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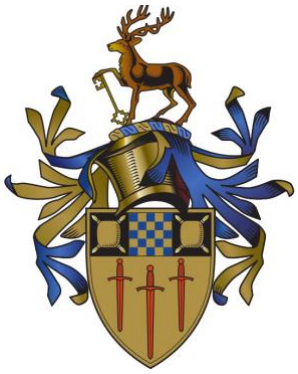

Real stories through fake media: Machine learning in the production of news and documentary filmmaking

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ABSTRACT

Journalism often constitutes a 'field of struggle for truth'.[1] The digital age has presented the reporting of news with many new challenges, including fake news, digital manipulation, and an overall post-truth era. Visual effects have reached previously unimaginable possibilities, with machine learning models continually advancing. This advancement has led to increasingly realistic visualisations that are difficult to distinguish from reality, providing an opportunity to make previously unseen parts of life visible. This article proposes that machine learning models, that refer to real data provided to them, can present a new type of truth—*inferred truth*—which does not represent 'the real' but is still based on truth. AI-generated visualisations function in a metonymic mode. They represent the real but do not constitute the pictorial representation as a mode of scientific evidence. Rather, they can represent or at least be purported to represent the social-historical world. As we live in the digital age, we can use artificially produced visual environments to deliver an inferred truth; this may be a viable option to provide better fact-based education and information and oppose the currently prominent truth-blurring challenges to news in a way that deflate those tactics.

'*There are three sides to every story: your side, my side, and the truth. And no one is lying. Memories shared serve each differently.*' - Robert Evans, American film producer[2]

A boy in a hospital bed—his face wounded, his skin tainted with thermal flash burns, his eyes empty—is looked over by a nurse, their hands holding a swab to dab the open wounds. This is just one of many images of the aftermath of the nuclear bomb detonated above Hiroshima by the United States in 1945. In his 1983 documentary, *The Truth Game*, John Pilger presents hard-hitting and shocking facts not only about what had happened in Hiroshima but also about the gruesome details that had been hidden from the public. The film shines light on the human errors and political games that were played at the cost of civilian lives. Beyond Hiroshima, the documentary also highlights the fact that information has routinely been intentionally and strategically withheld from the public to popularise a certain false impression, one example being the number of US bases on British soil at the time of the film's creation not being 12 (as was reported in June 1980) but 103.[3] Pilger has made many documentaries over the last five decades to raise awareness of the covert actions of the powerful and emphasise their detrimental and long-lasting consequences.

The instant nature of news, made possible only recently through the advent of new technologies, can work both for and against journalism. This is what Gowing calls 'the information boomerang'.[4] BBC journalist John Simpson sees danger in the fact that you can report 24 hours a day from anywhere in the world, as 'people will try to get you to do that and that […] leaves less time for finding out what's really happening'.[5] Halberstam emphasises that immediacy does not necessarily mean better or more thoughtful reporting and wonders whether 'the lack of satellites and comparative slowness of the transmission process in the old days permitted the news desks to act less as prisoners of technology than they do today.'[6] He argues that improvements in news technology have resulted in an inverse decline in journalists' editorial functions, sense of judgement and

capacity to blend the visual and non-visual.[6]

The ability to transmit images to the wider public as a form of communication has been used and misused to influence people's minds and behaviour since its inception. Although some footage of newsworthy events from the 1890s survives, the first true newsreels were produced by Pathé in 1911. They were effectively short films shown in movie theatres, generally alongside cartoons and feature films, and were initially perceived as entertainment rather than news. As a matter of policy, they avoided controversial topics, and with later newsreel footage sometimes being censored. Newsreel video footage has also been manipulated since as early as 1912 to put forward a certain narrative or give a certain impression.[7]

After the Titanic sank in 1912, a newsreel was soon broadcast in cinemas that featured footage of a captain onboard a ship—seemingly the Titanic—touring its layout and facilities to give the paying audience insight into what it was like onboard.[8] An unknown producer created the film partially with footage shot onboard one of the Titanic's sister ships, the Olympic or the Britannic, and partially with footage shot onboard the Titanic itself. Some areas of the film that would have revealed the ships' identifications were scratched out to avoid breaking the illusion for the audience. The Titanic newsreel is a prime example of how moving images have long been visually manipulated to create an illusion for dramatisation purposes or to tell a story more convincingly amid the backdrop of the overall purpose of news: to inform and educate with facts and truth. However, if all footage, interviewees, locations, topics and questions are chosen by journalists and media organisations, then all news reports are merely selections, viewpoints, parts of an overarching story—each constitutes a mere slice of the truth.

The interplay between reality and illusion—their 'mingling'[9]—today represents a significant body in the arts and in moving images. In film, visual effects constitute practical tools with which to overcome the constraints of time, space and budgeting governing the creation of a work. They are essential to its role as a narrative medium.[10] In the reporting of news, as demonstrated by the example above, visual effects can be used for the same

purposes. However, visual effects create illusions and, therefore, one could argue, ideologically oppose the standard for news reporters: the pursuit of truthfulness.

Evidently, the question remains as to whether it is acceptable to use visually fake components in news reports or whether reporters must solely use original footage and present components as they truly are without any filters and additions. In turn, it is worth asking the following question: When machine learning models, which are based on AI, employ inference—which entails a model referring to real data, such as images, it has been given and learned from—is the result truly fake? Or does it, as some scholars propose, create a new, distinct type of reality? This article argues that machine learning models create a new type of truth—*inferred truth*—which is artificially developed but based on the real; thus, these models can be used in the reporting of news to create a truthful simulation.

The remainder of this article details how machine learning models could be used productively alongside traditional tools of news production so as to inform and educate the public in a trustworthy, understandable, engaging and entertaining way.

REALITY AND ILLUSION

Historically, humans have been fascinated with the real and the unreal, with reality and with dreams. The ideas and testaments of ancient philosophers offer solid insight into how the world was perceived millennia ago. According to Aristotle, the senses constitute a gateway to reality. In his view, colours and shapes are real—as real as trees, desks, people and any other objects that represent members of a totality that we refer to as 'reality' or 'the universe'.[11] However, the totality of reality does not only comprise material objects that can be seen, heard, smelled, tasted, or touched; Aristotle believed that there are also immaterial objects, those that cannot be known by perception but only by a special cognitive capacity that he called 'intellect'. Moreover, he thought that objects around us have essences that we must grasp in order to properly explain their characteristic features, behaviours and genesis and that these essences are accessible only via intellect. Overall,

Aristotle argued that there is much more to reality than meets our senses.[12]

In the ancient Indian folktale covering the sage of Narada's transformation,[13] Narada tells the god Vishnu that he had conquered illusion, but Vishnu promises to show Narada the true power of illusion or *Maya*. The next day, Narada wakes up as a woman, marries a king and has multiple children and grandchildren. One day, all of Narada's children and grandchildren are killed in an enemy attack; amid her grief, Vishnu appears to tell her that it was all an illusion, at which point Narada finds himself back in his own body. From this experience, he concludes that his whole life had been an illusion just like that in which he was a woman.

