

A Review of the Interrelationships between Painting, Photography, Facial Recognition, and Artificial Intelligence Technologies in Portraiture Aesthetics

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We see faces every day, and all of them leave us with different impressions. Our brains also respond emotionally to new and familiar faces we find in non-animated objects, paintings, and sculptures. To retain such memory of a face or express our feelings, we create portraits. Portraits have fascinated us for millennia. This paper reviews the interrelationships between painting, photography, facial recognition, and artificial intelligence technologies in portraiture aesthetics. The importance of portraits as a subject in artistic creation, studies, and research has led to various advancements in technological innovations. The inevitable role that portraits play in different mediums of art, history of art, communication, and security marks the intersection between humanity and identity, art and technology, as well as its undeniable position within the genre of art. Today the rapid development of digital tools, mobile software, and artificial intelligence allows not only the artist and designer to create portraitures but is also widely used by the public in all walks of life to create portraitures instantly. Driven by the marriage and momentum of art and technology in the field of new media art, will artificial intelligence and modern facial recognition technology take over the role of artists?

Keywords: *portrait, painting, photography, facial recognition technology, artificial intelligence*

Introduction

Ancient portraiture could be classified as either private or public art, and it depicts a specific social status within society. Portraiture was primarily considered a public art form in ancient Mediterranean civilizations such as Greece and, later, Roman and Byzantium art. According to Georges Perrot, Charles Chipiez, and Walter Armstrong, the ancient art of Egypt may be set aside in “A History of Art in Ancient Egypt” published in Paris in 1882. “Painting by no means became segregated and efficient art in Egypt; it was frequently used to attain sculptural quality and it never liberated itself from this subjection” (Collier 1905, p. 1). Painting can be used as a form of cremation art for the Kings, Czars, Popes, and Gods. Portraits were completed similarly to sculptures, either in bronze or marble; or as panel paintings or murals known as “Frescoes.” “Portraiture” is a medium of expression of making “portraits.” It continues to be one of the most intriguing genres within the art discipline (Merriam-Webster, n. d). Portraits were commonly

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used by the ancient Greeks and Romans to document the identity and personality, social background, or group affiliation of a prominent member of society (Freeland 2007, p. 97). It encompasses riveting, puzzling and even contradictory aims as portraiture could portray different means in culture, gender, psychology, condition and emotion, political and social status. Surely, it is so much more than just portraying pretty faces. Portrait painting can indeed be dated back more than five thousand years ago to ancient Mesopotamia and Egypt when it was first combined with relief sculpture in metal, clay, or stone.

The TATE Modern Museum defined the term “portrait” as a “simple representation of the physical appearance of a person” (Carmel 2022). There is a range of representations such as sculpture, sketches, photos, drawings, and paintings, where the aim is to depict likeness expression or the particular mood of a person. Some others may refer to a “portrait” as the representation of the state of mind of the person and their external physical features together. Artists’ portraits have been painted over the centuries as a way of documenting a person’s resemblance or sometimes a “portrait” would be expressed at his best and is often idealistic. Even when an ugly person was faithfully portrayed there would be a certain suave play of line which would go far to redeem this ugliness (Collier, 1905, 3). As stated in the Oxford English Dictionary, a portrait is interpreted as “a depiction or a person’s distinction, primarily through the face, made from real life, by painting, photography, drawing, etching, or other means.” (Maes 2015) This notion or definition may bring some challenges to this discourse since a CCTV record of a person’s likeness (face) or physical appearance may not result in a “portrait” per se. Shearer West’s book “Portraiture,” for example, ascertained how almost all portraits in the West portray an aspect of the body and face as “the essence of the character, or virtues of the sitter on the other.” (West 2004, p. 21). Not only is the representation of generic bodies in anatomical drawings or the drafting of idealistic figures in numerous anonymous unclothed statues a distinguishing feature of a “portrait,” but so are forms of allegorical, pastoral, and symbolic painting (Maes 2015).

When studying the history of art, particularly painting, there is a wide range of notable portraits painted by influential artists from various periods, such as *The Arnolfini Portrait* (1434) by Jan van Eyck, *The Mona Lisa* (1503-1506) by Leonardo da Vinci, *Vertumne ou Rodolphe II* (1590) by Giuseppe Arcimboldo, *Bacchus* (1596) by Caravaggio, *Rembrandt Self-Portrait* (1659) by Rembrandt van Rijn, *Girl with a Pearl Earring* (1665) by Johannes Vermeer, *V.V Gogh Self-Portrait* (1887) by Vincent van Gogh, *Adele Bloch-Bauer I* (1907) by Gustav Klimt, *American Gothic* (1930) by Grant Wood, *Self-Portrait with Thorn Necklace and Hummingbird* (1940) by Frida Kahlo, *Marilyn Monroe Diptych* (1962) by Andy Warhol, to *Self-Portrait* (1971) by Francis Bacon. The list is unmeasurable. However, each portrait has told us the way artists view their subjects. The requirement for recognizability need not imply that the portrait always be implemented in a hyper-realistic manner. This brings different “isms” such as classical, romanticism, impressionism, post-impressionism, expressionism, etc., by which artists have manifested their creativity in revealing portraits.

