals. *And our faces, desires, and thoughts are on volunteer labour* - we generate the juice for automated discrimination machines, prompted to classify, categorise, and optimise those divisions. *"Machine learning systems are trained on images like these every day—images that were taken from the internet or from state institutions without context and without consent. They are anything but neutral. They represent personal histories, structural inequities … But the presumption that somehow [these] images can serve as apolitical, inert material influences how and what a machine learning tool "sees." [...] A computer vision system can detect a face or a building but not why a person was inside a police station or any of the social and historical context surrounding that moment. Ultimately, the specific instances of data—a picture of a face, for example—aren't considered to matter for training an AI model.*

All that matters is a sufficiently varied aggregate. Any individual image could easily be substituted for another and the system would work the same.

[...] According to this worldview, there is always more data to capture from the constantly growing and globally distributed treasure chest of the internet and social media platforms.[171]" In the promise of automated cognition, we are not given a neutral worldview. Rather our systems of value and perception degrade or dilute in the consumable echo-chamber of feedback content, cultural needs become neglected or even regressive and as Kate Crawford implies in the essay on the *Anatomy of AI*: *"The training sets for AI systems claim to be reaching into the fine-grained nature of everyday life, but they repeat the most stereotypical and restricted social patterns, re-inscribing a normative vision of the human past and projecting it into the human future."*[172]

As a signal can be recognised in noise, knowledge can be extracted from the information. In the spirit of Neoplatonist's ideas on divination through mathematics that can form knowledge of higher external concepts – in nowadays terms – data science is placed in the *view-from-above.* Mathematical abstraction and logic, one of objectivity, correlation and rule-based dynamics of prediction serve as a method for statistical data processing in the world where data is everything and anything can become data. The advanced

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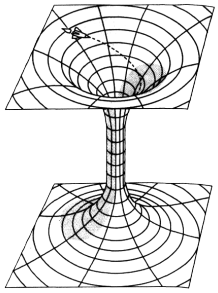
[171] Kate Crawford, *Atlas of AI: Power, Politics, and the Planetary Costs of Artificial Intelligence*, (New Haven: Yale University Press, 2021.), 96.

[172] Crawford, Joler "Anatomy of AI." part XIX. (2018).

possibilities of computation processes in data science nowadays, offer an immense field for measurement, exploration and analysis at hand where all kinds of seemingly uncorrelated phenomena can be brought into relation, and magic is in the numbers. The responsibility of data science or a data scientist in machine learning is to organise, analyse and process various kinds of given data and to supervise and optimise automated data processing towards the desired outcome. The outcome is very dependent on the starting premise, and both ends of the cycle are human-made, the intent and its objective are human goals, and the human task is to make *sense* of the data, whereas the machinic procedure is to access the optimal way of achieving the intended objective. That brings us back from automation to authority, or *agency* – where the responsibility becomes diluted within goal-oriented means of research in pattern finding and their classification where correlations do not necessarily come with needed causality. When the layers between the accessible data and the spectrum of an ecosystem surrounding the extracted phenomena of measurement are not taken into account, missing, reduced, or isolated set of sources or parameters turn objective mathematical or statistical results into a selective proof of correlations between isolated phenomena, mathematically accurate but possibly biased, and still by all means subjective.



Einstein-Rosen bridge, wormhole visualisation

5.1.2. ALGORITHMIC THOUGHTLESSNESS

Claiming a statistical prediction to be a totality of truth around an objective in question becomes more obfuscated and problematic once we leap into *big data,* where reverse engineering and determination of human factor on a scale between human and computer bias is likely impossible, especially from a standpoint of a user, citizen, consumer - we usually trigger the consequences and feel the effect of faulty reality-engineering. As *big data* is also an ecosystem consisting of humans, machines and corporations, a data scientist's job is not neutral, it has an embedded responsibility that affects real life, where *thoughtlessness* shall not be any less criticised than in the historical examples of intertwinement of science, military, governments or corporations that consequentially transform society. '*Where machine learning makes reasoning inaccessible, and where the computation itself is subject to errors which cannot be pinned down, accountability for mistakes acquires a core obscurity. However, this assemblage still includes human agency at most junctures.'*[173] Scientific *accuracy as proof* in data processing can be a weaponised tool for the placement of models and products developed on misleading premises, sources, and outputs, being acceptable when decorated with a percentage of statistical confidence.

"It was sheer thoughtlessness - something by no means identical with stupidity"[174] - that predisposed us to become one of the greatest contributors participating in an automated condition of a global scale. Algorithmic operations have been displaced into an invisible power structure, where there is seemingly no need for targeted, personal accountability. And while running these systems, the distance level between the information we have and the knowledge that is being generated does not depend on reasoning anymore, but it also cannot be classified as an objective for that. The agency is invisible and dispersed, but it still exists behind *big data* algorithms. *'With data science, we have moved from metadata to metaphysics; it is an embedded, even weaponised, philosophy. Where humans are part of the data science apparatus, what can be said about the effect on human agency of data science as an organising idea? By providing actionable numbers with the aura of authority, the algorithmic predictions become forceful at a human level. The potential exists to sideline ethical concerns or amplify pre-existing biases.'*[175] Actions are being pursued and mandated by an abstracted authority. For McQuillan: *'thoughtlessness, which is not a simple lack of awareness, is also a useful way to assess the operation of algorithmic governance with respect to the people enrolled in its activities. … If we are unable to understand the judgement of the algorithms, which are opaque to us, we are in some way released from categories of intent or accountability.'*[176]

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[173] Dan McQuillan, "Data Science as Machinic Neoplatonism", 11.

[174] Hannah Arendt, *Eichmann in Jerusalem: A Report on the Banality of Evil*, 287.

[175] McQuillan, "Data Science as Machinic Neoplatonism", 11.

[176] *ibid.*

Algorithmic productive force avoids causality, evades accountability, and restricts agency to participation and adaptation.[177]

Using data science as a dogmatic deterministic tool only opens the field for faultiness when some tools and operations are mixed into complex aspects of life, social and historical contexts in particular. From McQuillan's point of view, it is articulated through the contrast of objective reality and computational objectivity: "*A counterculture of data science refuses to throw the baby out with the bathwater; it does not abandon the idea that empirical and mathematical methods of data science can generate valid propositions about the world. But, like standpoint theory, an alternative form of data science must also tackle the question of objectivity. As we have seen, data science is slippery on this point; while not claiming to discern objective reality, it operates through forms of mathematical and computational objectivity. Combined with a dualistic metaphysics, this results in the production of an apparently neutral and external authority with the tendency to encourage thoughtlessness at the point where its judgements are applied."*[178]

AUTOMATIC FOR THE PEOPLE

Every social and political structure is established on a protocol that has an interwoven ideology in it. Every protocol offers a *categorical imperative*[179] and therefore a possible dispersion of agency. As Galloway in his book, *Protocol* noted Foucault's ideas on discourse through an anti-anthropomorphic manner: "*This tendency in Foucault—to diminish the importance of individual expressive actors—may be summarized as Foucault's desire to be anti-anthropological. In his historical genealogies, Foucault aspires to write a theory of history that is not based on living human beings. For example, in Archaeology of Knowledge Foucault expresses his desire to 'define a method of historical analysis freed from the anthropological theme ... a method of analysis purged of all anthropomorphism.' He claims that he wants to uncover the principles of an "autochthonic transformation"—that is, a transformation in the realm of words and things that is immanent, particular, spontaneous, and anonymous. … In fact, Foucault writes that his interest lies in the 'anonymous and general subject of history,' not the social subject of history."*[180] As Foucault himself states in *Archaeology of Knowledge*: *"…discourse is not the majestically unfolding manifestation of a thinking, knowing, speaking subject, but, on the contrary, a totality, in which the dispersion of the subject and his discontinuity with himself may be determined. It is a space of exteriority in which a network of distinct sites is deployed."*[181]

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[177] Dan McQuillan,"Ghosts in the Algorithmic Resilience Machine." (November 07, 2015) http://danmcquillan.doc.gold.ac.uk/resilience-smartcity-democracy.html. accessed December 17, 2022.