In 300 BCE, Chinese philosopher Zhuangzi recounted a parable centred on being a butterfly. In the parable, Zhuangzi 'dreamt he was a butterfly flitting and fluttering around, happy with himself and doing as he pleased. He didn't know he was Zhuangzi. Suddenly he woke up and there he was, solid and unmistakably Zhuankzi, but he did not know if he was Zhunagzi who had dreamt he was a butterfly, or a butterfly dreaming he was Zhuangzi'.[13]

Around the same era as Zhuangzi, ancient Greek philosopher Plato relayed his allegory of the cave.[14] Plato begins by having Socrates ask Glaucon to imagine a cave with prisoners who have lived their entire lives chained up within a cave.[16] Behind the prisoners is a fire, and between the fire and the prisoners are people carrying puppets and other objects. These objects cast shadows on the opposite wall, and the prisoners watch these shadows believing them to constitute their reality, as they've never known anything else. One prisoner then comes free, sees the fire and realises that the shadows are fake. This prisoner is able to escape from the cave, at which point he would discover that there is a whole new—and far more real—world outside, of which they were previously unaware, and return to free the other prisoners. Upon his return, however, he is temporarily blinded because his eyes were not accustomed to sunlight. The prisoners who remained would infer from the returning man's blindness that the journey out of the cave had harmed him and that they should not undertake a similar journey. Socrates concludes that the prisoners, if they were able, would therefore reach out and kill anyone who attempted to

drag them out of the cave.

Chalmers[13] proposes that, considering various philosophers' definitions of 'what is real', reality consists of five strands or five dicta: 1. reality as existence—does it really exist?; 2. reality as causal power—as the Eleatic stranger in Plato's *The Sophist* suggests, 'everything which possesses power of any kind, either produce a change in anything of any nature or to be affected even in the least degree by the slightest cause, though it be only on one occasion, has real being',[16] meaning that to be real is to have causal power; 3. reality as mind-independence—as Philip K. Dick defined it, reality is that which, if you stop believing in it, does not go away,[17] meaning that it does not depend on anyone's mind for its existence; 4. reality as non-illusoriness—something is illusory when it is *not* the way it seems, something is real when it *is* the way it seems, physical reality is real because it is roughly the way it seems and things are real when they are roughly as we believe them to be; 5. reality as genuineness—J. L. Austin highlighted the importance of the way in which words are used,[18] arguing that instead of asking whether something is real, we should ask whether something is a real X. If one holds a watch that looks like a Rolex, it is not necessarily a real Rolex. In other words, we don't know how much of reality is accessible and how much is inaccessible. Still, there must be some explanation of our experiences, and explanation yields structure, which, in turn, yields reality.

The five dicta serve as a helpful guide, but there is also the question of relativism. In recent years, there have been questions over whether objective reality in politics and news reporting has gone out the window. Whether a fact is a fact depends on the system that one is using or the viewpoint that one has. In 2017, White House Press Secretary Sean Spicer claimed that the crowd outside the US Capitol celebrating Donald Trump's inauguration was larger than that which had celebrated Barack Obama's second inauguration in 2013 despite all evidence pointing to the contrary. Senior Counsellor Kellyanne Conway responded to the backlash to Spicer's point by arguing that he had simply stated 'alternative facts'.[19] Some felt that her statement suggested a relativism with regard to truth, meaning that there are multiple equally valid sets of facts that correspond to

different viewpoints.[13] Chalmers argues that certain things like shape, mass and time may be considered to be objective, but that even these are, in truth, relative to a certain frame of reference. A given object's weight, for example, is only its weight on Earth—its weight is different on the Moon, as mass is relative to gravitational force. For Chalmers, we can reconcile relativism with objective reality by recognising relations as part of reality. The documentation of relations is necessary to provide a comprehensive description of reality.

According to Hoffman,[20] what we see is only ever a representation rather than 'reality'—and it is certainly not the complete picture. Our brain is limited, and the available information in reality is overwhelming. We make decisions automatically and intuitively thanks to a built-in filter in our brain that dictates what we should and should not pay attention to. Things that are important to our survival are magnified, while less important aspects are reduced in prominence.[20] This cognitive shortcut to assessing reality approximately rather than perceiving it in its totality enhances our chances of survival.[20]

Perception

Hoffman argues that we see objects in three dimensions not because we reconstruct objective reality but because this is the format of a compression algorithm that evolution happened to construct within us. Our perceptions are encoded into our data structure, and we simply mistakenly believe it to be objective reality.[20] As an example, he points to the research conducted by Zadra et al.,[21] the results of which highlight differences in distance perceptions among humans. People given a drink containing glucose make shorter distance estimates than those given a drink containing no carbohydrates. Additionally, people who are more aerobically fit make shorter distance estimates than those who are less fit. This suggests that humans' perceptions of distance depend not only on energy cost but also on the ratio of energy cost to available energy.

Hoffman points out that human evolution has had a major impact on our perception of reality and that we are the offspring of those who, in each successive generation, saw more accurately.[20] As Geisler and Diehl argue, '(perceptual) estimates that are nearer the truth

have greater utility than those that are wide of the mark'.[22] They believed that much of human perception is veridical under natural conditions.[23] According to Trivers,[24] perceiving the truth about the outside world helps us to navigate it more effectively, and our sensory organs have evolved to give us a precise view of the outside world. Our minds, however, evolved through natural selection to solve problems 'that were life-and-death matters to our ancestors, not to commune with correctness'.[25] Thus, humans' beliefs and perceptions do not always align with reality.

Van Doorn asserts that, from the cocktail of information that we receive from an endless number of sources, we tend to choose the most convincing story. In other words, we are not natural truth-seekers, we merely subconsciously think about which arguments most clearly speak for the truthfulness of the story.[26] In addition, Klintman[27] discusses the existence of different forms of knowledge resistance, such as 'rational ignorance' and 'strategic ignorance'. According to Klintman, one of the most important reasons behind knowledge blocks is that they enable us to continue to belong to our group. He refers to times of hunter-gatherer societies, times when the difference between remaining in the group and being excluded from it meant survival or death. Thus, in this sense, conscious and unconscious non-immersion can be a form of self-protection.

Hoffman has conducted extensive research on reality and human perception. He defines the proposition of the interface theory of perception (ITP) as follows: our perceptual systems have evolved to provide a species-specific interface to guide adaptive behaviour—not to provide a veridical representation of objective reality.[28] He compares what we see and experience as reconstructed icons on a user interface that hides all complexity, aiding in operational functions through the ignorance of reality. Hoffman agrees with Klintman, highlighting in his definition of ITP that 'our perception of space time and objects were shaped by natural selection not to be veridical - not to reveal or reconstruct objective reality - but to let us live long enough to raise offspring'. [20] Like an interface, the 'job' of our senses is not to reveal the truth but to guide useful action.