Background

Types of Portraits

Given the great variety of artistic poses a human being can take on and the psychological wealth which characterizes every possible personality, the artist will try to assess the best possible “pose-attitude” for the model to assume. This brings some challenges to an artist to display the best likeness (Civardi 2002, p. 6). In addition, all individuals have their characteristic posture and typical movement, which are intrinsic and part of their “being,” besides there are essential physical behaviours along the “model” social convention, which allow the artist to place the subject (model) in the possession of status they belong to or aim for. An artist can create various types of portraits. For example, a “formal” portrait is where the subject (live model) poses in classical posture, paying a lot of attention to composition, the surrounding of the subject, and the symbolic representation of the subject (live model). Perhaps focusing on the aesthetic value of the subject represents time. On the other hand, an “informal” portrait is one the subject (live model) poses spontaneously by capturing the figure in motion. The category may also belong to the “expressive” portrait, where the subject (live model) can be drawn or painted with facial expression or in motion (Civardi 2002, p. 6).

It is a known and primal urgency for humans to leave a record of their existence, which is implied from the pre-historic cave painting produced across the world, from Spain to Indonesia, dating back at least 30,000 years ago (Reynolds et al. 2016, p. 9). Portrait or self-portrait records the presence of the artist together with his/her “self” subject (model); whether this served as the primary motivation or was a coincidental by-product. Modern eyes find a lot of appeal in portraits and self-portraits because of this sensation of being in the artist’s presence. All portraits serve as records of identity, but the degree to which they can reveal a subject’s inner self - their personality, aspirations, etc. - is frequently what sets an exceptional portrait apart from one that merely mimics external appearance. In contrast, unless it is being created as a commission for a patron with specific requirements, one person typically assumes the roles of creator, sitter, and patron when creating a self-portrait, making all the decisions regarding the appearance of the finished work of art. Some artists portrayed themselves many times throughout their lives, while others never did (Reynolds et al. 2016, p. 10). A positive example would be Albrecht Dürer (1471-1528), whose self-representations occurred throughout his life (Borchert 2021, Koerner 1996). Norbert Schneider claims in his book “The Art of the Portrait” that portraiture “developed its own identity” between the end of the Middle Ages and the 17th century. People from all backgrounds and social classes began to sit for portraits instead of merely royals, clerics, and noble art patrons (Freeland 2007, p. 97). On the other hand, the development of portraiture as a distinct genre was influenced by both humanism, which served as the Renaissance’s epicentre, and the Christian Reformation. The humanist philosophy’s fundamental tenet - “Man is the measure of all things” - logically assigned the portrait a position of the utmost significance. The Renaissance artists not only shared this viewpoint, but they also enhanced the character’s depiction thanks to technological advancements. The oil medium,

introduced to Venice by Antonello da Messina (1430-1479), provided art with a new sensation and strength of modelling (Poldi 2009, p. 91). Leonardo da Vinci (1452-1519) gave an example of how light and shade could enhance a painting's allusion to personality and psychology. *Sfumato* is an oil painting technique by which the brush strokes are smoothed off to a certain degree, that there is a seeming transition from tone to tone (Nagel, 1993, 11). Although it is simple to find the theoretical justification for "sfumato" in Leonardo's writings, it can also be understood as the full realization of the potential inherent in the oil painting technique as it was passed down and developed in the workshop traditions (Nagel 1993, p. 15). The term "horizon" is used to refer to the literal notion of different areas and not to any effect of atmospheric perspective alone presented by Leonardo. It refers to the limits that vision encounters in the perception of all objects. This method was created to increase the level of nuance in how sensate phenomena are perceived. As a result, it increased the degree to which the understanding of oil medium painting is dependent upon the specific context in which the painted form emerges (Nagel 1993, p. 19). In Florence's Santa Maria Novella Dominican church between the years of 1425 and 1427, Masaccio regarded as the early Italian Renaissance painter, painted the "Holy Trinity, with the Virgin and Saint John and Donors." The figure appears to be larger in a scene, usually in an altarpiece, using a fresco painting technique. This is an early Renaissance portraiture example. The viewer is typically depicted looking at what appears to be a space embedded in the wall in such paintings, giving the viewer a sense of the depth of Jesus Christ's body and surroundings.