[178] McQuillan, "Data Science as Machinic Neoplatonism", 11.

[179] Kantian's categorical imperative is the central philosophical concept in the deontological moral philosophy. Introduced in Immanuel Kant's 1785 "Groundwork of the Metaphysic of Morals", it is a way of evaluating motivations for action. It is the normative ethical theory that the morality of an action should be based on whether that action itself is right or wrong under a series of rules, rather than based on the consequences of the action. It is sometimes described as or rule-based ethics.

[180] Galloway, *Protocol*, 83.

[181] Michel Foucault, Archaeology of Knowledge, 60.

These remarks on discourse can be understood in relation to a world being constructed through data science and the world of data itself. Dispersion of subjectivity claims totality, it is at least the image that is often being presented in all-knowing-tech-marketing belief. Through outsourcing on a global scale contribution to forming data traces, we lose agency and responsibility in knowledge forming. In the age of informatics, the information does not require knowledge, whereas it can be built based on the given information, but it is not mandatory. The concept of knowledge has been automated and presented as an ultimate totality through *computational objectivity*.

The information is an object of exchange but knowledge is a matter of reception. It might have been optimised rather than all-grasping ultimate truth. Also, the subject of history is less important, here goals are dominantly future-oriented, which again erases accountability because there is no dealing with consequentialism, it is not retrograde, it predicts, being in the now-and-beyond, where the future cannot be proven. *"The many-dimensional character of the 'fit' that machine learning makes between the present and the future, using categories that are not static or coded by humans, has the potential for forms of algorithmic discrimination or redlining that can escape regulation."*[182] Disregarding causality and allowing the creation of unregulated correlations with a premise of an 'objective conclusion' can lead to many dangerous misinterpretations. *"Machine learning as another form of proposition becomes amenable to the discourse of peers. Seeing data science as a form of rhetoric rather than a way to X-ray reality would allow its propositions to be returned to their proper place, as basically political statements that need to be debated."* McQuillan then warns about *'the possibility that algorithmic prediction will lead to the production of thoughtlessness, as characterised by Hannah Arendt.'*[183]

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[182] Dan McQuillan, "*Hannah Arendt and Algorithmic Thoughtlessness*", http://danmcquillan.doc.gold.ac.uk/arendtandalgorithms.html. accessed November 15, 2022

[183] McQuillan, "Data Science as Machinic Neoplatonism", 11.

5.1.3. GENERATIVE IDEOLOGY

Given the complications in addressing the responsibility of the individuals we surely must talk about the companies, and conglomerates of techno-menagerie which should not be seen as Leviathan but as a human-made structure[creature]. As Yarden Katz states in *Manufacturing an Artificial Intelligence Revolution: "Corporations have helped manufacture an "AI revolution" in which AI stands for a confusing mix of terms — such as "big data", "machine learning", or "deep learning" — whose common denominator is the use of expensive computing power to analyze massive centralized data. …The manufactured AI revolution has created the false impression that current systems have surpassed human abilities to the point where many areas of life, from scientific inquiry to the court system, might be best run by machines. However, these claims are predicated on a narrow and radically empiricist view of human intelligence. It's a view that lends itself to solving profitable data analysis tasks but leaves no place for the politics of race, gender, or class. Meanwhile, the confusion over AI's capabilities serves to dilute critiques of institutional power. If AI runs society, then grievances with society's institutions can get reframed as questions of 'algorithmic accountability.' This move paves the way for AI experts and entrepreneurs to present themselves as the architects of society."*[184] In this society, the automated condition tranquillises human needs in focusing on the sole purpose of sustainability of a system that generates its own accelerating needs, the needs of capital and power.

As Matteo Pasquinelli notes: *"What people call "AI" is actually a long historical process of crystallizing collective behaviour, personal data, and individual labour into privatized algorithms that are used for the automation of complex tasks: from driving to translation, from object recognition to music composition. Just as much as the machines of the industrial age grew out of experimentation, know-how, and the labour of skilled workers, engineers, and craftsmen, the statistical models of AI grow out of the data produced by collective intelligence. This is, to say that AI emerges as an enormous imitation engine of collective intelligence. What is the relationship between artificial intelligence and human intelligence? It is the social division of labour."*[185] As Pasquinelli continues: *"[...] the algorithms of machine learning and AI are emergent systems that are based on a mundane and material division of space, time, labour, and social relations. Machine learning emerges from grids that continue ancient abstractions and rituals concerned with marking territories and bodies, and counting people and goods; in this way, machine learning essentially emerges from an extended division of social labour."*[186] To look back on the cybernetic premises of interconnectedness, these relationships are unequally distributed, since the algorithmic future is imposed as a seemingly decentralised, impersonal power structure, while the promise of the networked culture is reduced to user's echo chambers

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[184] Katz, *Manufacturing an Artificial Intelligence Revolution,* 2.

[185] Pasquinelli, "Three Thousand Years of Algorithmic Rituals: The Emergence of AI from the Computation of Space", 2019.

[186] *ibid.*

constructed as attention-grabbing, micro-labour data extraction factories - it is rather an extractivist master-servant relationship that renders collective and global-scale efforts of people, whereas intelligence comes as a collective effort. Collective labour and behaviour become privatised data, subjectivity is dispersed and agency negated.

"Despite the way it is often framed and critiqued, artificial intelligence is not really 'artificial' or 'alien': in the usual mystification process of ideology, it appears to be a deus ex machina that descends to the world like in an ancient theatre. But this hides the fact that it actually emerges from the intelligence of this world."[187]

To hold a techno-solutionist belief that an automated system can perform tasks i.e. *recognition* better than humans obfuscates all the collective labour of humans creating this system, and at the same time imposes the credibility of automated decision-making. The ideology of prediction delegates the agency of decision-making for us, and instead of us, to a self-referential, goal-achieving calculus of the optimal; all coming with a decorated discourse of the machine that gives solutions, answers, performs tasks such as creating essays, composing music or creating visual art that is feeding the status quo of self-referentiality of these systems and the power structures behind. The 'new' as much as any other older technology or invention should not be expected as the new methods to solve our problems, they rather translate our problems into a new medium - they can pave the way to the creation of new reflections or catalyse the visibility or urgency of particular problems to be solved making the environment for *us* to see it fit to use so to solve some problems ourselves. The problem is not in technology or in the lack of it, it is in us and we should not admire it, or be afraid of it, we must follow its anatomy while it is being built. We should put it under a therapy session: what if we are becoming too fascinated, and, yet, accommodated to all the shifts that our global society has gone through? At the same time, we are training the machine to 'see', and yet we are no anymore teaching ourselves that. Therefore the fantasy of computational creativity or a *thoughtful AGI (artificial general intelligence)* system is inextricable from collective efforts of labour, and in the particular case of this research, creative and artistic labour. Intuition and abstract thinking cannot be assimilated with the mathematical logic of computation, and intention should not be confused with a performance of a task. With respect to the significance of both, they should be separated and carefully assigned to specific tasks and their desired outcomes. The content production via image-generating tools is just another reflection of the same gimmick that the AGI is promising, an illusion of a knowledgeable system replicating improvisation by combinatorial supremacy that is a rather useless category of the invention in the terms of non-goal-oriented competency of production, for which automation and efficiency is not required or needed. That is the threshold on which AI as a cluster of tools and technologies and AI as an ideology collide. Only our experience alerted awareness, technological literacy, healthy scepticism and time might teach us how to navigate the purposefulness of the former, without being seduced by the latter.