Illusion

If Hoffman is correct in this assertion, then what is illusion and where does it start? Palmer defines illusion as follows: 'veridical perception of the environment often requires heuristic processes based on assumptions that are usually, but not always true. When they are true, all is well, and we see more or less what is actually there. When these assumptions are false, however, we perceive a situation that differs systematically from reality: that is, an illusion'.[29] Hoffman writes that evolution spaces our perceptions to guide adaptive behaviours rather than to seek truth. In this case, illusions are failures intended to guide adaptive behaviour, not failures intended to see truth.[20]

Reality is a matter of how people perceive the world around them. Everyone is exposed to different bits of reality at any given time and throughout their lives, forming an individual glass mosaic of the world—an individual reality—that varies in pattern, shape, size and colour. Looking through this glass, everyone will perceive a slightly different view of the world from one another, and we look through this glass constantly. Importantly, these glass mosaics may also include self-caused illusions. When looking through the glass, these illusions may blur our vision and perception, creating a slightly 'unrealistic' interpretation of a current real event depending on the clarity of the mosaic's composite pieces.

Geographical position is also important to one's perception of reality. People in the same location at the same time may have very similar views and interpretations of their reality. People who are in a different location but hear or see the same reality 'second-hand' may perceive it quite differently, as they are not physically present and are forced to rely on their imagination. Notably, the psychology of immediate perception also comes into play.

Cognitive psychology

Visual perception is also a widely researched topic in psychology. A major theoretical issue on which psychologists are divided is the extent to which perception relies directly on the information present in one's environment.[30] This controversy is discussed with regard

to Gregory, who proposed a constructivist (indirect) theory of perception (a 'top-down' theory),[31] and Gibson, who proposed a direct theory of perception (a 'bottom-up' theory).[32]

Gregory argues that perceptual processes are not direct; rather, they depend on the perceiver's expectations and previous knowledge as well as the information available in the stimulus itself. A lot of information reaches the eye, but much is lost by the time it reaches the brain—about 90 per cent, by Gregory's estimation. Therefore, the brain effectively needs to make an educated guess as to what the person is seeing based on their past experiences. In other words, we actively construct our perception of reality. Gregory asserts that perception involves a high degree of hypothesis testing to make sense of the information presented to the sense organs. The formation of incorrect hypotheses leads to perception errors and visual illusions, one example being the Necker cube.

Gibson's[32] bottom-up theory, on the other hand, suggests that perception involves innate mechanisms forged by evolution and that no learning is required. To him, sensation is perception: What you see is what you get. Perception is direct, not subject to hypothesis testing (as Gregory proposed). There is no need to process or interpret the information we receive when it comes to size, shape or distance; the baseline information that we receive is sufficiently detailed for us to interact directly with our environment. Gibson's emphasis on direct perception explains the fast and accurate perception of our environment, but his theory does not explain naturally occurring illusions. For example, if you stare for some time at a waterfall and then transfer your gaze to a stationary object, the object appears to move in the opposite direction.[32]

Neisser, on the other hand, argues that the two processes defined by Gregory and Gibson may be viewed as interacting with each other in a perceptual cycle. In his perceptual cycle model (PCM)[33] of perception, he describes a cyclical process in which top-down processing and bottom-up processing drive each other. From his perspective, to be purely data-driven, we would need to be mindless automatons; to be purely theory-driven, we would need to be disembodied dreamers. An active schema sets up relevant

expectations for a particular context; if the sensory data flout these expectations, they may modify the schema or trigger a more relevant one.

Art

For tens of thousands of years, humans have recorded their encounters with their surroundings in the form of artwork. Stonard,[34] having analysed copious works of art from the course of human history, asserts that what has essentially changed is the relationship between humans and their environment. Thousands of years ago, paintings served to record humans' encounters with nature and animals, with their direct surroundings. Of course, over the years, the 'surroundings' accessible to humans expanded to the whole world. Today, we live in an entirely human-made environment, a world in which humans dominate nature—not the other way around. Stonard concludes that images of art make the unseen visible, unseen parts of life, assumptions lodged in our minds, social habits. Art exists to change the world, to show a vision of something better. Images of art make—or at least try to make—freedom visible.

Ichihara defines the perceptive world in which truth and falsehood are indecipherable and where the function of concept does not reach 'illusion'.[35] She sees reality and illusion as part of a duelist relationship of mutual dependence, similar to that of the two sides of a coin: One cannot exist without the existence of the other.

Grau writes that the search for immersive forms of illusion is deeply anchored in the history of Western art and that immersive illusion blurs and erases the distinction between viewer and image.[36] To him, panoramas, films and digital image displays are aggregates of continually changing machines, forms of organisation and materials. Despite all efforts towards standardisation, they are seldom stable but always driven by fascination with increasing the illusion. A look at the history of cinema reveals a continual movement towards providing the viewer with greater perceptual immersion, achieved through improvements in framing, lighting, editing, colour, sound quality, stereoscopy and video quality.[10]

However, according to Benjamin,[37] there is one element that is impossible to replicate: the 'aura' of a work of art. Benjamin argues that the whole province of genuineness exists beyond the realm of technological reproducibility: 'even the most perfect reproduction of a work of art is lacking in one element: Its presence in time and space, its unique existence at the place where it happens to be'—its unique cultural context, or aura.

Artworks often employ various components to distort the senses, mostly the sense of vision, leading to a misinterpreted perception of the sensory experience—an illusion—in an attempt to make the unseen visible. Illusion is therefore a helpful tool for artists to make the unseen (e.g., invisible news stories) visible despite the fact that it may seem contradictory to use artificial elements when reporting non-fiction.

Computer-generated imagery has been used in the film industry for years. When watching the 2019 Star Wars film *The Rise of Skywalker*, the character Leia, traditionally played by actress Carrie Fisher, is not actually represented by the actress. Her face is merely digitally inserted onto a virtual body.[38] Machine learning technology gave the crew behind the film the opportunity to finish telling the story the way that they intended to tell it despite the actress passing away a few years prior to the film's production. Evidently, synthetic media constitutes an applied form of artificial imagination.[39]

JOURNALISM AND TRUTH

The news is, at its core, information about recent events.[40] Many definitions specify it as the provision of 'noteworthy' information, which is, of course, subjective. News organisations inevitably differ in what they view as noteworthy, and these determinations have come under increased scrutiny in the digital age, in which more information is accessible to the public than at any time in human history without it being filtered first by political or corporate media organisations.