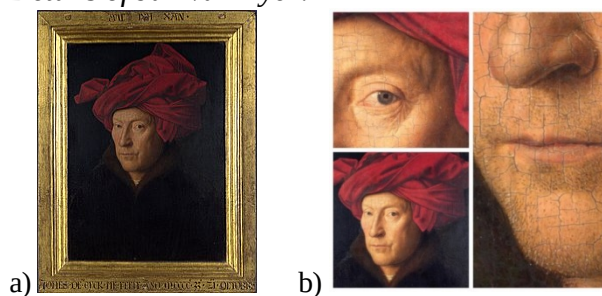
Self-Portraiture

Until Nicolas Poussin's time, the term had yet to become adequately specialized to be restricted to human (rather than animal) subjects. Michael Podro highlights three aspects that a painting corresponds to the matter or sitter in his book "Depiction." The artist can experience investigating the figure closely, seeking the sensation of motion well within the figure, and/or learning... as well as a portrait itself could serve as a method for the sitter to articulate himself with the artist's assistance (Freeland 2007, p. 97). The self-portrait has been around far longer than the term itself. The self-portrait was first used in 1831, but "autoritratto," its Italian equivalent, was first used in 1913. Before that time, accounts and historical inventories would refer to works where the artist is both the subject and the maker using phrases like "by their hand," "by himself," or "portrait of the artist." Self-portraiture developed into a distinct and well-liked genre in the Western world starting in the sixteenth century (Self-portraiture, n. d). It was not, however, an entirely new phenomenon during the Renaissance; examples can be found in early medieval manuscripts, the Classical era, and Ancient Egypt. The 17th century benefited from the standard that the portraiture of Renaissance Italy had established. Before photography sessions or personal introductions were thought to be necessary, even for a royal wedding, the painted portrait was utilized to express the physical appropriateness of the potential bride. Through the splendour of the costume and the abundance of jewellery, the court portrait also served the purpose of denoting power and rank. This characterized the "Elizabethan

Era,” which describes the period in the history of England when Queen Elizabeth I was in power (1558-1603). In books, movies, plays, and television shows, this era is often romanticized as a “golden age” of English history, as described by historians.

Perhaps it was the obligation of the patron that the characteristics be rigid and ceremonially expressionless, whereas the wealth of accessories demonstrated status. In addition to a difference in “eye contact,” embedded portraits may also use gesture, position or physical appearance as clues to indicate the status. Despite the rise of autonomous self-portraiture, some painters, including Durer, Rembrandt, and van Eyck, continued to include self-portraits within historical narratives over the course of the following centuries. An inspiration for a different kind of portraiture came from the Christian Reformation. In the reforming nations, religious imagery was outlawed, which increased the demand for portrait artists. Jan van Eyck’s (1390-1441) “Portrait of a Man – 1433” is widely regarded as the Western world’s first stand-alone self-portrait (Figure 1a below). The National Gallery in London currently exhibits the portrait, which is distinguished by the directness of the subject’s gaze and the prominence of the two inscriptions, “Als ich can” and “Jan van Eyck made me on October 21, 1433.” (Reynolds et al. 2016, p. 12). He added an unprecedented level of realism to the themes and characters of late medieval art and popularized the oil painting technique, which involved applying several layers of oil paint, as seen in all of van Eyck’s portraits. His self-portrait painting shows the subject sitting in a three-quarters profile position and is a third the size of life. His shaven face is heavily lined with the beginnings of middle age, and his eyes are almost bloodshot. He has a piercing gaze outward and may be the first portrait in a millennium to look directly at the viewer. His prominent nose, tightly pursed wide mouth, headdress, and tired expression are all combined to create this effect. The overall expression is that of a man who, in the words of one scholar, “see things - including himself - in close-up, but without losing track of the bigger picture” (Figure 1b).

Figure 1. (a) *Portrait of a Man (Self-Portrait?)*, 25.5cm x 19cm, 1433 (b) *Portrait Details of Jan van Eyck*.



The psychological and social interactions between the painter and the sitter that result in a portrait juncture are the main aspects that differentiate portraiture from various other forms of art. Oftentimes classical portraiture depicts a specific event or occasion, either directly or indirectly (Figure 2). This is a direct encounter between a specific individual (poser) and the artist. Charles Sanders Peirce (1839-

1914), known as the “Father of Pragmatism,” was a philosopher, scholar, polymath, and scientist, who explained this distinctive quality of portraiture (Burch 2022). A symbol, according to Peirce’s icon, index, and symbol semiotic theory, is an arbitrarily defined sign that is culturally associated with a specific object. An icon resembles the subject it signifies. An index places the focus according to the representation and on something else (West 2004, p. 41).

Figure 2. *Leonardo Da Vinci. “Lady with an Ermine, 1489.” Oil on Canvas. 54cm x 39cm*



Proof of Presence

The ability of a portrait to evoke subjectivity can provide proof of a person’s “presence.” The “presence” can manifest itself in a variety of ways. For example, an image may demonstrate that the subject existed and that the artist as an ideal did not create the image. Instead, the subject was present as a model, demonstrating how the subject serves as an icon to confirm their presence. Another meaning of “presence” exists and is significant in icons. The painted subject appears to emerge from the canvas, as in Rembrandt’s profound portraits. The portraits are created to portray a person’s actual presence, as in attempting to bring a person into contact with us. For example, “Portrait of a Man 1632” (Figure 3a), although there is not much known about the man’s identity, it indicates the skills and abilities that allowed this young artist to quickly establish himself in the biggest and the most artistically competitive town in the Dutch Republic (Schama 1999). A portrait as such (Figure 3a below) is frequently referred to as offering a special connection to the deceased. However, one could just as easily travel to distant lands or go to war with a miniature painted portrait of a loved one in their wallet or locket, as many soldiers did in earlier times (Figure 3b below). The person is replaced by the image. Again, physical resemblance is not necessary in this case. Because it functions as if an artefact expressed miraculously, a lock of an adored one’s hair could substitute the image (West 2004, p. 43). The painted portrait decreased dramatically in the 20th century, while the photographic portrait noticeably

increased. Regardless of its technological origins, the artistic quality and aesthetic appeal of such types of portraits are not diminished.

