Operativity: From Images to Archives

Extending Harun Farocki's concept of "operative images," we introduce the concept of "operative archives," reflecting the profound changes brought about by digital information processing in archiving and beyond, necessitating a reevaluation of image theory. Farocki's "Eye/Machine" trilogy highlights images for automated operations in ma-chine vision systems that replace human aesthetics with machine readability. These images, particularly exemplified by the impersonal precision of guided munitions or automatic facial recognition, are emblematic of the transition towards a system where images are processed and enacted upon by machines. Central to the notion of "opera-tive archives" is the principle that no image stands alone; images are pluralistic, interconnected components of vast data sets that drive automated decision-making and the training of AI algorithms. This collective characteristic of operative images within operative archives challenges the singularity of images and necessitates a collective, systemic understanding. With AI advancement, the impact of these archives on societal structures and individual free-doms becomes more pronounced. The concept of "operative archives," derived from Farocki's work, calls for a new image theory that addresses the societal impacts of such technologies, ensuring ethical and democratic guidance for their evolution and integration into the fabric of society.

1. Harun Farocki's operative images

The digital processing of information has profoundly transformed nearly all aspects of life. Contributing factors to this change include: the combinability and nearly infinite storage of data, their rapid dissemination, and extensive networking, the impact of which we often underestimate despite their ubiquitous presence.

Harun Farocki's trilogy "Eye/Machine" begins with images from the 1991 Iraq war showing so-called "intelligent weapons". Shots of cameras attached directly to the explosive devices and transmitting from there. Farocki refers to such shots, taken from a non-human, yet subjective perspective – that of the missile – as "subjective phantom images" (Farocki 2004, 13). They show surgically clean operations, images without people, full of precision, without emotion. Here the

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camera's images are only a depiction, the documentation of an operation. With "Eye/Machine", Farocki introduces the concept of "operative images", referring to images "that do not represent an object, but rather are part of an operation" (Farocki 2004, 17). These images are distinguished by two key aspects: Firstly, they are not intended for human eyes but are produced by machines for machines. Secondly, they are not representations but rather functions, instructions, or components of operations (cf. Hoel 2018, 26).

Operative images are not meant to be viewed passively or interpreted aesthetically, but rather to be acted upon or interacted with in some way. They are tools for controlling or manipulating reality. Operative images can be found in fields such as medicine, surveillance, industrial or military operations, where their primary function is to act out a task, provide information or facilitate decision-making. By exploring the role of images in different applications, Farocki reveals how images have evolved into potent tools for exercising power in contemporary society. The concept of operative images thus poses significant challenges to traditional image theories, as they cannot be explained or interpreted through established frameworks.

Trevor Paglen says, that in the light of the development of new visual paradigms in warfare, industry and surveillance, for example, the human eye has more and more become an anachronistic tool (Paglen 2014, 1). Similarly, Hoel argues when she writes that "[...] the advent of a new visual regime, and simultaneously of a new stage in the history of machine vision where the machines have started to see for themselves" (Hoel 2018, 12). Though operative images are largely dissociated from humans, no longer created or intended for human perception, human involvement persists in numerous aspects of these images, such as their programming and what algorithms are trained to see in them, in interpretation, and application of their outcomes. Above all, it is humans who are most affected by the consequences of these images. Operative images reference a before-the-picture – the concept, the programming – and an after-the-picture – the result of the execution of the image order. Aspects that are in turn ac-cessible to the human being, determined by her/him.

Nearly two decades after "Eye/Machine" was produced, Farocki's material appears strikingly anachronistic. Both computer simulations and examples of machine vision seem dated, still closely oriented to human perception. Since its inception, the field of operative images has grown steadily and rapidly, and is increasingly linked to the field of machine vision. Thus, Volker Pantenburg refers to the "om-

nipresence of practices such as data mining, image retrieval, facial recognition software and related practices" (Pantenburg 2017, 49) and continues: "Wherever algorithms of pattern recognition are employed, images become part of and merge with a technical operation" (Pantenburg 2017, 49). The term "image" may no longer be appropriate, according to Pantenburg; instead, he suggests that data visualization may be a more accurate term (Pantenburg 2017, 49). The image, he says, has become a "secondary function, almost a gesture of courtesy extended by the machine" (Pantenburg 2017, 49). Although operative images are now pervasive and differ significantly from Farocki's original examples, his conceptualisation and analysis as a distinct category of images prevails.