The core objective of the news—as is often taught to journalism students—is to report the truth. Sometimes, the boundaries within which one must operate to achieve this objective in a truthful manner are crossed. One example of such boundaries being crossed

can be found in the actions of a German news reporter during the historic North Rhine-Westphalia flooding in 2021, which resulted in dozens of deaths. Moments before going live on camera, she smeared mud all over her clothes, saying that she had felt ashamed to report on the story from the scene in clean clothes.[41] The criticism on social media was intense, with some people from the region, who had been directly affected, feeling disrespected. Others complained that acts such as this were a significant reason behind the growing distrust in journalism and a sign of narrative control by the corporate media.[42]

Hearns-Branaman[43] outlines four philosophical approaches to journalistic practice and truth. First, the realist approach is predicated on positivist ideas and the Enlightenment notion that reality is accessible to the human mind. Therefore, journalists can convey reality to their audiences through media with the goal of providing the most valid information in line with reality. Second, the pragmatic entails a marketplace of ideas, privileging the airing of as many ideas and knowledge sources as possible. In journalism, this means offering as many different opinions and views as possible. Both of these approaches are based on the idea that information about reality can feasibly be conveyed. Third, the antirealism approach argues that the reproductions conveyed by journalists' reports can never truly correspond to reality. The focus here is on how journalists construct reality. Fourth, from the three aforementioned approaches, Hearns-Branaman suggests hyperrealism, which incorporates the uncertainty of reality while still being grounded in the notion that a journalist's goal is to convey reality. Given the social constructivist nature of reality – a construct created from language and other influences - hyperrealism asserts that journalists give signs of reality, relying on the self-referential codes of media logic.

Hoxha and Hanitzsch[44] have proposed a news-production model that captures the following three stages: story ideation, story narration and story presentation. Four elements are central to the process of story presentation: *selections*, meaning the choice of information bits (or 'facts'), sources, sound bites and any other substantive elements that get covered in a report; *emphasis*, which reflects the fact that not all of these elements are presented as equally important or relevant in the report; *links and references*, as news reports do not exist

within a narrative vacuum; and *cues*, which link a news account to real-world occurrences. The most powerful cues in this regard are visuals, such as the picture of the three-year-old Syrian boy who drowned in the Aegean Sea in 2015 and subsequently became an icon of the European failure to deal with the refugee crisis.[45]

News production is an iterative process. The central narrative and framing of a story can change if its facts, points of emphasis and cues fail to effectively support it. The narrative may also change in response to the coverage presented by competing news organisations. Finally, a story idea may be dropped altogether if its narrative is deemed to be outdated or out of place or if it lacks sufficient evidence to support its central storyline.[46]

Documentaries

'Documentary' is often defined as a genre, though Kilborn and Izod[46] suggest that the term may have outlasted its critical usefulness due to the proliferation of actuality programming. It is often described as a 'television, film, video, or radio programme dealing with factual material rather than fictional material, usually with some defined goal to create new insight or exposure to facts'.[47] The documentary holds a privileged position within society due to the perception that 'it can present the most accurate and truthful portrayal of the socio-historical world […] the image and the record of that image are seen as being one and the same, suggesting a strong and direct connection between the cinematic record and "reality"'[48]. There are three key ingredients for a documentary to authenticate a story: eyewitnesses, photographs and newsreel footage,[48] all of which are part of the code of realism and naturalism. At the same time, documentaries make frequent use of reconstruction, meaning the use of fictional and dramatic codes. Roscoe and Hight[48] highlight the fact that documentaries construct relationships with both factual and fictional discourse and, therefore, exist along a fact-fiction continuum. The documentary is a constructed object comprising many pieces; to Roscoe and Hight, it transforms the fragments of real life into an argument or story.

Images play a vital role in the authentication of both news and documentaries. Kilborn

and Izod[46] assert that images typically function in a metonymic mode. 'Metonymy is the rhetorical convention in which the image represents a part of a larger whole and partakes of the same order of reality as that to which (in the case of lens-based imagery) it is indexically bonded […] In short, metonymy is a significant part of the persuasive machinery of documentary realism'.[49] It is the visual element that seems to carry so much weight when evaluating the fidelity of documentary truth claims.[48] In the 1980s, Barthes stated that the authenticity of a photograph outweighs or exceeds the power of representation.[49] Almost a half-century later, images remain a powerful tool; however, with the emergence of AI-generated images, their power and credibility are undergoing a transformation. They have become more multi-faceted.

Making the unseen visible was once the privilege of works of art. Today, however, AI-generated images can remove the constraints of time and space borne by real images and create snapshots of the past, present or future in any location. In recent years, animation has seen an exponential rise in non-fictional stories. Ehrlich sees this as an indication that modern culture is at a turning point, poised between fiction and fact—and perhaps combining the two.[50] When AI-generated environments are used as backgrounds, they function in a metonymic mode. They represent the real background, but they do not constitute a pictorial representation as a mode of scientific evidence. Rather, they represent (or are purported to represent) the social-historical world.

Politics and manipulation

The news has always been a target for misinformation and disinformation. In 1981, investigative journalist Eckart Spoo provided insight into how 'we the journalists make history' and explained that 'all wars start with lies'.[51] He offers several examples of the consequences that false or manipulated reporting can have. In 1980, for instance, the German magazine *Der Spiegel* reported an anthrax attack in the Soviet city of Sverdlovsk, now Yekaterinburg, said to have cost somewhere between 300 and 1,000 lives. The source behind this story was simply 'an emigrant'. Six months earlier, the same story had been published by the British

right-wing magazine *Now*, only that the site of the attack was Novosibirsk according to this report, and the source was 'a traveller'. The German newspaper *Bild* re-used the story three months later, asserting that biological weapons had killed 1,000 Russians (again in a different city). The US Foreign Broadcast Information Service picked up the story, and the *Daily Telegraph* followed up with an article explaining that the US's publishing was part of a greater strategy to shake up public opinion pertaining to biological and chemical weapons. As a consequence, the NATO General for Europe, Bernard Rogers, ordered the introduction of chemical weapons to ensure that the US had a deterrent if Russia were to start an offensive using chemical weapons. *Bild* then claimed that their exclusive story had led to newly increased tensions between the US and Russia. *Bild* readers and others never found out that the US government later distanced itself from the whole story.

Today, in the 21st century, any information that has not been fact-checked or that has been actively manipulated—whether through the report's narrative or its portrayal—can spread instantly and easily around the world. Even when politicians and others make statements that are blatantly false, they are often shared and tweeted by reporters as quotes. It is often not until one reads a more in-depth report that they find out the quoted statement is a fabrication.[52] Analysis done by Buzzfeed revealed that top 20 fake election news stories generated more total engagement on Facebook than the top 20 election stories from 19 major media outlets combined.[53]

A well-documented example of active digital disinformation for the purpose of political propaganda can be found in the 2010 Massachusetts special senate election between Scott Brown and Martha Coakley.[54] Midway through the campaign, computer science researchers identified a group of suspicious-looking Twitter accounts were routinely launching attacks on Coakley, alleging that she was anti-Catholic and tweeting anti-Coakley content. The allegations made it into the news, which cited these Twitter replies as evidence of growing anti-Coakley sentiment among the public. Bots had successfully given false allegations against Coakley the illusion of legitimacy and popularity.[54] Ultimately, Scott Brown won the election, providing strong evidence that bots can contribute to the

creation of illusions.