Figure 3. (a) Rembrandt van Rijn. “Portrait of a Man, 1632.” Oil on Wood. Oval: 29 $\frac{3}{4}$ x 20 $\frac{1}{2}$ inches (b) Giuseppe Macpherson. “Rembrandt self-portrait,” (1772-1780). Watercolour on Ivory. 6.10cm x 5.1cm



Portrait as Document

The uniqueness of portraits renders them a profound connection to historical sources; portraits are visual representations rather than records. The portrait's representation of a person, along with the specific details of the ambience, props, and attire, may provide a documentary feel. Name and age labels for the sitter can both bring up memories, and relevance of a specific moment in time. In every historical record, it is critical to balance what seems to be the presentation of “factual evidence” with the way the information was represented and understood (Figure 2). How artists express themselves and represent themselves frequently undermines any verification facts that could be added to a masterpiece, is what underpins such ambiguity concerning the documentary nature of portraiture. Portraits served as evidence in lawsuits, advocacy to find conspirators, or depicted struggles in battles during the modern period of history. Artists can use portraits for a variety of purposes. For example, in 1509-1511, Albrecht Dürer created a renowned portrait of himself to illustrate a distressing ailment to a distant doctor, which was most probably not his real appearance. He created a visual depiction of himself identifying the location of the ache in his left side around his abdomen and thoracic regions. This visual rendition was intended to convey information about his internal states of being (Figure 4).

Figure 4. Albrecht Durer. "Self-portrait, Ill." (1509-1511). Pen and Brown Ink, Partially Water Coloured. 118mm x 108mm



Documented portraits mainly serve as artistic, autobiography, documentaries, or affiliates, and are frequently associated with memories. Thus, with a person's death, miraculously, portrait functions as preserving the life of a deceased person or persons who have aged. A portrait can either bring the deceased to life once again or carry the deceased's personal history into the current moment, reflecting as a type of memorial or funerary oration (Pujazon et al. 2022, p. 34).

The Birth and Innovation of Technology

Portrait Photograph

The creation of the camera and photography in the 19th century left a paradox in the history of art and culture. The innovative intervention created the basis of a desiring "uniqueness" that people presumed, both astonished and dismayed by the technology. Cameras change the way people perceive, produce, and create art. Paintings no longer required being realistic because the camera captured real-time scenarios. Cameras and photography paved the way for videography, which in turn paved the way for films and movies. Art was evolving into a wide range of forms. This was merely one representation of technology permeating society. Emerging digital inventions have since transformed the field of art. Today photography pervades our lives. The various functions of photography are not only ubiquitous but also immensely essential. There are many distinct kinds and types of photographs. Some are taken for advertisements, documentary shots of sports and news events, some for criminal "wanted" posters, and some for scientific images to serve as pattern recognition in the discovery process or even as factual tools for concrete evidence and teaching (Shusterman 2012, p. 67). The implications of photography as a machine seem rather intriguing. However, it could have been a gradual evolution from the early invention of the "Camera Obscura" (Latin for a darkroom), in which people initially moved toward the identical goal of taking photographs, which has been known since Leonardo da Vinci's time (Wong et al.

2022, p. 57). The term “photography” is derived from the Greek words “phos--φως,” which means “light” or “unit of illumination,” and “grapho- γράφω,” which means “writing.” Attempting to fix the image and recreating it on a separate surface was required when taking photographs of living or non-living subjects (Forrester 2020). Such an innovation was not possible until the revelation of the light-sensitive silver compounds in the 19th century. The year 1839 is generally perceived as the year when Daguerre first publicly revealed his positive method, which was quickly followed by Talbot’s declaration of the paper-based negative process (Figure 5). Centuries of development in science, quantum theory, and optical devices, along with the invention of the “camera obscura,” laid the groundwork for the world’s first photography. Johann Heinrich Schulze (1687-1744), a German scholar and mathematician, demonstrated in the 17th century that certain components of silver nitrate and silver chloride were charred when exposed to sunlight (Forrester 2020, Wong et al. 2022, p. 57).