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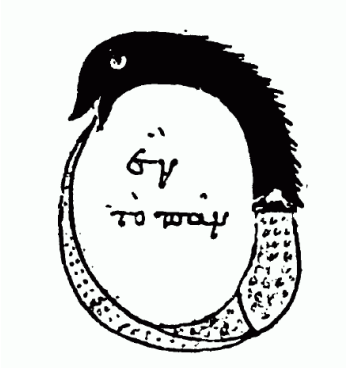
[187] *ibid.*

To use and impose these tools as a discursive and visual proof of a techno-evangelical future is mainly a gimmick to 'democratise' and justify the investment capital and resource extraction absorbed for the development of these tools for all other industrial, militaristic and surveillance purposes. This future is promising for a minority of the *big* and the rich, while in return we receive a *creative* tool as a glimpse of a technological achievement that will have success in many industries, yet shall not serve as a creative replacement for artistic *intent* where the characteristic of *uniforming the forms of expression* within the use of the tools in question reveals the conservative characteristics of the ideology of AI. The techno-menagerie *instance of justifying the ideology of AI* through the popularisation of automated image-making tools*,* rather reveals their restraints which should encourage artists, and programmers to go beyond the imposed *hype* of the new - as Marco Donnaruma sums up: "*AI art is, in my view, soft propaganda for the ideology of prediction. As long as it remains tied to the paradigm and politics of ever-large models, increasing capital and marketing hyperbole, its contribution to art practice will have little meaning, if any. Where the ideology of prediction sees the future of art in a know-it-all model generating on-demand art, or in a creativity equalizer wrestling artistic intent out of stolen artworks, I rather see something else: unpredictable machine learning tools, artworks as outliers of trends, affirmative perversions of technology and grassroots development of creative instruments. This is a future already in the making, one only needs to look for those artists who are not keen to play the gamble of the hype cycle and rather dare imagine how to create unexpected technologies and risky artistic languages."*[188]



Early alchemical ouroboros illustration of Cleopatra the Alchemist with the words 'The All is One'

[188] Marco Donnarumma, "AI Art Is Soft Propaganda for the Global North." *Hyperallergic.* (October 24, 2022) https://hyperallergic.com/772848/ai-art-is-soft-propaganda-for-the-global-north/. accessed January 25, 2023.

5.2. COLONISED IMAGINATION

simulacra of simulation: founded on information, the model, the cybernetic game - total operationality, hyperreality, aim of total control.[189]

The algorithmic processing of massive amounts of data paves the way to a control system that is abstract, accelerationist, structurally irreversible and therefore uncontrollable, but never independent from human intention. In the context of image-making and image-reading processes that were elaborated in this writing, we can reflect on the same limitations in the current use of machine learning tools for image production. As distributed as they are, they come with their own preset, that as diverse it may be, does not invite us to look behind, dismantle or question the structural principles on which they are developed. Even with a creative process such as image-making we are limited to the role of the user-*prosumer*, mainly interacting on a level of command–execution, at the point of no return - as the scope of operational information within a dataset of a model is the limit of its map of operation, we are also navigating that same map, therefore the use of these tools had established boundaries on the scope of the territory we are able to cross. Additionally, a computed image is not a dream - machine vision is vision without images - it is a data image.

There are two instances of the representation in image-making in machine learning processes that I would like to note, the first one coming from Audry: "*The question remains whether machine learning models work as representations of the world. While deep learning systems indeed attempt to model some aspects of the real world by learning mathematical representations of the data, the notion of representation in machine learning literature differs from the humanist tradition of representation in western art and philosophy. Representation learning in neural networks refers to ways that the system extracts relevant features from data, for example, by finding regularities in patterns. It thus closely follows internal processes of abstraction and compression of data found in the perceptual systems of the brain, specifically by the visual cortex."*[190] and the second one from Steyrl: *"Inceptionist image production is decisively different from previous chemical or even electronic photographic procedures, posing new questions concerning realism and veracity. If previous techniques relied on myths of mechanical or optical "objectivity" and ultimately on optics and geometry, in the case of inceptionist image production vision appears to rely on pattern recognition, based on implanting pseudo-platonic forms into*

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[189] The third out of three orders of simulacra, whereas the first two are: *(1) simulacra that are natural, naturalist, founded on the image, on imitation and counterfeit, that are harmonious, optimistic, and that aim for the restitution or the ideal institution of nature made in God's image; (2) simulacra that are productive, productivist, founded on energy, force, its materialization by the machine and in the whole system of production - a Promethean aim of a continuous globalization and expansion, of an indefinite liberation of energy (desire belongs to the Utopias related to this order of simulacra)"* Jean Baudrillard, *Simulacra and Simulation*, 118.

[190] Audry, *Art in the Age of Machine Learning,* 65.

sensing technology and running the lot on petabytes of spa[s]m."[191]

While they both agree on the key principle of the technical process in the making - pattern discrimination and combinatorial approximation of replication of the given recurring values, the problem of representation in Audry's opinion is problematised from the viewpoint of human-inspired perception, some kind of probabilistic *gestalt,* that does not hold any image-making principle that humans use to depict or reproduce what is seen, via geometrical, spatial or physical rules and affordances, or techniques, but on a mathematical principle of representation via combinatorial statistical optimum of pattern recurrence given in the database. For us, it is a picture that should not be about representation, and it does not possess intrinsic meaning outside of the scope of our interpretation. For us, thinking about this image should be without symbols - symbolic relations are substituted by the correlational value. Pattern finding comes by numbers [probability of reoccurring value on a specific position on a pixel grid] and not any *intuitive*[192] or experiential values. As examples which propose the strategy of infinity and universality show that these are functioning only within a limited scope of information, there is definite proof of hermeticism of the systems that are developed on a premise that quantity makes quality. It is also necessary to point out the fact that with increasingly faster processing of ever larger amounts of data, the computer still only processes the given data —it calculates and optimises–- *and it does not create anything new by itself.*

As Pasquinelli and Joler state in the essay *Nooscope Manifested: "The logical and political limitation of AI is the technology's difficulty in the recognition and prediction of a new event. How is machine learning dealing with a truly unique anomaly, an uncommon social behaviour, an innovative act of disruption? The two modalities of machine learning display a limitation that is not simply bias. A logical limit of machine learning classification, or pattern recognition, is the inability to recognise a unique anomaly that appears for the first time, such as a new metaphor in poetry, a new joke in everyday conversation, or an unusual obstacle (a pedestrian? a plastic bag?) on the road scenario. […] As a technique of information compression, machine learning automates the dictatorship of the past, of past taxonomies and behavioural patterns, over the present."*[193] To propose machinic creativity is an aggressive negation of intuition, imagination, and abstract thinking, all powered by motivation or intention that are genuinely human characteristics that developed the complex culture as it is to the present day. To politically and ideologically impose the predictive behaviour of a machine learning system as a solution-making tool is an analogue to the treatment of these exact same tools for text and image generating as creative. A computer is not guided by an intention, it does not have a will, but it executes a

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[191] Hito Steyerl, *"A Sea of Data: Pattern Recognition and Corporate Animism", Pattern Discrimination,* ed. Clemens Apprich et. al., (Lüneburg: meson press, 2018.), 10.

[192] "*Intuition* is the method of Bergsonism. Intuition is neither a feeling, an inspiration, nor a disorderly sympathy, but a fully developed method, one of the most fully developed methods in philosophy.", Gilles Deleuze, *Bergsonism*, 13.