Another danger is that of journalists simply echoing the analytical framework of their sources by uncritically using borrowed keywords and photos.[55] This can lead to the source's perspective being a key element of the news coverage, lending credence to unreliable sources' framing of a conflict. For example, consider how fundamentalist groups' framing was dominant during the Maluku conflict in Indonesia in 2005.[56]

Beyond the scope of mere news manipulation, the mid-2010s witnessed the rise to prominence of the concept of 'fake news' following the rise of false news stories amid the 2016 presidential election campaigns in the US. The same people who produced the junk content associated with this moniker reclaimed the phrase as a way to undermine legitimate journalism, as a crutch to attack evidence inconvenient to their narrative, or as a means to refute factual stories about their own misdeeds.[55] The very term 'fake news' has itself become a tool with which to spread fake news. One 2017 research paper detailed the social media propaganda expenses of various governments around the world, showing that President Duterte of the Philippines had spent around 200 000 US dollars for a social media army with the goal of viciously defending him against critics.[57] The Filipino news outlet *Rappler* revealed his regime-funded digital propaganda and trolling campaigns against dissenters,[58] firmly demonstrating that social media can be used for the purpose of public manipulation.

Political truth

Notably, reporters and journalists can sometimes unwillingly aid the spread of falsehoods. Davis[52] points to an increasingly successful deployment of truth-suppression tools and highlights the fact that, with this high volume of false information flowing around the globe—regardless of whether it is deliberate or unwitting—many politicians and scholars have simply come to accept that we now live in a post-truth era. A 'post-truth society' is defined as one in which objective facts are less influential in shaping public opinion than appeals to

emotion and personal beliefs.[59] According to Saul Newman, the characteristics of such a post-truth society include the propagation of falsehoods, lies, misinformation, outrageous exaggerations and the distortion of reality.[60] According to Nealon, politicians create or produce reality through their discourse.[61] Informed by the work of Austin and Derrida, Nealon suggests that what is politically true—or what we can call 'political truth'—is performative rather than rooted in the logic of facts. Austin argues that performatives are straightforward utterances that cannot possibly be simply true or false; rather, they fulfil a purpose—they perform.[62] For Fridlund, it is the force of the utterance rather than its substance that achieves the most significant outcome.[63] Ultimately, it is the outcome of an utterance that counts, not whether that utterance housed truth or not.[64] So long as there is an opportunity for misuse, misuse is likely to occur. Therefore, using partially artificially produced visual environments based on real data and delivering an inferred truth may be a viable option for educating and informing the public not *despite* the fact that we live in an age in which fake news, manipulation and post-truth dynamics challenge the reporting of news reporting but *because* we live in such an age, which could be improved through the use of this new technology.

MACHINE LEARNING, AI INFERENCE AND VISUAL ENVIRONMENTS

The use of machine learning models in news production does not feign any false reality. Rather, it entails AI inference, which is achieved through an 'inference engine' that applies logical rules to a designated knowledge base to evaluate and analyse new information.[65] There are two phases in the process of machine learning. First, the training phase entails intelligence being developed by recording, storing and labelling information. If, for example, one is training a machine to identify cars, the machine learning algorithm is fed with copious images of different cars to which the machine can later refer. Second, the inference phase entails the machine using the gathered intelligence to understand new data. In this phase, the machine can use inference to identify and categorise new images as 'cars' despite having never seen them before. The images created using ML models refer to real images and

represent the real in a metonymic mode.

The recently released ChatGPT app is a prototype artificial intelligence chatbot developed by OpenAI, which specialises in dialogue. The chatbot is a large language model that has been fine-tuned using both supervised and reinforcement learning techniques. It has garnered a high degree of attention for its detailed responses and articulate answers, although its factual accuracy has been criticised. The application certainly has limitations. ChatGPT sometimes provides answers that sound plausible but are incorrect or nonsensical.[66] According to the creators, fixing this issue is challenging for three reasons: (1) During reinforcement learning training, there is currently no source of truth (); (2) Training the model to be more cautious causes it to decline questions that it could otherwise answer correctly; (3) Supervised training misleads the model because the ideal answer depends on what the model knows rather than what the human demonstrator knows.

ChatGPT highlights the opportunities and limitations presented by ML models: It is possible to create realistic data-informed results (in this case, detailed responses and articulate answers), but there is no source of truth during training. ML models that refer to intelligence gathered in the training phase from real data are creating a new type of truth, one that is based on truth but is not the real picture—inferred truth. Using inferred truth in the production of news may be a viable option, as it does not entail feigning a false reality; rather, it provides a realistic but 'artificial' picture that depicts the truth in order to aid in accurate explanations.

GauGAN2, MonoDepth2, other models

GauGAN2 is a deep learning model that involves a pair of neural networks: a generator and a discriminator. The generator creates synthetic images, while the discriminator, trained on millions of real landscape images, gives the generator network pixel-by-pixel feedback on how to make the synthetic images more realistic. Over time, the model learns

to create convincing imitations of the real world.[67] The GauGAN2 model was trained on 10 million high-quality landscape photographs on the NVIDIA Selene supercomputer (NVIDIA DGX SuperPOD), one of the ten most powerful supercomputers in the world.[68] When users draw their own doodle or modify an existing scene in the GauGAN2 demo (which is publicly available), they are working with segmentation maps, or high-level outlines that record the location of objects in a scene. Individual areas are labelled with features like sand, river, grass or flowers, giving the AI model specific instructions on how to fill in the scene.[68] GauGAN2 is a robust tool for creating photo-realistic backgrounds using a combination of words and drawings, as it integrates segmentation mapping, inpainting and text-to-image production into a single model. The user can modify the text-based beginning point by drawing, for example, a snow-capped mountain range. GauGAN2 then creates a new, modified picture. Trees or clouds, for example, may be added, elements can be altered in height and scale, and much more. This model is one of the first to use a single GAN framework to mix different modalities—text, semantic segmentation, drawing and style.[69]

Another interesting model for potential use in news production is MonoDepth2. It is a self-supervised method that uses a combination of depth and pose networks to predict depth in a single frame.[70] It uses image reconstruction as its framework. It makes its predictions by training the architecture on an unlabeled sequence of frames and several loss functions for the two networks. The depth network is a U-Net [2] encoder-decoder architecture. The encoder is a pre-trained ResNet model. The depth decoder converts the sigmoid output to depth values. The pose network from a ResNet18 is modified to take two coloured images as input to predict a single 6-DoF relative pose or rotation and translation. The pose network uses the temporal frames as the pair of images rather than the stereo pair often used in similar models. It predicts the appearance of a target image from the viewpoint of another image in the sequence, either a frame before or a frame after. This method does not need to be trained using a ground truth dataset. Instead, it uses consecutive temporal frames in an image sequence to provide a training signal. To help constrain learning, they

use a pose estimation network. The model is trained on the difference between the input image and the image reconstructed from the output of the pose network and the depth network[71]. MonoDepth2 is useful for creating realistic depth when using several image segments to construct an environment within a single image.