Figure 5. *Daguerreotypes: (left) Jacques Louis Mandé Daguerre (1787-1851) by Jean-Baptiste Sabatier-Blot and (right) William Henry Fox Talbot (1800-1877) by Antoine Claudet, Both Taken in 1844*



Photography has long been seen as less relevant and appreciated than other artistic genres like painting, sculpture, dance, and theatre, even though photography had a huge influence on the works of artists like Manet and Degas. Portrait photography was barely recognized as high art when it first appeared in the 19th century, but instead was portrayed as an imitation of the art form as it was machine-made. In a comical parody of photography that was created in the late 1800s by a cartoonist by the name of Nadar, Mr Photography begs for a little space in the exhibition of fine arts, but Mr Painting yells at him and throws him out of the scene (Rosenblum 1984). The struggle by Alfred Stieglitz is not in vain when he introduced his portrait photography as artwork in an exhibition, which was rejected and questioned by the art museum director whether his works could be an art form. In the early 20th century, Man Ray went even further, giving up painting and focusing only on photography, where he discovered the value of reproduction in black and white (*National Museum of Art/Aperture, Man Ray's Man Ray West Palm Beach* 1994). Henri Cartier-Bresson studied painting, and he switched his medium to photography because he felt compelled to use a faster tool

than a brush to witness the scars left by the world (Squies 1997). Without a doubt, with the encouragement of Alfred Stieglitz, Man Ray, Henri Cartier-Bresson, and other pioneers in portrait photography, photography is now acknowledged as part of a broader definition of the visual arts. Artists depicted temperament, contentment, and distress throughout their sketches and paintings, yet in the 19th century, photography revolutionized the peer-reviewed study of facial expression. Scientists photographed and recorded what the eye could not distinguish instead of depending on artistic abstract ideas of the ephemeral face and emotional features. (Wade 2016, p. 1). Relatively low cost, the photograph has been another means for depicting a portrait, its uses being either clinical or artistic; wedding photography was commissioned for social events and many other commercial purposes. Nevertheless, portrait photography has played a central role in this tradition, which is tasked with the ambitious goal of capturing a subject's identity in a single shot image (Deguzman 2022). Traditional "portrait photography" is more formal and is usually done in a studio or outside with the subject looking directly into the camera. The composition may range from a close-up of the head of a person to a full body length. Photographers who take traditional portraits aim to capture the essence of the person in a single shot (Figure 6). Iconic figures could be people from culture, politics, arts, and sports amongst others. Lifestyle photography refers to portraits of less formal or more casual and typically tends to describe everyday situations and the environment of the subject. They can be taken both indoors and outdoors in a variety of settings (Figure 7). Furthermore, portrait photographs by Ami Vitali, Carolyn Drake, and Alex Wong precisely emphasized cultural background where the surrounding inclusion is evident in all of their works. Both history and cultural background contributed a large context behind the content of the arrested portraits, both as evidence of the present lifestyle and contemporary culture (Wong 2019). Meanwhile, conceptual portraits are an example of creative photography, a type used to illustrate an idea commonly known also as a self-portrait, expressed by the artists to see themselves as an artistic mean. Many photographers aim to capture internal states like emotion conceptually, it also gives them the freedom to "think outside of the box," visualizing elements to capture the subject identity. An important element is to understand your subject well to be able to anticipate their behaviour, mimics, and movements to capture that particular and special moment (Caputo 2023).

Figure 6. Y.W. Alex Wong, *Portrait-Photography (Close up)*, Nikon D800E, Nikkor (f.2.8) 80-200mm, C-Print, 160cm x 55cm. Mt. Hagen Festival, Papua New Guinea



Figure 7. Y.W. Alex Wong, *Portrait-Photography (Inclusion of Environment)*, Nikon D800E, Nikkor (f.2.8) 24-70mm, C-Print, 150cm x 100cm. (Top left & right) Kashmir, and (Down left & right) Tibet