[193] Vladan Joler, Matteo Pasquinelli,"The Nooscope Manifested: Artificial Intelligence as Instrument of Knowledge Extractivism", KIM research group (Karlsruhe University of Arts and Design) and Share Lab (Novi Sad), 1 May 2020 (preprint forthcoming for AI and Society). https://nooscope.ai. accessed December 02, 2022.

command. His creative process is under human control. Mihai Nadin explains that "*if it were only the intelligence it takes to win a game (chess or any other), it missed the most important aspect: the creation of the game itself, as one of many instances in which human beings shape their own condition*."[194] The speed and scope of data processing may overshadow a human in the game of chess[195], but the computer did not invent the game itself. As Sofian Audry adds to the topic on differentiation within the scope of automation, efficiency and complexities of solutions for real-life tasks: *"Most real-world problems requiring intelligence are very different from playing board games. For example, although specialized work such as translation, financial trading, teaching, research, and medical diagnosis and treatment must follow sets of rules and guidelines, those tasks require a great deal of intuition and experience."*[196] Only through understanding these procedures, we can get rid of the magic in the box. It's no magic, it is human, and we know that by its failures. The un-optimising tactics of appropriation of these tools, break the siren song of intelligent behaviour coming out of digital automata. We should adjust the way we see these systems, and therefore understand and accordingly choose how to integrate them into our lives, or at least to recognise them, and make them visible, and penetrable, to see their limits, the end line of their capacities and purposes, which we can break through only through more risk-taking, radical or critical access and way of implementation, where art takes place.

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[194] Nadin, "'*In Folly Ripe. In Reason Rotten*'. Putting Machine Theology to Rest.*",* 28.

[195] "*Just as no chess player will ever live long enough to exhaust all the combinations of possible moves for the thirty-two pieces on the chessboard, so we know (given the fact that our minds are chessboards with hundreds of billions of pieces) that not even in a lifetime lasting as long as the universe would one ever manage to make all possible plays. But we also know that all these are implicit in the overall code of mental plays, according to the rules by which each of us, from one moment to the next, formulates his thoughts, swift or sluggish, cloudy or crystalline as they may be.",* Italo Calvino, "*Cybernetics and Ghosts", The Uses of Literature.* (San Diego, New York, London: Harcourt Brace & Company 1986.), 7.

[196] Audry, *Art in the Age of Machine Learning*, 7.

5.2.1. SYMBOLIC MISERY

In the words of Jonathan Crary, *"Philosopher Bernard Stiegler has written widely on the consequences of what he sees as the homogenization of perceptual experience within contemporary culture. [...] Over the last two decades, he believes, they have been responsible for a "mass synchronization" of consciousness and memory. The standardization of experience on such a large scale, he argues, entails a loss of subjective identity and singularity; it also leads to the disastrous disappearance of individual participation and creativity in the making of the symbols we all exchange and share. [...] The unfathomable amount of accessible information can be deployed and arranged in the service of anything, personal or political, however aberrant or conventional. Through the unlimited possibilities of filtering and customization, individuals in close physical proximity can inhabit incommensurable and non-communicating universes."*[197] Even though Crary interprets Stiegler's notion on the new media[198] such as television, and does refers to the fixation of time, and momentum, in current times we are even more culturally homogenous, physically isolated in our feeds, while seemingly interacting with our own echo-chamber, the probability of same content, floating on an algorithmic slot machine for attention-grabbing that discriminates us by gender, age, geolocation, and our previous data footprints of interaction, makes it likely that the same ghosts of information slide through each of our social media interfaces, where mass-synchronisation still occurs regardless of the discontinuity of the physical momentum within the dimension of time as we perceive it.

On the scope of the mass production, we are all producers and content generators that feed the algorithm, we over-produce and over-saturate not only via the perversion of archiving, but sharing, reacting and delivering any kind of metadata micro-work within our networked presence, as we can refer to collective labour and micro-labour, the scope of our *employment* to build these systems that are afterwards interpreted as independent content-creation by these tools is by least deceiving and hypocritical. With the use of the tools such as *stable diffusion* or *DALL-E*, as fascinating as they may appear at first, the actual feedback loop [user-owner-product] feels more like a relationship where a person who stole your wallet takes you out for dinner. And you enjoyed the meal. *"... a disturbing instrumentalisation of aesthetics, again it should be recalled that a leisurely absorption in images, the rush of the sublime, the staging of a multimedia micro-utopian happening, all*

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[197] Jonathan Crary, *24/7: Late Capitalism and the Ends of Sleep,* (London, United Kingdom: Verso Books, 2013.), 50-53.

[198] "*But the audiovisual culture industry tends to substitute itself for the artist in the production of tertiary retentional arrangements, in order to produce homogeneous collective secondary retentions which lead to the straightforward elimination of the singularity of individual points of view [regards individuals], and of the bodily behaviours of the consciousnesses to which these points of view belong: it is thus a case of standardizing the behaviours of consumption. This is possible because television is a network broad casting temporal objects at fixed times, allowing for the mass sharing of secondary retentions, which results in the accentuation of increasingly homogeneous criteria for selection from primary retentions. To the point that no longer able to project itself, individual singularity here disappears, and ultimately it is primordial narcissism, or the condition of desire, that collapses.",* Bernard Stiegler, *De La misere symbolique Vol. 1 : L'epoque hyperindustrielle*, (Paris: Galilee, 2004.) [Symbolic Misery], 90.

poses a certain purposiveness, form part of a project, and mandate certain patterns of behaviour. It is incumbent upon us to assess their effects and effectiveness."[199] Such optimisation of aesthetics is instrumentalising and conditioning the socio-cognitive aspects of our experience, knowledge and empathy.

"Artworks built using the sometimes unfathomable processes of machine learning display aesthetic qualities unique to their media, demanding novel kinds of artistic assessment and appreciation. Because the behaviour of the algorithms that produce these artworks cannot be accounted for using logical rules, it is a challenge for the audience to describe them rationally or for artists to explain them. [...] Although the technological function of an artwork may not be important at all to the artistic vision of the artist, audiences often wish to know more about the technological functioning of a work in order to interpret its potential meaning."[200] However, this does imply the self-referentiality of a generative image as an artwork. If the element of *how* it was made would be ignored, the *what* would show that the *emperor is naked*. As we go back to the context of what these tools actually are, we disambiguate the potentiality of the meaning between the scope of creative or curatorial intent, content creation, and post-production or process of contextualisation or interpretation. Without the treatment of these technologies as a tool, and expecting it to be *art* of its own kind, or at worst interpreting it as artificial creativity, the experimentation will become obsolete, repetitive and framed into a scope of possibilities that does not allow further interaction that would surpass its design.

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[199] Mackay et. al., ed., *Speculative Aesthetics*, 6.

[200] Audry, *Art in the Age of Machine Learning*, 66.

5.2.2. THE VAMPIRE OF TIME AND MEMORY

Everything becomes an object of [or a subject to] quantification, which comes as a strategy to map the worlds, or rather, to *create a map that is bigger than the territory*, extracting sensory and affectionate elements of human perception of reality[201], that is translatable into data. The scope of correlation when articulating that data, pattern finding becomes the culture-shaping model that boomerangs into suggestive consumption assets of the networked world's extractivist infrastructure, as it is right now - an infinite self-optimising loop, a mechanism of the accumulation of capital that is monopolised by tech-industry magnates. The tools such as *DALL-E,* and *Stable diffusion* do not coincidentally resemble the exploitation of cultural capital as part of power accumulation, they are a literal continuation and manifestation of techno-capitalist colonisation of time, space and memory, collective histories, labour and attention, which I would like to compare with Mark Fisher's writing on the power of capitalist realism in the book of the same title: "[The power is]*…that capitalism subsumes and consumes all of the previous history:*

one effect of its 'system of equivalence' which can assign all cultural objects, whether they are religious iconography, pornography, or Das Kapital, a monetary value.