There are additional ML models that have already been created or are in the pipeline that could be very useful for the purposes of this research. One example is that of Eulerian motion fields,[72] which allow individual segments of image frames (e.g., clouds, water) to be animated, and generative image dynamics,[73] which, alongside an image-based rendering module, can use the trajectories for a number of downstream applications, such as turning still images into seamlessly looping dynamic videos or allowing users to realistically interact with objects in real pictures. Both of these models have recently been developed by Google Research but are not yet publicly available; still, they are indicative of the possibilities to come in the near future of non-fiction filmmaking.

Virtual production has seen a significant push in recent years, with news organisations looking for ways to more effectively present and explain context. Schausten, deputy editor-in-chief and head of the main editorial office for current affairs at ZDF, the German public broadcast service, notes that concisely explaining complicated facts with visuals is a recipe for success in news and that modern technology will enable the more effective use of this approach.[74] With the help of virtual rooms, presenters could report from an active football field or from Mars without actually needing to be there. Schausten asserts that while such rooms will be used more frequently in the future, the rule still applies: no false reality should be feigned, but optical support for explanations should be provided.

ETHICS

Media coverage of war and violence is critical to the public's understanding of conflicts, but it often also contributes to the development of conflicts. This is why the importance of reporting on conflict has rarely been questioned. However, there is an ongoing regarding the balance between the importance of and the dangers of reporting on

conflict—not only to human lives but also to the very concept of objectivity. Central to the controversy over the presence of reporters in enemy countries is the belief that the enemy issues propaganda, which taints the perceptions of journalists based abroad, while those who stay at home continue to report the truth.[75] However, journalists at home may not have the insight provided through on-the-ground reporting and unfiltered access to local information and footage. Keeble argues that the focus on the role of frontline reporters tends to downplay the significance of journalists at home.[75]

In 1968, there were 649 foreign reporters in Vietnam to broadcast news of the war back home—yet none of them reported on the My Lai massacre[76] in which as many as 500 unarmed Vietnamese civilians were killed by US soldiers.[77] It was not until a freelance reporter based in Washington exposed it—after all of the top US media organisations had rejected it—that it became public knowledge. There has also been criticism of the media 'sanitising' wars. The Gulf War, for instance, was largely represented as a bloodless conflict fought with precise super-modern weaponry.[78] Shots from video cameras on missiles headed towards their targets meant that viewers effectively became the weapon. Such remote but intimate consumption of warfare was able to sustain the moral detachment of earlier military technology. Seeing was split from feeling; the visible was separated from the sense of pain. Through this lens, the enemy remained a faceless alien.[79] In reality, according to war veteran Fisk,[80] '[war] is about pain and, ultimately, about death. […] Having persuaded ourselves that we can go to war without casualties, we don't believe in death anymore'. While media coverage often portrays war as bloodless, films today recreate violence with rising graphical 'realism', as demonstrated by *Saving Private Ryan*. In the words of Fisk, 'Why bother to smell the shit and blood—and those smells, unhappily, are exactly what you find in the frontline hospitals—when you can watch wars without such distractions?'

War reporting has undergone a drastic transformation in the digital age. The results of one study[44] show that, when invited to speak about their jobs, many conflict journalists cling to a professional narrative, suggesting that they are reporting 'just the facts' and that it

is the 'reality' that tells the story. However, their stories clearly demonstrate that journalists deliver an intellectual reconstruction of 'reality', actualising the factual evidence that most effectively speaks to the central narrative of the story and best 'exemplifies' what they think 'really' happened. Furthermore, journalists tend to routinely consume social media and the reports of leading news outlets; According to Hoxha and Hanitzsch,[44] this explains why conflict coverage is often so self-referential.

Zeynep Soysal[81] discusses the trade-offs that journalists must face and balances that they need to strike in order to reconcile conflicting goals in the coverage of conflict. Journalists should pull back the curtain for their readers, reporting on the trade-offs that they made while constructing the narrative of their story. Even when one does find what they think is the 'real' story and believe that the relevant public interest is sufficient, there is always the fear that they have it wrong. For example, what if the cited documents were forgeries? Cross-referencing with documents from outside data and presenting the allegations against those concerned are the only real ways to be sure.[82]

CONCLUSION

There is concern over the potential that synthetic media can be used to spread misinformation and disinformation and manipulate the public. Thus, when using machine learning models and 'fake' elements in the production of news and documentaries, it is crucial to be open and clearly state that they contain reconstructed elements. Transparency is vital for the credibility of both news reporting and documentary filmmaking. Using artificially produced visual environments to deliver an inferred truth, may be a viable option to provide better fact-based education and information. They can be used to explain certain events, that might otherwise not be covered or not as well, due to no or a limited amount of real visual backgrounds existing. Such methods could also oppose the currently prominent truth-blurring challenges to news in a way that deflate those tactics.

References

[1] Swartz, Davide L. (2019) *Spotlight: Pierre Bourdieu and the journalistic field*, in *Journalism and Truth in an Age of Social Media*, edited by James E. Katz and Kate K. Mays. Oxford University Press.

[2] Evans, Robert (1994) *The kid stays in the picture*. Hachette Books.

[3] Pilger, John (1983) *The truth game*. Accessed: 10.10.2023. Online: http://johnpilger.com/videos/ the-truth-game.

[4] Gowing, Nik (1998) *Dispatches from disaster zones: The reporting of humanitarian emergencies*, in *The war correspondent* by Greg McLaughlin, p. 83. Pluto Press.

[5] McLaughlin, Greg (2016) *The war correspondent*. Pluto Press.

[6] Halberstam, David (1991) " Television and the instant enemy", in *The Gulf War Reader: History Documents, Opinion*, Times Books, pp. 385–388.

[7] Princeton University Library (2022) *Finding newsreels*. Accessed: 6/4/2022. Online: https://libguides. princeton.edu/c.php?g=84226&p=540944.

[8] National Film Preservation Organisation (1922) *Pathé news, no. 15*. Accessed: 10/10/2023. Online: https://www.filmpreservation.org/preserved-films/screening-room/pathe-news-no-15-1922.

[9] Ichihara, Kentaro (2022) *Between reality and illusion*. Accessed: 22/10/2022. Online: https://www.guggenheim. org/blogs/the-take/between-reality-and-illusion.