Portrait in Film and Animation

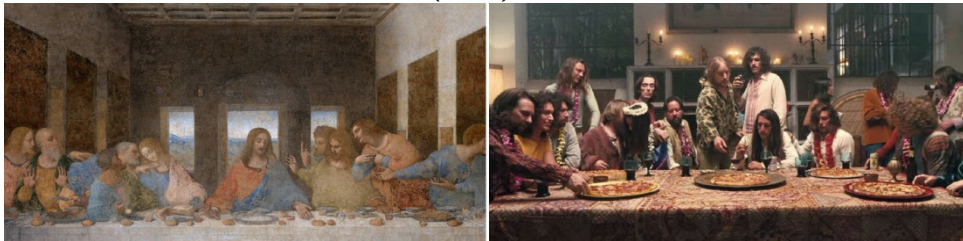
The optical paradox is the persistence of vision, and the phi phenomenon that underpins film illusion. When projected at the appropriate speed, the succession of still images on a strip of the film could indeed represent a continuous flow. Since Thomas A. Edison tasked his assistant William Kennedy Laurie Dickson to create the kinetoscope (1892), a machine that can portray moving images onto a screen and is widely considered to be the very first motion picture camera (Sklar et al. 2023). Edison proclaimed his prototype the “Kinetoscope,” a combination of the Greek terms “kineto” (motion) and “scopos” (scope) (to watch). In the year 1891, the Kinetograph (camera) and Kinetoscope (viewer) were copyrighted and filed by Edison. The Kinetoscope was finished in 1892 (Library of Congress n.d.). However, the tedious and painstaking effort of motion picture making has changed dramatically more recently as digital camera has supplanted film. Meanwhile, cinematography is the art and technology of creating motion pictures (Britannica 2022). Rather than capturing a still image, cinematography entails framing a composition in motion. Even though both involve live models and actors, photography and cinematography have significant differences. Cinematography was concerned with the relationship and flow of shots. However, a single photograph can be deemed a complete work in its own right. A good portrait film requires not only a good actor, but also a good scene, lighting, camera lens, angle, and movement (Sklar et al. 2023). Portrait films attempt to capture the identity and story of a person or place, irrespectively of film style (Film noir, Italian neorealism, German expressionism, Documentary and Spaghetti western) or genre (Comedy, Adventure, Science fiction, Crime, Horror, Action, Romance, Drama, Fantasy, and Historical). It can be gradual, straightforward and conceptual like the cinematic portrait shots in the film, *Joker* (2019) directed by Todd Philips, which focuses on the Joker’s psychological behaviour. Isolated, bullied and ignored by society, slowly Arthur Fleck (Joaquin Phoenix), the main character evolved into a criminal mastermind (Figure 8). We can notice that many great portraitures in art history influence and inspire the scenes in films and animations. Several film shots such as (Figure 9) Paul Thomas Anderson’s *Inherent Vice* (2014) cinematic scene

referencing Leonardo da Vinci's notable painting *Last Supper* (1495-1498), Sofia Coppola's film *Marie Antoinette* (2006) with Jacques David's painting *Napoleon Crossing the Alps* (1800-1803), Terry Gilliam's memorable cinematic shots in *The Adventures of the Baron of Münchhausen* (1988) referencing Botticelli's renowned painting *The Birth of Venus* (1484-1485), etc. great films. Several animations also draw inspiration from great portraits in paintings, such as *Loving Vincent* (2017) an awe-inspiring animated portrait depicting Vincent van Gogh's works and his life. *Ruben Brandt, Collector* (2018) a mesmerizing mind-bending animated feature inspired by 13 portraits from different artists. The animated sitcom *The Simpsons* (1989) often mocks global issues and contains wicked humour from various portraits of well-known paintings and photographs.

Figure 8. Screenshots from the Movie *Joker* (2019) Directed by Todd Philips, *Joker* Played by Joaquin Phoenix



Figure 9. (Left) Leonardo da Vinci's *Last Supper* (1495-1498) and (Right) Paul Thomas Anderson's *Inherent Vice* (2014)



Hyper-realistic computer-generated (CG) living portraits are widely seen on movie screens nowadays. Several pioneering and high-definition facial capture systems enhance facial performance in the movie-making visual effects and animation production process, for example, Medusa, Anyma, Flux, and Mova helps to elevate and transfer the actor's facial expression to a computer-generated digital character. The characters such as Gollum (*The Lord of the Rings*, 2001-2003), Neytiri (Figure 10) and Jake Sully (*Avatar*, 2009 & *Avatar: The Way of Water*, 2022), Caesar and Koba (*Rise of the Planet of the Apes*, 2011), Davy Jones (*Pirates of the Caribbean*, 2006), Smaug (*The Hobbit: The Desolation of Smaug*, 2013), and Thanos (*Avengers: Endgame* 2019) are all possible on-screen with hyper-realistic facial mimic and expression, all thanks to such effective facial capture system and technology. Such technology and software changed the world. The way we perceive and interpret portraits, as well as how we define new boundaries in the art of cinematography, have all changed dramatically. At the

same time, there are more affordable and widely used facial software for public access such as Banuba Face AR SDK, Adobe Character Animator, IClone 8, Blender and CrazyTalk 8, which can be used on regular desktops, laptops, digital tablets and mobile phones.

Figure 10. *Facial Motion Capture Mirrors the Emotions of Neytiri, Avatar (2009)*
Played by Zoe Saldana and Directed by James Cameron



The Advancement of Technology (New Media)

Facial Recognition

Whether in school, public, private activities, neighbourhood parks or personal devices, in innumerable and inexplicable ways, facial recognition technology (FRT) is infiltrating our lives (Raji et al. 2021). A question to start with is, what is facial recognition technology (FRT) and how does it function? An audit or evaluation is required in this description to assess the appropriateness of this specific technology to fulfil its purpose function within the specified context (Raji et al. 2021).

Portraiture has served as a means of representing identity as well as articulating quantified selves since its inception (Lupton 2016). Faces have always fascinated us, but they also reveal a lot about our personality, attitude, psychological state, and socialisation. Since the dawn of time, artists have attempted to depict this fascination, while scientists and academics have attempted to distinguish characters based on facial form and expression since the time of Aristotle.