[Walk around the British Museum where you see objects torn from their lifeworlds and assembled as if on the deck of some predator spacecraft, and you have a powerful image of this process at work. In the conversion of practices and rituals into merely aesthetic objects, the beliefs of previous cultures are objectively ironized, and transformed into artefacts. Capitalist realism is therefore not a particular type of realism; it is more like realism in itself…]… Capitalism is what is left when beliefs have collapsed at the level of ritual or symbolic elaboration, and all that is left is the consumer-spectator, trudging through the ruins and the relics."[202]

Whatever mundane or original artwork[203] content we offer to the *cloud*, its nutritive value comes in numbers, and we are going into a corporate machinic daydream dictated by the affordances and accessibility of images, regardless of our perception of the content, where this sea of data becomes a source for a model that is making optimised, and therefore, uniformed imagery. It is extraction of the cultural capital, as Marco Donnarumma

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[201] *"Current machine learning approaches are characterized by an aspiration to map the world, a full quantification of visual, auditory, and recognition regimes of reality. From cosmological model for the universe to the world of human emotions as interpreted through the tiniest muscle movements in the human face, everything becomes an object of quantification. Jean-François Lyotard ["Presenting the Unpresentable: The Sublime," Artforum, April 1982.] introduced the phrase 'affinity to infinity' to describe how contemporary art, techno-science and capitalism share the same aspiration to push boundaries towards a potentially infinite horizon."*, Crawford, Joler, "Anatomy of AI.", (2018.)

[202] Mark Fisher, *Capitalist Realism: Is There No Alternative?,* (London: Zero Books, 2009.)

[203] "*These systems do not create images out of thin air but rather amalgamate abstract features of existing artworks into pastiches. Because of their mathematical nature, the way they create artifacts lacks basic intent and is driven, instead, by complicated probability approximations. [...] Other things are clear enough, though. First is the exploitation of cultural capital. These models exploit enormous datasets of images scraped from the web without authors' consent, and many of those images are original artworks by both dead and living artists.",* Marco Donnarumma, "AI Art Is Soft Propaganda for the Global North."

reminds us of the gravities of power and propaganda underlying the image-making tools that are [almost] freely offered to us: *"Deep learning and, by extension, AI generators are particularly problematic because their efficiency depends on the exclusive assets of a few extraordinarily wealthy agents in the industry. They have vast computational power, immense datasets, capital to invest in academic research, and capacities to train evergrowing models. Open sourcing a model, as StabilityAI did with its own, may open up research to some extent but does not undermine the reliance of the whole project (development, maintenance, promotional campaign, investments, revenues) on the steady stream of money by its founder — a former hedge fund manager. Unsurprisingly, the artistic and ethical shortcomings of AI generators are tied to their dependence on capital and capitalism."*[204] More interestingly, a subset of the *LAION5-B* dataset that we previously introduced, is *LAION-Aesthetics*, *that contains a collection of 600 million images algorithmically selected for being "aesthetically pleasing images" — as if aesthetic pleasure were universal.*[205] Dominated by the rule of the majority, as the reoccurring patterns make a bigger score in priority, determined and classified by *some humans* the colonised imagination is compressing psychogeographies into cliches, averaging the user and the content into an infinite equilibrium of self-optimisation. This kind of consumption surpasses formed culture-induced behaviours, it is an ideologically critical discourse on giving up agency in creation. Standardised and predictable aesthetics, diluted dynamics, pattern repetition and generative plagiarism, at worst. Is it a visualisation of the virtues of today's needs of society - if so, the society of optimisation, patterned by the rule of repetition, immersed in the commodification of iterative content, spiralling in a loop of correlations that oppress the possibility of an exception, glitch, or accident.

From personal to collective quantitative evaluation, where the individual disperses into the collective unconscious, for which the responsibility, intention, emotion and memory do not appear to be relevant anymore —neither for us, and certainly not for the machine learning algorithms— the proximity of *the familiar* becomes satisfaction within the automated recycling of the past. From an ideological point of view - this is a very hauntological concept of recycling the past - before we would even think of our agency for the future, we speculate and fantasise over a technological promise of the *new*. Compensating for our own disorientation within the momentum, and collision of so many *new[s]* feeding on our feeds, we can righteously feel overwhelmed and discouraged to even try and think of the *now.* The new rituals of information exchange transcend us from continuity or physicality of memory of past–present–future into a re-iterative momentum loop of now=now+1, sequences of *[now, now, now, now, …]-s.* Algorithmic iterations became our rituals, there is no finite end to our consumption of content, or images in this particular case. In such a pace of consumption, the value of *the familiar* grows within *our recognition systems* in need of satisfaction.

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[204] *ibid*.

[205] In LAION-5B model's Search Demo there is an available parameter setup of an *aesthetic score* *https://rom1504.github.io/clip-retrieval/?back=https%3A%2F%2Fknn5.laion.ai&index=laion5B&useMclip=false*. accessed January 10, 2023.

5.3. DEMYSTIFAI

ARTWORK OVERVIEW: ON CODE, STATISTICS AND PROMPTS / PRAYERS, FUTURES AND STORIES

Florian Cramer describes the relationship between code, mystification and speculation, which could be translated to the human relation to the interface: "*With its seeming opacity and the boundless, viral multiplication of its output in the execution, algorithmic code opens up a vast potential for cultural imagination, phantasms and phantasmagorias. The word made flesh, writing taking up a life of its own by self-execution, has been a utopia and dystopia in religion, metaphysics, art and technology alike. […] From magic spells to contemporary computing, this speculative imagination has always been linked to practical —technical and artistic— experimentation with algorithms. The opposite is true as well. Speculative imagination is embedded in today's software culture. Reduction and totality, randomness and control, physics and metaphysics are among the tropes it is obsessed with, often short-circuiting their opposites."*[206] *Words Made Flesh: Culture, Code, Imagination*, as the title of his book is, are related to the characteristics of the code not only as a semantically organised set of words as instructions – code also means *execution*. Between magic and rituals, the presented artwork examples carry the responsibility of removing the cultural obfuscation that comes with such invisible systems, exposing the combinatorial reality behind them, while escaping the theology of information. To be conditioned to develop *trust* in a system that promises to provide the *truth* from *true [false]* permutations of data feedback loops is yet another form of human belief in the system. The more distant the system seems, the more magical and cryptic it becomes, and bigger are the chances to mystify and dream of it, to shape, form and visualise it by our own measurements. Simply put, to project ourselves into rituals of usage and consumption, abstract it from its initial form, and inscribe infinite meaning, hope, or desire into it. As for the algorithm, recurrence makes the content valuable, making the confidence of prediction bigger, for us the confidence or recognition of the familiar shall not create comfort.[207]

Codes in terms of language are not semiotic phenomena themselves, however, the combination of symbolic *(codes, signs), imaginary (audiovisuals), and real aspects ('affects', pulses)*[208] creates a state of semiotic impact intertwined between the real and the virtual, inscription of meaning, familiarity and recognition. Culture shaping through simulation of *creativity* —as a signifier for *intention* or *intelligence*— does not deploy its central discursive importance through evaluation of the generative content itself. It already makes its success and relevance by the fact that we immediately take it seriously, as part of our now, and as part of the future. It is part of the *truth* we accepted, that a computer

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[206] Cramer, *Words Made Flesh: Code, Culture, Imagination, 9.*

[207] *"There is an affiliation of interactive and interpassive mediation and technological mediatization. The apparatuses give both belief and alienation."* Andre Nusselder, *Interface Fantasy: A Lacanian Cyborg Ontology*, (Cambridge: Massachusetts: The MIT Press, 2009.), 128.