[10] Prince, Stephen (2012) *Digital visual effects in cinema: The seduction of reality*. Rutgers University Press.

[11] Stanford Encyclopedia of Philosophy (2020) *Aristotle's metaphysics*. Accessed: 16/10/2023. Online: https://plato.stanford.edu/entries/aristotle-metaphysics/.

[12] Descartes, Rene (2008) *Meditations on first philosophy*. Oxford University Press.

[13] Chalmers, David J. (2022) *Reality+: Virtual worlds and problems of philosophy*. Penguin Random House UK.

[14] Plato (360 BCE) *The republic*. Accessed: 31/10/2022. Online: http://classics.mit.edu/Plato/republic.8.vii. html.

[15] Bedard, Mike (2022) *Plato's allegory of the cave — Summary & meaning explained*. Accessed: 31/10/2022. Online: https://www.studiobinder.com/blog/platos-allegory-of-the-cave/.

[16] Plato (360 BCE) *The Sophist*. Accessed: 02/11 /2022. Online: http://classics.mit.edu/Plato/sophist.html.

[17] Dick, Philip K. (1987) *I hope I shall arrive soon*. St Martin's Press.

[18] Austin, J. L. (2017) "Sense and sensibilia", *Cultural Critique*, 95(145) pp. 242–252. Accessed: 02/11 /2022. Online: https://www.cambridge.org/core/journals/philosophy/article/abs/austins-sense-and-sensibilia/E9121942DD280301F305948A3F2D56B0.

[19] Bradner, Eric (2017) *Conway: Trump white house offered 'alternative facts' on crowd size*. Accessed: 01/11/2022. Online: https://edition.cnn.com/2017/01/22/politics/ kellyanne-conway-alternative-facts/index.html.

[20] Hoffman, Donald D. (2020) *The case against reality: How evolution hid the truth from our eyes*. Penguin Books.

[21] Zadra, J. R., Weltman, A. L. and Proffitt D. R. (2016) " Walkable distances are bioenergetically scaled", *Journal of Experimental Psychology: Human Perception and Performance* (42)1 pp. 39–51.

[22] Geisler, W. S. and Diehl R. L. (2002) " Bayesian natural selection and the evolution of perceptual systems", in *Philosophical transactions of the Royal Society of London*, pp. 419–448.

[23] Geisler, W. S. and Diehl R. L (2003) " A Bayesian approach to the evolution of perceptual and cognitive systems", *Cognitive Science* 27 pp. 379–402.

[24] Trivers, R. L. (2011) *The folly of fools: The logic of deceit and self-deception in human life*. Basic Books.

[25] Pinker, Steven (1997) *How the mind works*. W. W. Norton.

[26] Von Doorn, Menno, Duivenstein, Sander and Pepping, Thijs (2021) *Real fake*. Ludibrium Publishers.

[27] Klintman, Mikael (2019) *Knowledge resistance: How we avoid insight from others*. Manchester University Press.

[28] Hoffman, Donald D., Singh, Manish and Prakash, Chetan (2015) "The interface theory of perception", *Psychonomic Bulletin & Review* 22 pp. 1480–1506. Accessed: 16/10/2023. Online: https://link.springer.com/article/10.3758/s13423-015-0890-8.

[29] Palmer, S. (1999) *Vision science: Photons to phenomenology*. MIT Press.

[30] McLeod, S. A. (2018) *Visual perception theory*. Simply Psychology. Online: simplypsychology.org/perception-theories.html.

[31] Gregory, R. (1974) *Concepts and mechanisms of perception*. Duckworth.

[32] Gibson, J. J. (1972) " A theory of direct visual perception", in *The Psychology of Knowing*. Gordon & Breach.

[33] Neisser, Ulric (1976) *Cognition and reality: Principles and implications of cognitive psychology*. W. H. Freeman and Company.

[34] Stonard, John-Paul (2021) *Creation: Art since the beginning*. Bloomsbury Publishing.

[35] Ichihara, Kentaro (2007) *After the reality*. Deitch Project.

[36] Grau, Oliver (2003) *Virtual art: From illusion to immersion*. MIT Press.

[37] Benjamin, Walter (1936) *The work of art in the age of mechanical reproduction*. Penguin Books.

[38] Acuna, Kirsten (2020) *The 'star wars' team describes the challenge of bringing carrie fisher back to the screen one more time: 'it was a gigantic puzzle'*. The Insider. Accessed: 10/10/2023. Online: https://www.insider.com/how-carrie-fisher-was-in-star-wars-the-rise-of-skywalker-2020-1.

[39] Vales, Aldana (2019) *An introduction to synthetic media and journalism*. Accessed: 10/10/2023. Online: https://medium.com/the-wall-street-journal/an-introduction-to-synthetic-media-and-journalism-cbbd70d915cd.

[40] Cambridge Dictionary (2022) *News*. Accessed: 10/10/2023. Online: https://dictionary.cambridge.org/ dictionary/english/news.

[41] BBC News (2021) *German TV apologises for smearing mud on clothes at flood site*. Accessed: 10/10/2023. Online: https://www.bbc.co.uk/news/world-europe-57946430.

[42] Storymakers (2021) *#RTL-reporterin @SusannaOhlen macht sich vor ihrem live-einstieg schmutzig - anstatt anzupacken: @RTLde #hochwasser- hilfe #hochwasser #flutkatastrophe*, on Twitter. Accessed: 10/10/2022. Online: https://twitter.com/mz_storymakers/status/1418179614661304322?ref_src=twsrc%5Etfw%7Ctwcamp%5Etweetembed%7Ctwterm%5E1418179614661304322%7Ctw gr%5E7b54f254b65d6bb8da2a9c4ab7fe0c2c31651f2f%7Ctwcon%5Es1_&ref_ur l=https%3A%2F%2Fwww.bbc.co.uk%2Fnews%2Fworld-europe-57946430.

[43] Hearns-Branaman, James-Owen (2018) *Journalism and the philosophy of truth: Beyond objectivity and balance*. Routledge.

[44] Hoxha, Abit and Hanitzsch, Thomas (2017) How conflict news comes into being: Reconstructing 'reality' through telling stories, in *Media War and Conflict* 11(1). Sage Journals.

[45] Smith, Helena (2015) Shocking images of drowned Syrian boy show tragic plight of refugees. Accessed: 19/19/2022. Online: https://www.theguardian.com/world/2015/sep/02/shocking-image-of-drowned-syrian-boy-shows-tragic-plight-of-refugees.

[46] Kilborn, Richard and Izod, John (1997) *An introduction to television documentary*. Manchester University Press.

[47] Oxford Reference (2023) *Documentary*. Accessed: 16/10/2023. Online: https://www.oxfordreference.com/display/10.1093/acref/9780199587261.001.0001/acref-9780199587261-e-0208.