Farocki analyses the structural composition of operative images as fragmented, discontinuous, impossible to observe, drawing on Vilém Flusser's concept of the technical image: "What defines these images is that they are composite images made up of individual, discrete entities (grain, dots, lines, pixels). More than their concreteness and functional character, they are characterized by their formal composition" (Pantenburg 2017, 52). The difference between these two types of images lies in the fact that the former can be observed, thus enabling a sensory experience, while the latter does not emerge from observation, but from computation (Flusser 2011, 10 and Pantenburg 2017, 52). And such is the operative image: "The operational image is not only a 'working image:' but also an image that is the result of a calculation, as opposed to other forms of image production" (Pantenburg 2017, 52).

Jussi Parikka highlights the historical and intellectual roots of the concept of operative images (Parikka 2023), and emphasizes that they are not only about perception and sensing, but also about operations. He traces the origins of the emphasis on operations back to the field of operational research (OR) that developed in the U.S. and British militaries in the 1930s and 1940s (Parikka 2023). OR involved the quantifiable analysis of military operations for the purpose of optimization, and it evolved into the more speculative systems analysis of the Cold War era. For Parikka, these systems analysis approach can be thought of as "institutional-level 'machine learning systems' that aim to formalize, train, and model based on available quantitative data" (Parikka 2023). This means that learning itself becomes a formalized operation, and the successes of operations research led to the belief that mathematics and theory now have become the superior to more traditional tactics based on experience ways of operating. Parikka's highlights the historical and intellectual roots of the

concept of operative images and the importance of understanding the broader context of operations research and systems analysis in the development of these technologies.

Parikka emphasizes the centrality of numbers and data in the production of images as well as the history of industrialization. He notes that data is not infallible or objective, and that the use of data-driven decisions and operations can have significant social and economic implications, even if the data itself is flawed or incorrect. This means that the use of operative images is not simply a technical or aesthetic issue, but is also an intervention in broader social and cultural landscapes. Parikka's comments become particularly relevant in light of the growing interest in big data, machine learning, and artificial intelligence, all of which rely on the collection and analysis of vast amounts of data. As the use of these technologies has the potential to shape, form and transform social relations and our sys-tems of values in significant ways, it is first and foremost important to recognize these broader implications (Parikka 2023).

In the historical developments "are the implicit conditions of emergence for what Farocki called the 'soft montage' of archive and in-consequential images" (Parikka 2023). This soft montage involves the juxtaposition of archival or found images with inconsequential or seemingly unrelated images. Parikka suggests that the emergence of operative images is an implicit condition for the development of this approach, and that it reflects a wider historical and cultural context in which images are increasingly being shaped by data-driven processes, such as "questions of artificial intelligence and machine vision, but also to the genealogy of the concept of operations as it pertains to images, institutions, spaces, and nonhuman visuality" (Parikka 2023) or what Farocki framed as the "industrialisation of thought" (Farocki 1993 cited after Parikka 2023). A category such as "inconsequential images" is about to cease to exist: every image might be of importance.

Another difference between "conventional" and operative images is the immediacy of their application. Operative images are images that can be used directly to perform specific actions or processes, while conventional images are considered more passive and aesthetic objects. Operative images are often used in industrial, military or surveillance environments where they need to be analyzed and processed in real time or very quickly. While an image in the traditional sense is ambiguous and can be interpreted in several ways, this should be avoided at all costs with operative images; unambiguity is their premise. One example is surveillance cameras that capture subjects and

objects in real time to identify potential threats and trigger alarms. In contrast, conventional images often have a longer lifespan. Duration also plays a role in viewing: while conventional images are passive and people encounter them contemplatively, operative images are triggers for immediate action. They are fundamentally instantaneous and ready for use, especially due to their digital nature (i.e., without prior interpretation, without the need for conversion to another format). Immediacy is reflected, among other things, in real-time use, direct applicability, and direct feedback on an action.