[208] *ibid*., 5.

can do something human. That is the biggest magick in this discourse, a trick of deception where we already describe it as something *new and competent* to interfere in our reality. First of all, we should stop differentiating reality from virtuality, since the former created the latter, they are part of the same cognitive perception, and they are both corporeal. As automatic writing or dada poetry was a method, a combinatorial strategy - the possibilities of computational permutational processes are immense and supreme in that scope, but the selection and decision on where we find meaning or what we like, is ours, it is the same as it was with any analogue method of permutation, but also randomness. Italo Calvino wrote in *Cybernetics and Ghosts* about the machines that might become authors[209], where he speculated and hoped that such machines could delve into our algorithmic subconscious, repressed languages, and extended mythologies, opening up mysteries of thinking or knowing, to run a process that would be able to have the intent to deconstruct itself, to stop, cancel, negate, decompose and abandon any formerly given logic. Our *artificial intelligence* is a conservative surveillance machine, set to make an optimum behaviour score, it does not *appreciate* randomness. It observes and detects behaviour patterns, and classifies and categorises the world, its fear are exceptions, new events, and complexities of a holistic worldview. A machine that does not recognise symbols, metaphors or meaning, can only simulate context and understanding.

These observations underline all three presented projects in this research, the distinction of humans, and the essences of being human inscribed into the introduced image-making and image-reading systems, those that we try to use to simulate, or animate the calculating machine, and those disappointments that emerge once we understand the spellcasting power in automation is not in our individual possession, that the two-way communication is engineered as a loop between reality and simulation, a simulation that deconstructs our past and present into numbers, that cannot speculate, dream or imagine for us, it is a structure with one inscribed goal - to sustain itself by all means of extraction. Belief and trust are not the same things, symbolic and causal relations are not patterns and correlations in the same way as the machine sees it. All three works were developed on these dialectic relationships. These projects are created as contemplations on human needs and desires, bias and projections, translated into works developed with the use of machine learning tools so as to demystify the technical processes, and visualise their character within specific circumstances related to human-specific constructs and rituals. The presented artworks could have not been created by any other medium or tool except for the ones chosen, so in my work, I also treat the self-referentiality of machine learning tools as a necessary element inscribed in any generated output. The works are developed on the semiotic interplay between representation and meaning, ritual, repetition and permutation, claiming back another form of meaning and interpretation that comes as a critique not of the systems, but of our own psychologies of phantasms, metaphors and fascinations that obfuscate the concreteness and simplicity of functioning of these tools.

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[209] "*I am thinking of a writing machine that would bring to the page all those things that we are accustomed to consider as the most jealously guarded attributes of our psychological life, of our daily experience, our unpredictable changes of mood and inner elations, despairs and moments of illumination. What are these if not so many linguistic "fields," for which we might well succeed in establishing the vocabulary, grammar, syntax, and properties of permutation?*" Italo Calvino, "*Cybernetics and Ghosts", The Uses of Literature.* (San Diego, New York, London: Harcourt Brace & Company 1986.), pp. 3-27., 6-8.

All the complexity comes through the filtration of our own world, whether through data or further through the implementation of meaning, significance, anthropomorphisation, theology and teleology.

In my projects, I developed a poetic hack of meaning between (1) code and prayer (2) future predictions and false positives (3) a prompt and a story. For *Digital Prayer,* the generative meditation on combinatorial transcendence was a simulation and exposure of the code as the essence of the magic of the image, a word that makes the execution and manifestation of the picture. This picture is growing and collapsing in front of our eyes, breathing in and out its possible appearances, all in one and one in all, it is an *identity confection* and at the same time a *fractal multiplication of identities*[210]. An interplay of transcendence as a combinatorial illusion creates the meaning of these images - where the compositional structure of the original samples in the database was not implied in any algorithmic rule, yet was accurately reproduced via statistical proximity of the recurrence of the given pixel values and patterns within the grid. Emphasising the epistemological deficiency of representation, or a pseudo-platonic form of the computational image-synthesis processes we are questioning the cognitive 'affect' of an image that culturally holds such a strong cultural, religious, political and spiritual significance, here being simulated into a combinatorial transcendence of *statistical art*, not limiting it to religious or national traditions, but also not devoting it to the technological innovations, rather making a challenge to understand what lies behind the altarpiece, beyond the curtain of techno-iconostasis, to step beyond mystification of these systems and to provoke questions of materiality and visibility of the systems that build the spectacle of a computed image

On the other hand, *FUTUREFALSEPOSITIVE* is a predictive analytic tool, set to prophet cryptic advice, predictions and speculative superstition, through a method of computer bias of false positives. It is computational pareidolia, or apophenia, trapped in the infinite loop, which comes as a desperate search for a meaning where there is none, as intuitive and metaphorical as it may be for humans, it is an execution task for a machine, reminds us on the *Entscheidungsproblem* - there is no true or false value in this loop, our object recognition system will search and track patterns *forever*, unless *instructed* differently. For us, a phantasm or speculation, imagination and pattern finding can be a form of creative expression, leisure or communication, and for the execution algorithm it is a struggle of no efficiency, no meaning, no score of success, it is *accurate* but *faulty*, stuck in an obsolete activity, yet the one that reveals the automated character of machinic vision - a statistical probability generator that *sees* what we want it to see, or rather that detects patterns that we want it to detect.

In the case of the final project, *PROMPT: WAR STORIES,* a generative chimaera of image synthesis and image analysis, a syntax-driven generator between the worlds of words and

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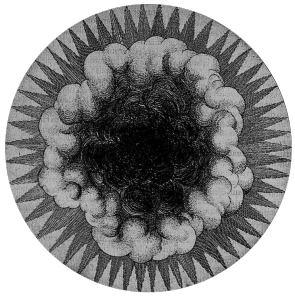
[210] "*…how does AI contribute to the production of identity confection, the fractal multiplication of identities, which are bought as commodities, as cheap pocket saints? How does propaganda work now that the editors-in-chief are in fact AI algorithms? Can we imagine these algorithms as public, social, open, democratic? How can we demand our voice and our share in the process of IT development, which seems to necessarily lead to global centralization and control?",* Uroš Krčadinac, "Data Vizantija." https://krcadinac.com/rad/sveska/data-empire/. accessed December 30, 2022.

worlds of objects, in a mapped synthetic reality, deprived of any intent of meaning, a renderer of collective data traces of the past. Prompting narratives and imagery outputs established on the efforts of slow processes of cultural transformations, individual and collective histories - they become recycled past, ghosts of images haunting the liminal space between the real and the virtual, the data-mapping imagery that is *naively* exploiting veracity and authorship, with occasional glitches of socio-cultural bias - in the times of extreme language sensitivity, unresolved postcolonial issues and cultural appropriation; gender, racial and wealth-distribution bias, misinformation and false information, with an influx of extreme violence broadcast and unapologetic polarisation of society, we are running a slot-machine of cultural capital and comparative linearity of histories set on *random–render–recycle*, navigating the engineered map of extracted extrapolated notions of the real and familiar.

In the state of algorithmic culture as a discursive power of tech industries promising a future beyond our scope of knowledge or comprehension, while feeding on collective crowdsourced labour and histories, the semiotic value of algorithm-based solutions, predictions and values is increasingly growing, obfuscating human agency and intent, and becoming a condition of totality. We are served with phantasmagoria and cultural imagination of an optimised character, a feedback loop of power - of a *big data* spell cast that from code to manifestation becomes a geopolitical infrastructural re-engineering of society, manifested through *likeness* and a promise of superiority. In this research we reflected on possible visualisations and manifestations of the character of techno-evangelist society, through visual culture, interface theory, and semiotics of an image, deconstructing its form and meaning. Every system and every ideology comes with its own propaganda, and the image is always a carrier of a message, even when it is automated and a-personal, it may not only speak for an individual or a particle of the historical momentum of reality, but it can also speak on a collective level of totality, and reflect a broader structure of current techno-ecosystem we are living in.