[48] Roscoe, Jane and Hight, Craig (2001) *Faking it: Mock-documentary and subversion of factuality*. Manchester University Press.

[49] Barthes, Roland (1981) *Camera lucida: Reflections on photography*. Hill and Wang.

[50] Ehrlich, Nea (2021) *Animating truth: Documentary and visual culture in the 21st century*. Edinburgh University Press.

[51] Engelmann, B., Horne, A., Lohr, S. and Spoo, E. (1981) *Anspruch auf Wahrheit*. Steidl Verlag.

[52] Davis, Stephen (2019) *Truthteller: An investigative reporter's journey through the world of truth prevention, fake news and conspiracy theories*. Exisle Publishing.

[53] ABC News (2016) *When fake news stories make real news headlines*. Online: https:// abcnews.go.com/Technology/fake-news-stories-make-real-news-headlines/ story?id=43845383.

[54] Woolley, S. (2020) *The reality game: How the next wave of technology will break the truth and what we can do about it,* p. 19. Hachette.

[55] Howard, Philip N. (2011) *The digital origins of dictatorship and democracy: Information technology and political Islam*. Oxford University Press.

[56] Lim, Merlyna (2005) "Islamic radicalism and anti-Americanism in Indonesia: The role of the Internet", in *Policy Studies* 18 pp. 1349-1547.

[57] Bradshaw, Samantha and Howard, Philip N. (2017) *Troop, trolls and troublemakers: A global inventory of organised social media manipulation*. Accessed: 16/10/2023. Online: https://ora.ox.ac.uk/objects/uuid:cef7e8d9-27bf-4ea5-9fd6-855209b3e1f6/download_file?file_format=application%2Fpdf&safe_filename=Troops-Trolls-and-Troublemakers.pdf&type_of_work=Report.

[58] Ressa, Maria A. (2016) *Propaganda war: Weaponizing the Internet.* Accessed: 16/10/2023. Online: https://www. rappler.com/nation/148007-propaganda-war-weaponizing-internet/.

[59] Oxford Learner's Dictionary (2022) *Post-truth*. Accessed: 16/10/2023. Online: https://www.oxfordlearnersdictionaries.com/definition/english/post-truth?q=post+truth.

[60] Newman, Saul (2019) *Post-truth and the crisis of the political, in* Soft Power, 6(2), pp. 90-108. Accessed: 16/10/2023. Online: https://editorial.ucatolica.edu.co/index.php/SoftP/article/view/ 3564.

[61] Nealon, Jeffrey T. (2017) "Jokes and the performative in Austin and Derrida; or, the truth is a joke?", *Cultural Critique* 95 pp. 1–24. Accessed: 16/10/2023. Online: https://www.jstor.org/stable/pdf/10.5749/culturalcritique.95.2017.0001.pdf.

[62] Austin, J. L. (1961) "Performative utterances", in *Philosophical Papers*. pp. 220–239. Edited by J. O. Urmson and G. J. Warnock. Accessed: 10/10/2023. Online: https://philpapers.org/rec/AUSPU.

[63] Fridlund, Patrik (2020) *Post-truth politics, performatives and the force*, in *Jus Cogens 2*, pp. 215-235. Accessed: 10/10/2023. Online: https: //link.springer.com/article/10.1007/s42439-020-00029-8.

[64] Ford, D. R. (2020) *Politics and pedagogy in the "post-truth" era: Insurgent philosophy and praxis*. Bloomsbury Publishing.

[65] Arm (2022) *AI inference*. Accessed: 15/12/2022. Online: https://www.arm.com/glossary/ai-inference.

[66] OpenAI (2022) *ChatGPT: Optimizing language models for dialogue*. Online: https:// openai.com/blog/chatgpt/.

[67] Salian, Isha (2022) *What is GauGAN? How AI turns your words and pictures into stunning art*. Accessed: 04/11/2022. Online: https://blogs.nvidia.com/blog/2022/03/01/what-is-gaugan-ai-art-demo/.

[68] Ingle, Pratamesh (2021) *NVIDIA introduces GauGAN2: An AI model that con- verts text into images*. Accessed: 14/12/2022. Online: https://www.marktechpost.com/2021/11/25/ nvidia-introduces-gaugan2-an-ai-model-that-converts-text-into-images/.

[69] Salian, Isha (2021) 'Paint Me a Picture': NVIDIA Research Shows GauGAN AI Art Demo Now Responds to Words. Accessed: 19/10/2023. Online: https://blogs.nvidia.com/blog/2021/11/22/gaugan2-ai-art-demo.

[70] Godard, Clément et al. (2019) *Digging into self-supervised monocular depth estimation*. Accessed: 14/12/2022. Online: https://arxiv.org/abs/ 1806.01260.

[71] Schiappa, Madeline (2019) *Recognizing depth in autonomous driving*. Accessed: 04/11/2022. Online: https://towardsdatascience.com/ depth-prediction-autonomous-driving-18d05ff25dd6.

[72] Holynski, A., Curless, B., Seitz, S. M. and Szeliski, R. (2020) *Animating pictures with eulerian motion fields*. Accessed: 15/01/2022. Online: https://eulerian.cs.washington. edu/.

[73] Li, Z. , Snavely, N. and Holynski, A. (2023) *Generative image dynamics.* Accessed: 09/10/2023. Online: https://generative-dynamics.github.io/.

[74] Film-TV-Video.de (2021) *ZDF-Nachrichten in neuem Design*. Accessed: 27/10/2022. Online: https://www.film-tv-video.de/productions/2021/07/21/zdf-nachrichten-in-neuem-design/.

[75] Keeble, Richard (2009) *Ethics for journalists*. Routledge.

[76] Pilger, John (2006) *War by media*. Accessed: 10/10/2023. Online: http://www.coldtype.net/Assets.07/Essays/0307.Pilger.War.pdf.

[77] BBC (2008) *The archive hour - the My Lai tapes*. Accessed: 10/10/2023. Online: https://www.bbc.co.uk/radio4/1968/mylai.shtml.

[78] Gottschalk, Marie (1992) *Operation Desert Cloud: The Media and the Gulf War,* in *World Policy Journal*, summer, 1992, Vol. 6 No. 3, pp. 449-486. Duke University Press.

[79] Robins, Kevin and Levidow, Les (1991) " The eye of the storm", in *Screen* 32(3), pp. 324–328. Accessed: 16/10/2023. Online: https://academic.oup.com/screen/article-abstract/32/3/324/1709853?redirectedFrom=fulltext.

[80] Fisk, Robert (2020) *War is not primarily about cynicism or defeat*. Press Gazette.

[81] Soysal, Zeynep (2019) "Truth and journalism", in *Journalism & truth in the age of social media*. Oxford University Press.

[82] Oliver, James (2018) "Why data is the starting point: The beginning of journalism", in *Investigative journalism today: Speaking truth to power*. Bite-Sized Books.