2. Operative images and machine vision

Expanding on Farocki's notion of operative images leads us to contemporary machine vision, employed for example in automated facial recognition and various pattern recognition applications. As operative images, they have become active agents: "Instead of simply representing things in the world, machines and their images began to 'do' things in the world", describes Trevor Paglen (Paglen 2014, 1). This means that their primary function is not to be viewed and understood by humans, but to serve a specific operative purpose carried out by a machine. The perception of these images is closely linked to action, whether immediate or delayed. As a result, "This coupling systematically operationalizes terrains and targets" (Parikka 2023).

Such images are employed across various domains, with military applications being among the first, as Farocki demonstrated. However, they have since extended into everyday life, evident in automated facial recognition and other face-targeting technologies. Machine vision transcends mere image generation by computers for computers; it relies on a vast pool of images for training AI algorithms and result comparison. We argue that these growing sets of images and their fragments constitute speculative archives or arsenals, embodying both individuals and collectives. The images do not exist in isolation, as Roland Meyer remarked (Meyer 2021, 9); they are components of dynamic image networks, serving specific purposes and performing tasks.

Operative images surpass data visualization, as they are grounded in reality, with the real world serving as a basis or reference point for comparison. Their purpose within a complex process is to prompt subsequent actions, rendering them active. These "images" are not final products, but represent stages or triggers for actions justified by their presence, which may be executed by either humans or machines. It is vital to acknowledge that "seeing" has long surpassed being a privilege exclusive to humans or other organisms. Nowadays,

we metaphorically use the term to describe machine vision processes. Here, "seeing" pertains less to sensory experiences and more to the recognition and intricate processing of patterns. Within these processes significant events are programmed, learned by algorithms, and executed. These "images" and this "seeing" directly affect people and their bodies. Trevor Paglen suggests that the rise of operative imagery represents a significant shift in the way we produce, consume, and understand visual information, and that this shift has important implications beyond the purely machinistic for how power and control are exercised in various domains (Paglen 2014, 3). This power is meant to be interpreted literally, "We've long known that images can kill. What's new is that nowadays, they have their fingers on the trigger" (Paglen 2014, 3).

Paglen concludes that "I don't know how we will learn to see this world of invisible images that pull reality's levers, but I do know that it's imperative for other artists to pick up where Farocki left off, lest we plunge even further into the darkness of a world whose images remain invisible, yet control us in ever-more profound ways" (Paglen 2014, 3). We must not stop at knowing that these images exist; we must understand that the concept of the operative image is proliferating and that it is our responsibility to try and understand these images as they continue to evolve and have further impact on our lives, he suggests. Even if they remain hidden from human view, these images have the power to shape reality in profound ways. By referencing Harun Farocki, Paglen also emphasizes the importance of historical and cultural awareness in this process. Farocki believed that artists had a responsibility to critically engage with the visual culture of their time. Paglen's conclusion can be read as a call to action, urging other artists to follow in Farocki's footsteps and engage with the challenges posed by operative images in our contemporary moment. Paglen believes that it is imperative for artists in particular to take up the challenge of making the invisible visible and raising awareness of the need for greater transparency and accountability in the use of such imagery.

Farocki scrutinizes the application of operative images in various contexts, particularly their impact on decision-making, actions, and political processes. He underscores the importance of critically examining this class of images to comprehend their social and political ramifications, and to prevent potential misuse. Farocki was deeply committed to highlighting the necessity of devising counter-strategies by exposing concealed images and image processes. He posited that their invisibility and opacity often stem from their use in indus-

trial, military, and other sectors that are typically inaccessible to the public. Through his work, Farocki sought to expose these processes and their societal effects, thereby promoting awareness of these critical issues. For Farocki, revealing these images and processes was the first step towards formulating counter-strategies. A deeper understanding of how these technologies function and their implications enables us to implement appropriate measures to mitigate their adverse effects. An indirect example of a counter-strategy emerging or being inspired by this increased visibility is the digital rights movement, which calls for greater transparency and control in data collection and processing. Additionally, other movements and initiatives champion data protection, freedom of expression, and freedom of information, though the connections should be further substantiated since they are not direct links. Farocki's work aims to raise awareness of image usage and imaging techniques across various domains, thereby helping cultivate critical reflections and counter-strategies to minimize the negative impact of these technologies.