Robert Fludd, Utriusque Cosmi Historia, 1617.

CONCLUSION

Looking at algorithmic culture as a method of organising relations, and defining processes —to measure, track and structure— make *sense* of exterior dynamics of coexistence, in and with the world around us, we accept the nature of the need to articulate and tame the entropy of the dynamics of nature, and our own cognition, and relations. As every cultural development creates further complexities, and every technology provides new modalities of operation, navigation and imagination, we aim to reframe previously given structures, and expand and apply new visions of the territory of thinking and being. With the development of computers, another paradigm of coexistence and cohabitation emerged between the human and the machine - a *cybernetic* system, a feedback loop system of self-regulation, circularity and control. The history of computer art influenced contemporary computational image processing, as cognitive theories influenced networked culture, and communication systems, but also the goal of predictive behaviour. On the premises of *cybernetics*, behaviourism and *big data* processing, we are reaching the point where the automated systems are engineering content for algorithmic echo chambers we are perceiving as a window into the world, projecting our needs and desires onto a user interface —in this particular analysis— the screen, merging real and virtual into an intertwined techno-ecosystem of prediction [and probability].

Aesthetics represent and mark the momentum, *the now*, and also shape the future that will indeed be inseparable from socio-technical conditions. Aesthetics is not defined by beauty or by the evaluation of art by its representational values, here it is related to ethical problems that are caused by the placement of the tools promoted as creative, becoming discriminative projections of the engineers of such simulacra. The singularity that was in question is not a centralised *visible* agent at this point, as we are surrounded by accelerating technologies that obfuscate the visibility of the sources of power, *big tech* industries providing us with a statistically optimised infrastructure of networked communication, a framework of seemingly distributed power-centres of an automated self-regulating data-organism that is developed on the global north dominated culture and accumulation of the capital, representing another form of extractivism, whether in physical or data resources, already making socio-cultural and political changes on a global scale. We do not need to imagine an entity a symbol or an icon of a superintelligence that is a centralised visible agent, we are becoming one. Algorithmic ideology leads to the colonisation of our dreams, leisure, imagination, hopes, extraction and filtration of data into a probability generator on a pixel grid, in the realms of visual computation and its aesthetics. The form of expression becomes technologically *singular* or unified, resulting in a *style* or aesthetics that is recognisable because of the tool, not because of the author. Algorithmic image-making models generate outputs that are an instance of quantity and computational power, in their core, any image is just a particle, a floating information package that can be substituted by the other, to an infinite extent, with every further execution of the code. However, we are a society of images, so no image is neutral or inert in a socio-political sense.

Using *generative adversarial neural networks* (GANs), and *StyleGAN* models, the image is no longer just material for reproduction, the image itself becomes something that the

computer can build from beginning to end. Even though the image is being built 'from scratch', the procedure and the content that is generated were developed on a pre-made image database and a pre-trained algorithmic model. The model never reproduces any specific [original] image sample from the database, it processes all images of the database as a combination of values resulting in a theoretically infinite number of outputs, that can vary from overfitting [or outputs that are too similar to some of the images in the database] to noise glitches when an error happens or the materials that we can consider successful. The discourse and the levels of interpretation frequently end up at similar meeting points of *dreams*, *memory, hallucination, inception, uncanniness, machinic imagination* and *infinity*. With the popularisation of these models, after *Deepdream* had its breakthrough, these models were also limited by their own aesthetics - even though the human agency and curation were visible, codes were accessible and open to change but, after the hype, everything started to look like the other. The *styleGAN* artwork becoming a *GANstyle* - the aesthetics and the implementation of this model leads to similar visual characteristics in the output towards assimilation in expression, regardless of the motif that is being generated. The problem of protagonists celebrating this is interpretation through metaphor, opening the doors to mystify and imagine - injecting meaning, more than the tool itself could offer.

My artworks were developed as a visual and a semiotic take on understanding the interchangeability of meaning, and arbitrariness of context of generative images, of how we project meaning onto computational image processing. In the first presented case, for the project *Digital Prayer* I have established a relationship between the computer code and Mediaeval Orthodox Icon, whereas styleGAN model was able to produce images that resemble the originals given in the database, and therefore to promise a combinatorial transcendence, an infinity of image permutations, endless meaning-less iterations that we read as a *familiar* object with its meaning. The belief in the higher source, immateriality and all-knowing top-view power structure is not a new universal abstraction, but we can say that in the realms of mystification of power, and exploitation of power come with a possible analogy between the role of *God in feudalistic mediaeval times, and the one of AI in today's neoliberalism.* A promise of a neutral agent-zero in the ideology of AI is an important instance to disagree with, presenting research examples that visualise and materialise collective efforts and logical mistakes of promised decision-making automata. Computer vision systems for image analysis and object recognition are developed on a crowdsourced human labour non-transparency in datasets and labelling processes, leading to human bias and causing discrepancies in an ethical and moral context. We make *what* the machine sees, and the global tech industry filters *how* it should see us. As we noticed, intelligence is a collective effort, and all data is subjective. Therefore, every system is subjective, since it does not have an intent or a goal of its own. To exemplify this logical gap between the *intention* and *detection,* optimum *accuracy* against the *truth,* and mathematical correlation against human causality, I presented the project *FUTUREFALSEPOSITIVE.* A relation has been established between computer bias - *false positives* and human bias of *apophenia or pareidolia*. The acceleration of technological solutions being implemented into the pores of our lives and industries does not promise actual solutions to complexities of social systems or ethical priorities. In need to reject automation as tagged, labelled co-existence in the sea of data, with no meaning but with heavy discrimination, we must not forget to create and search for meaning in images, that is personal, emphatic, and understanding outside of the realms of classification. Statistical probability should not be the only interpretational category of human reality because the *confidence* of statistical prediction constructed as a form of *objective truth*, and bias of

human rituals of fortune telling, whereas confidence and reliability of future predictions, or statistical [in]capability of predicting a new event still do not solve any decision-making problem themselves.

In the ideology of prediction, to foresee the future, we are recycling the past. The problem of belief and trust in that the combinatorial permutations can (1) predict a new event, and therefore (2) be able to create something new, or surpass human efforts was another instance to explain in this research. In both ways, we can conclude that the only prediction that a machine can make is based on previous knowledge [i.e. database] and never will be able to predict a new element, circumstance, or interruption. With excessive expansion and enlargement of training datasets, the map grows bigger but the territory holds more entropy than the combinatorial permutation of probability can generate. A dream machine is a conservative tool for optimised predictions, in the artistic sense, it can mimic and resemble, but it cannot give what drives art, an accident valued by intuition or experience, it cannot discriminate any other value than numerical, of the kind that it was instructed to discriminate. The example of visual art can be transposed into the need for creativity and intuition in any aspect of human life, development of societies, technologies etc. To use the mimicry of creativity as proof of an independent intelligent system with its own agenda is insulting and dangerous for the cause of an ideological substitute for a society with a collective identity crisis, delegating responsibility for ethical and moral glitches in consumption to a non-agent, In a swarmed image-making world, such synthetic imagery recycles and reiterates stacks of our collective data-image histories. The living [world] makes the [living] data, it is the interconnectedness that is inevitable, yet it is exploited. In *PROMPT: WAR STORIES*, I selected a sequence of generative content that replicates war narratives, simulated realities and fantasies, merged into an oversaturated information text and image prompts that are meaning-less, desensitised combinatorial derivatives that excavate particles of collective traumas and heroic phantasms. In a generative world, it all goes, and we've seen it all, information does not necessarily induce knowledge or empathy, but it is fuel for propaganda.