Alan Sekula noted how photography, in the form of portraiture, has been used for the purposes of state surveillance since its inception. He claimed that in the 19th century, portrait photography was used to “establish and delimit the geography of the other and to clarify both the homogeneous look - the classifications - as well as the contextual case of delinquent behaviour and social pathology.” (Sekula 1986). Particularly, portraiture in photography can serve as a useful form of data, when the information is extracted from the individual face. Not only did anthropometrics advocates like Alphonse Bertillon and Francis Galton invoke the concept of the face as visual data, but so did critics of photography and its status as an art in general. Portraits are increasingly being used to prepare surveillance and authentication systems due to their ability to extract faces and people’s identities. Portraiture has been used in the development of algorithmic technology to access a person’s age, gender, race, emotional state, sexual orientation and political

preference (Hristova 2021, p. 74). In 1857, Lady Elizabeth Eastlake indicated portraiture as the balancing act between representation and quantification (Eastlake 1981). Like fingerprint and voice recognition, facial recognition is a form of biometric technology, which verifies and authenticates a user's facial identity in photos and videos (real-time). This biometric information may infringe on citizens' rights, which could be used as a surveillance tool; consumer advocates, on the opposing hand, are in favour of restricting the implementation of (FRT) for safety purposes. There is little doubt that (FRT) continues to pose many cyber threats, particularly when used in public spaces or locations; if used effectively, it will eliminate any likelihood of anyone concerning one's everyday routine privately and anonymously (Nakar 2017, p. 94).

Facial Recognition Technology (FRT) includes:

1. Facial disclosure – The camera detects and arrests the presence of a face from the user via photo or video mode. The main purpose is to determine the position, appearance and authentication of the user.
2. Facial examination – Face detection and recognition software maps the face and calculates the distance from its most important features such as facial characteristics and individuality. These calculations are later disseminated into a set of related arithmetic known as a “faceprint” or “face signature.” The face print is added to a database of identification for governmental or private companies (Boneh et al. 2013).
3. Facial identification – The face signature is matched to a database and an algorithm that quantifies known faces. Such processes help to determine the identity of an individual in either a photograph or video. The more diverse the set of photos embedded in the system, the more precise the results.

The popularity of Facial Recognition Technology (FRT) stems from its proven fiscal benefits, including:

- a) Increased surveillance: Face recognition technology has the potential to reduce crime while also improving safety and security. Even after several years, it aids in the identification of criminals and missing persons. Enterprises are secured from theft and illegal access to office compounds thanks to face recognition software.
- b) Simple assimilation: The majority of security software is compatible with most of the new biometric identification solutions. One requires no prior computational expertise to begin.
- c) Effectiveness: Heretofore, a person would perform the inspection process manually. It was laborious and unproductive. One can track the presence of staff members and other visitors using facial recognition technologies.
- d) Efficient organization: Face recognition systems are entirely automated. As a result, maintaining records and keeping up with everyday activities is much simpler.

As previously stated, face recognition provides numerous possibilities for companies and other entities. Although it continues to possess several discrepancies and flaws, its competencies in the present artificial intelligence digital industry are projected to expand (Traichuk 2022).

The Use of Artificial Intelligence to produce Portraits of Nonexistent Individuals

In the beginning, humans used computers to perform mathematical operations; this tool, like computers and networks later, quickly became an essential tool that humans take for granted in our daily lives. Looking back through history, the emergence of each new technology has resulted in the rise of a group of “technological innovators,” resulting in an entirely novel gap between the rich and the poor as well as a new path for social development. Those who cannot keep up will be squeezed into their initial fields and compelled to work harder during this transitional period. Although there will undoubtedly be people who encounter some hardship, the pace at which emerging technologies drive social development will generally benefit humanity as a whole. At this point, we should look at the context from “AI to replace humans” to “AI to strengthen humanity.” Surely, there will be challenges ahead in different eras and situations when AI is further developed. On the other hand, science fiction novels all share the same concern: “Is it possible that AI will overtake humans and become the most powerful entity on Earth?” Overtaken by a more prominent (artificial intelligence) species? Surely, this is humanity’s deepest fear. In this regard, the current learning consensus is that AI, which is based on machine learning and algorithms, is still merely a tool that should be managed by humans. Instead of letting the AI decide everything in a black box, the engineers determine how the algorithm performs, how to utilize the data, and what language to use to articulate it. Therefore, even if the AI demonstrates human-like emotional patterns as a result of the language model’s configuration, which includes knowing how to comfort the user when the user gets upset and replies cutely, it is merely a program arrangement, because AI is unable to defy the inputted command. The most significant distinction between AI and humans, in this regard, is that humans have autonomous consciousness and can make emotional and moral judgments. This is the core value of being human.

Is Artificial Intelligence the next leap in the evolution of the Art Movement? AI-generated art lets us experience a new level of unconventional creativity, blurring the distinction between machines and humans. Nowadays, AI systems are capable of producing multifaceted portraits in various styles, from cubism to modern to pop art. All AI systems require are keywords and prompts. The creative art world is exuberant with possibilities.