3. Operative archives

This discussion focuses not on the nature of individual images, but on the potential of images in their accumulation, fragmentation, and reconfigurability as both individuals and abstractions. It explores the speculated future, the partially archaeological analysis of the past through artifacts, and the present as a nexus for stocktaking and launching speculations. In conclusion, we want to speculate about the transformative potential of operative images and their role in constituting a new type of archive, the operative archive. This novel form of archive challenges our previous understanding of images and archives, as well as raises critical questions about privacy, individual freedom, and democratic values. We argue that understanding operative archives and reflecting on their potential power is essential for establishing limits and preserving freedoms in the digital age.

Archives debated in this context are to be understood as an extension of Farocki's concept of operative images. These images are also characterized by the fact that they are not to be thought of in the singular, but almost exclusively in the plural. Partly as already existing accumulations, but also as speculative and further accumulations.

Operative archives are archives that are not passive repositories, collections of documents, stakeholders of the unchangeable past, stored accumulations, dead stock, shelf corpses or, as Hertz & Parikka call it, "Zombie Media" (Hertz and Parikka 2012). But they actively intervene in and bring about various processes and control certain

developments. They hold and exercise power in the same way that traditional archives do.

We argue that these images have the potential to do multiple things. These multifolaint potential in combination with their flexibility, their combinatorics (not just relations put potential relations), their storage and transmission is what makes them relevant in the context of a new kind of archive. We need to discuss the term operative image not as a single image, but shift to the accumulation of large image sets, image parts and contextual information, in fact moving away from the image as a complete entity to the image as information that possibly results in an image in the widest sense of the word, in image as a metaphor for what we don't have an adequate concept or term for at the moment. No image exists in isolation (referencing Roland Meyer again); all are interconnected and increasingly interoperate. While traditional archival processes aren't discarded, they have become almost helpless in the face of digital capabilities. Effortlessly, digital technology can assume and transform prior archival activities, functions, and processes, extending them into versatile forms. Information is now operative, meaning it is easily combinable, transferable, storable, and more, whether entirely or in part, and regardless of its current relevance or perceived value. Due to their flexibility, combinatorics, and transmission capabilities, operative images possess multifaceted potential. The abundance of their presence combined with their connectivity, their interconnectedness, their data-ness, their operationality makes these archives a phenomenon to be noted and reflected upon. The image as a whole, its visual components and metadata, becomes information that can and is being exploited, stored indefinitely, traded, and repurposed in many ways not originally intended, with significant implications for privacy, freedom of expression and democratic values. The question thus is not whether these archives will shape our future. As a society, we have to ask ourselves what limits we want to set, what freedoms we want to preserve or create.

The central distinction lies in the operationality, be it active or momentarily dormant or speculative. The ability to utilize information in operations doesn't only enhance the efficiency of known and yet-to-be-imagined operations; it also significantly impacts our lives. We explore this, extending Harun Farocki's definition of the operative image to encompass any digitally accessible or convertible information in this operative sense. Collectively, these data traces create powerful accumulations, akin to historical archives' influence and power, which we will refer to as the speculative form of operative archives.