As much as the promise of the networked world and fast-paced information exchange has its benefits, we live among technologies of decentralisation, we are users of software as a service, that has the extractivist principles of data sourcing, *ascending* into 'cloud computing' seemingly immaterial or invisible, due to distributed re-localisation of storage capacities, data centres and computing power, create an architecture of new geopolitics, a planetary scale computation of obfuscated agency and power accumulation. The main ideological framework of making the power centres invisible is to mystify and abstract the agenda and the accountability for profit and the strategies of social engineering that provide that accumulation of attention and consumption = capital for service providers. The same service providers that have the computing capacity and data access [*ownership*] do develop tools such as *DeepDream, DALL-E* or *Stable Diffusion*, presenting them as a novelty - they are powerful tools that require powerful sources - to some extent they are available so as to justify the means and principles of data accumulation. For artists, it is an authorship paradox, in a condition where the use of these tools can be appropriated for artistic expression and experimentation in computational art, yet it can serve as promotion, or endorsement of the tool and the provider of the service, whereas the outputs start to look alike, the tool has its own aesthetics or rather a visual identity constructed by its pre-made form and code - so tool turns into a product and artist becomes a user.

The perspective that this research took towards understanding the systemic impacts on human agency, or the human condition within coexistence with these systems is one of visual culture and art. On the axis between the semiotics of an image, teleology of the machine learning tools and personal artistic practice inspired by ritual, mystification and protocol - control within, I introduced three different processes through three different projects, mainly to clarify the distinction between human and machinic agency and bias, through languages of familiar cultural codes transposed into machinic processing, over which we see the discrepancies and what makes a human-human and machine-a machine. A loophole for creative interpretation does not come only through the *prosumption* of the tools as they *are meant to*, but opening them to the challenges of the real world, or speculation that does not promise a better *future*, but a better *now*. A machine cannot imag[in]e new worlds - it can only optimise and reproduce existing ones, within its scope of database knowledge — it is limited by the scope of self-referential combinatorial infinity, the expansion of experience and knowledge is a human measure, it is still entitled to our entropic constellations of *being*. Commonplaces that are emphasised in the algorithmic culture of the *big tech,* extractivist and self-referential are not only the possibility of use of the technologies in question, yet those who acquire the power to improve it, hold the power for their own ouroboros of statistical significance as the referential point of value, as conservative and exclusive as it is: *repeat-reuse-score!* cycle. Hopes for an *Ars Combinatoria*, that would provide mystical knowledge of uncomprehensive logic and patterns, are neglected for the sake of the system, of accelerationist capitalist future as Wiener's ethical concern of intertwinement of scientific innovations, governments, and the military was in the right place. Every form of progress requires a form of belief. Every belief turned into a ritual can be consumed. Technology, as it is propagated and implemented in the structure of our networked lives today, does not provide a solution, it is a reflection or a projection of the world seen by conservative techno-evangelistic architects of the globalised society. The image phantasm of an aesthetic realm - *deepdream inceptionsim, combinatorial transcendence* and *simulacra of simulation* obfuscate the power structures that are the sellers of these tools.

The aim to break the phantasm of an aesthetic realm is to radically isolate these tools from their intended purpose, the framework proposed by the power structures that are their sellers. Aesthetics, concept, and context are intertwined, and within these strategies and methods of implementation in artworks, we require formalisation, and representation through an experiment that intersects functional, cognitive and human needs, entailing the practice of scepticism against the inherited need for compensation of trust, faith, or the belief that we implement in any new, i.e. *promising,* way of articulating our state of the now, or of the future. Our *now* and our future are inseparable from the sociotechnical conditions, yet that does not imply that techno-solutionism is a key to understanding and defining our own condition within. To avoid the trap of the custom-designed solution, we need to recognise a practice that is both aesthetic and conceptual in the realm of the search for the new domains of experience, of transformation of images and data, claim for formalisation and reappropriation of the accessible data, so as to entail a practice that is able to reconfigure the optimised aesthetics of the currently dominant *products* that at the same time fractals and uniforms the means of expression, to evade and refuse conceptual and contextual constraints that reflect the aesthetic engineering of power structures in the given systems-products. The claim of creativity being isolated from cognitive and causal relations, socio-cultural contexts or historical continuity is a bald statement that in return

offers statistical modelling of all of those connections, heritage and realities. Creativity cannot be a probabilistic approximation of a motif or simulation of a pre-existing artwork or style based on classification and categorisation. That is a statistical optimum of distribution within a pixel grid, cartography - data-image and a map of the territory we already conquered. As playful as it may be to experiment with the pre-produced models, the homogeneity of outputs makes them lose their *magic* as they are becoming a commercial tool, an obfuscated, opaque and biased product of global north culture and prejudice - a reference of industrial commercialisation of data extraction, derivatives of collective past, individual and total, customised, yet optimised, discriminative and calculatingly f[r]actual.

In the *optimal* spirit of the ideology of prediction, there might be a possibility that these systems and tools for generating *creative content* will reach the point of oversaturation and overfitting. If they are the flagbearers of, as we concluded, such a conservative system, they cannot provide more than they were given [by us] —if it is in not in *big tech's* interest to cause illogical, random excess, an error— but to standardise equilibrium of self-improvement of consumption models, these self-referential content generators might become obsolete tools on their own, yet possibly implemented in entertainment industries, hopefully, appropriated for synthetic data processing, image augmentation or similar tasks, that do not have much to do with our collective histories and interfere with mimicry of cognition. Also, the behaviourist-capitalist order of conditioning, of endless, repetitive content, might keep its self-optimised standard in the form of a mass-media structure. Even though it is appropriating the common intellectual possessions rendering all into a commercial product, software, tool, etc. while being occupied with its own rating and score of self-referentiality, prediction and control, this structure will not be interested in occupying possible new territories of creative expression, non-utilised labour, negation [as affirmation] - the loopholes are places to look for, keeping our eyes peeled, following our own needs, and thinking critically. Another promising aspect of how to hack even such opaque structures - they are repetitive, and they project themselves in every fractal of *intelligence* that they offer, so if we cannot grasp the whole map, we can always start with one point - one particle stands for all, and as long as we can extract a single element or a problem, and humanise it, *deeply un-learn* it, transform it by our own measurement of the world, we are on a fine path of acknowledging and defining our own condition, with and against the other - defining the points of acceptance and resistance. The responsibility of the artist to develop a critical approach in computational art in the time of algorithmic colonisation of everyday life, helps us to open our senses, and understand these systems from a different point of view, if an artist can avoid the *hype,* appropriating and hijacking these technologies in a way that they are not *intended* to be used is a tactic that creates the environment for us to feel, think and reflect; every misuse and disobedience is a radical tactic to claim back authorship and agency, and to deploy communication between the human and the machine in a more humane way, through human vision, understanding and needs, to develop unexpected technologies and artistic languages.

We shall not accommodate or accustom ourselves to be dependent on these tools more than they are dependent on us. Keeping in mind that this feedback loop, as coexistence,

derives from our needs, but also from the accumulation of our data, and labour, we should aim to sustain our own cognitive and creative powers, critical thinking and the need to stop, think, and contemplate. The ideology of acceleration, of *homo turing,* needs to have a point of resistance, where we can claim ownership of our own time, attention, production or leisure. In responsibility to provide possible frameworks of such instances, art and specifically a critical approach in digital art holds great power against the colonisation of everyday life, exposing rituals and habits, systems and structures that could otherwise impose themselves as the only valuable modalities of the function of existence. It is a human advantage to make and recognise a mistake or a glitch, to give value to it, and to create a rupture against the *status quo* - that becomes a point of resistance, and a point of progress. Acceleration pressure is an instance that art can radically refuse, it can pause, rewind and extract phenomena and poetics, problems and concerns, and translate or dismantle them, so as to accommodate them to more human, intuitive and empathic forms.

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