However, just as how photography is first introduced as art, the art world alienated and doubted its position, today, some continue to argue that computer or AI-generated art is neither art nor creative (*Christie’s Education* 2019). With the advancement of technology, the subject of portraiture was created and completed not “in time,” but “on time,” as the production duration shortened to a split second, whether it is in the form of painting, photo-realism or real-time.

The portraits created by Mario Klingemann using AI technology demonstrate that artists continue to experiment and find the sublime beauty in the imperfect

portrait creation from the marriage of the two disciplines (art and technology) as one. *Memories of Passerby 1* (Figure 11) have no registry of a database. Mario Klingemann created and trained an AI brain that creates new portraits in real-time, pixel-by-pixel. The changing portrait flow does not follow a predefined sequence but is the result of the AI interpreting its output; this means that no images will ever be replicated while the AI is actively running (Sotheby's). Another notable artist and engineer, Scott Eaton, develops and uses artificial intelligence to render his drawing and animations into figurative (Figure 12), digital imaging, and abstracted sculptural forms. Rather than using AI as a creating agent that "creates art" spontaneously, he prefers to use AI as the "art collaborator" in the emerging field of technology to enable the creative potential accessible to the human artist (Artfixdaily 2019). Meantime, other esteemed individuals such as Gene Kogan, Mike Tyka, Robbie Barrat, Ahmed Elgammal, and Stephanie Dinkins use AI technology as an artistic medium and tool, to generate unimagined portraits and distinctive figurative artworks.

Figure 11. Mario Klingemann, *Memories of Passerby Multiple GANs, Two 4k Screens, Custom Handmade Chestnut Wood Console, which Hosts AI Brain and Additional Hardware, 2018*



Figure 12. Scott Eaton, *Portrait Study – Pavel 1, Zbrush*



In 2019, the engineering team at Nvidia Corporation refined the Artificial Intelligence (AI) technology to create portraits of people who don't exist by using preliminary faces as data input to generate new faces with computational algorithms, to create new features of the new individual (Figure 13). It is very different from

the concept of transformation or morphing techniques, which draw information from the preliminary visual reference. Using style transfer research, the authors (Nvidia Corporation's Tero Karras, Samuli Laine, and Timo Aila) suggested alternate generator architectural features for adversarial networks with generative algorithms. This one-of-a-kind design enables intuitive configuration control of the formation as well as instantaneous, unrestricted disconnection of elevated features (e.g., gesture and personality while directed on human figures) and dynamical variability all across the image features (e.g., freckles, hair) (Karras et al. 2019).

Figure 13. *A Style-Based Generator Architecture for Generative Adversarial Networks, by NVIDIA Corporation, 2019*



On the other hand, AI portraits called magic avatars are portraits (Figure 14 below) generated by the Lensa app. Lensa, which is owned by Prisma Labs, lets consumers upload pictures of themselves with a fee and retrieve images of themselves in various fanciful parameters within minutes. The app elicits billions of images and other public information from the web while processing them through Stable Diffusion, an open-source algorithm. This popular app is now used by millions of people from all walks of life to create instant artistic portraits in different styles, without needing a painter or artist to do so.

Figure 14. *Example of Portraits Generated with Lensa's Magic Avatars App, Developed by Prisma Lab*



At the same time, Foto's AI face generator, which is integrated with AI and deep machine learning, allows users to generate highly realistic faces from scratch in seconds. Users can simply describe the keywords such as gender, age, hairstyle,

accessories and other characteristics. Midjourney and other low-cost AI programs and generative 2D software can generate images from text descriptions. Like OpenAI's ChatGPT, DALL-E, Stable Diffusion, Jasper Art, Photosonic, Starry AI, NightCafe, Artbreeder, and Dream by Wombo, users can install the program on a smartphone and use it instantly by typing keywords and descriptions to create portraits without having to take a photo of anyone.

Conclusion

Today, the practising and learning curve of art, which requires technology, could be harder for those who barely use a computer to produce artwork, such as a pure sculptor or painter who concentrates on perfecting skills. There remains room to improve; constant changes and modifications of digital art require the understanding of technologies, which in itself requires an entirely different mindset and perception. Artists who have embraced the fusion between art and technology today are highly imaginative in artistic content creation whether it is on the screen or by projection in the air and space. Regardless of the advancements of new AI technologies, there are certain setbacks. Choice and partisanship are top of the agenda because all current AI systems rely on the input and command of the creator and the information they are fed. Nonetheless, as time moves forward, the artistic creation of portraiture will surely become more spellbinding and magical because creativity is all about the capability to correlate, generate new synthesis, spark new ideas, and new metaphors, concerning shreds of evidence, philosophy, theory and history. In short, the art of portraiture creation, both in the past or near future, always depends on the creator and their choice of working tools, whether it is with paints, cameras, computers, facial capture systems or artificial intelligence generators. Just as the philosopher, Immanuel Kant mentioned, "Man has the ability to create himself". Great portraiture, whether from art or media aesthetics, always leaves an impact that mesmerizes the viewers and stands the test of time.

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