Operative images are images of the moment. They are not meant to stay, they do. When at first not intended to be permanent, this aspect is changing. They can and are increasingly being stored indefinitely; "trash" is no longer thrown away, but can later prove to become a "golden nugget". Increasingly, the components of operative images, such as biometric data, facial recognition images, or DNA samples, are stored individually or in combination for long periods of time. As these data are often collected and stored without the knowledge or consent of the individuals concerned, the implications for individual privacy and freedom need to be addressed. The long-term storage and use of operative images impacts how companies, governments, and other organizations make use of them. The same technologies can also be used to identify and classify groups of people and lead to a range of discriminations. The images and their components can be and are also used to monitor, to control, and to manipulate individuals and groups, in particular to identify critics or intimidate political dissenters. Critically accompanying and reflecting on the creation of such operative archives from the very beginning, not only knowing, but also understanding them, is therefore of vital importance for social responsibility and democratic values.

Both "image" and "archive" may not have left their original conceptual yard in this speculative consideration, but they transcend the previous understanding. Both are more than metaphors; they have assumed, or are in the process of assuming, the functions archives once had and were recognized as having. Technologies such as automatic facial recognition and forensic DNA phenotyping (FDP) rely on operative images and contribute to the development of these archives.

It need particularly to be emphasized that in the interplay between private companies, which collect and process this data and offer it as a commodity, and state authorities – especially law enforcement agencies – a new complex of actors enters the field and it has to be asked how the production and use of such data exceeds their legal powers, especially when it comes to data as sensitive as that relating to the human face.

Critically reflecting on the creation of operative archives and understanding the effects of long-term storage is an essential task for preserving social responsibility and democratic values. Operative archives are both in plain sight and hidden from view. As digital data, operative images are tentacular (a term borrowed from Amade M'charek 2020, 370) and adaptophile, allowing for the interconnectedness, operationality, and abundance of their presence. It is crucial to note and reflect upon these operative archives, as they will inevita-

bly shape our future and already affect our presence. As a society, we must consider the limits we want to set and the freedoms we want to preserve or create.

Operative archives affect the perception and construction of realities. They can be used to perform and produce both individuals and groups. These archives represent power in a very direct way, as they can influence the way people make sense of events and phenomena, reinforcing or suppressing certain narratives and perspectives. They already actively intervene in and bring about various processes, controlling certain developments rather than merely serving as passive repositories. As they accumulate and store images for specific purposes as well as unspecific ones, as they continuously grow and become more complex, concerns about potential misuse, social control, and surveillance arise. It is important to highlight the particular relevance of data relating to the human body. Operative archives based on images of people and their associated metadata are transformed into permanent data bodies, which can act in their entirety, in parts, or as cumulative data bodies. Especially in the context of training algorithms for AI, metadata play a crucial role. Without them, there is nothing to learn. It is through the metadata accompanying the images that artificial intelligence can make sense of and derive meaningful insights from these operative archives.

To further discuss operative archives, it will be important to consider:

- The role of algorithms and artificial intelligence is critical in the creation, analysis, and manipulation of operative images. They significantly contribute to the formation and functioning of operative archives. Through the examination of extensive data sets, AI systems can discern patterns and make predictions with unparalleled efficiency. However, this reliance on algorithms and AI raises concerns about the potential biases and inaccuracies inherent in these technologies. For example, if the training data used to develop an AI system is biased, the system itself may perpetuate and amplify these biases, leading to misrepresentations, misinterpretations, or even discrimination.

- Legal and regulatory frameworks that govern the collection, storage, and use of operative images and data also play a crucial role in shaping the operative archives. Existing legislation may not adequately address the unique challenges posed by these new technologies and the huge amounts of data they generate. As a result, there may be a need for new laws and regulations that specifically address issues related to operative images and ar-

chives, ensuring that individual rights and freedoms are protected in the digital age.

- The ethical responsibilities of those who create, maintain, and utilize operative archives, including private companies, governments, and researchers have to be reflected. These actors must recognize the potential consequences of their actions and strive to develop and implement best practices that prioritize transparency, accountability, and respect for individual privacy and autonomy. By doing so, they can help ensure that operative archives are used responsibly and ethically, minimizing potential harm and fostering a more just and democratic society.

Extending on Farocki, it is therefore important to be aware of this speculative form of archiving, to know and understand operative archives, and to become aware of their potential power, to reflect on them critically, and to ensure that they are transparent, accessible, and democratically controlled.

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