ACADEMY OF PERFORMING ARTS IN PRAGUE

FILM AND TV SCHOOL OF ACADEMY OF PERFORMING ARTS IN PRAGUE

Artificial Intelligence and Creativity.

Rony Eranezhath Thilakan

Final Theoretical Bachelor Degree Thesis

Consulting teacher: Josef Ledvina.

Prague, 2019

The author affirms that he based his work only on the sources and literature named in the Acknowledgment Section and that this diploma thesis is an original text of her own

Thesis Abstract :

The main purpose of this thesis is to discuss whether a mechanical device using artificial intelligence can create a piece of art. I will explore the changing relationship of technology as a medium used by the artists to create art. Furthermore there are new and more powerful technologies such as pre coded algorithms that have the power to create some of the most complex artworks. Questioning deeper into complex reasons of what makes some certain creations a piece of art.

To render a better understanding of the human element which goes into making art such as creativity, emotion, intent and a social cause and why machine would fail to capture these basic essence of creating art . Not to mention, where does a role of authorship stand for us and the artificial intelligence even though artificial intelligence is able to make their own decisions depending on the algorithm provided.

I will Further investigate how technology has played an important role in the field of art from the early periods such as French Realism movement . Moreover, I will discuss how these rapid developments in the technology is altering our social interaction and the visual landscape through digital art. In addition, I will note on how these developments are culminating in a culture of individuality and celebration of unique perspective.

Table of Content

Chapter I : Introduction to Artificial Intelligence

1.1   Introduction of Artificial Intelligence

Artificial Intelligence has come a long way since the first time the term was coined by John McCarthy in 1956 in the Dartmouth Conference[1]. McCarthy is known as the father of Artificial Intelligence, he was an American computer Scientist and an Inventor, he has played a vital role in developing the field of Artificial Intelligence, the foundation which he laiyed for the development of this field during the 1960s-1980s while he was the director at the Stanford Artificial Intelligence laboratory which was commonly known as the SAIL .

John McCarthy in 1958 developed the language Lisp which was used by computers to communicate with each other. This language is still used in the current day robotics and for developing new AI systems.

John McCarthy had organised the first the most important conference for artificial intelligence in 1956 at Dartmouth, it was here where he first coined the term "Artificial Intelligence" the sole purpose of this conference was to to find out if machines could think like humans or were capable learning and could develop problem-solving skill like human .

It was only later when John was leading SAIL in the early 70s he was able to create numerous systems which were capable of mimicking some human characteristics such as vision, hearing, reasoning, and movement.

1.2   Turing test

Turing test has played a vital role in machine intelligence even way before the term "Artificial intelligence" was coined in 1956. Turing test was a challenge created by Alan Turing a British born mathematician in 1950 to challenge the machine intelligence and see

if the computer can mimic a human to such an extent that a human would not be able to differentiate between a human or a machine. This has been a very long and very challenging task that AI(Artificial Intelligence) developers have been trying to break through. It was hoped that with the growing hardware and software development it would be an easy challenge to beat the Turing test, but the current progress and development has only shown that this task is way more complicated than initially thought.

Alan Turing in the 1950s wrote a book by the name " Computing Machinery and Intelligence"[1] which had opened with very simple question: Can machine think ?". Turing later proposed a way to challenge a machine to see if it has the power or a capability mimic human by using a very simple game which was then commonly known as "Imitation Game". As the name sounds it was very simple. The first idea to develop the test was to involve three humans a male and a female and an Interrogator, It was the Interrogators job to determine with who was conversing, it was easier for the interrogator to figure that out with their voice and their handwriting, so it was finally decided that the conversation between the three would be held using a typewriter and either the man or the female would be swapped by a machine and now it was the Interrogator's job to find out which was a machine . Even though the task at hand looked easy at the moment but it was something way ahead of its time, in order for the machine ace this test it would have to learn the natural human language and remember the old conversation and learn from them and understand the basic human notions which are considered as basic common sense by us .

Alan Turing was convinced that within the next 50 years when computers could have more memory than 500 megabytes, the simple task of mimicking humans in a casual conversation would be easily be tackled and most of the computers could pass the Turing test.

One of the most interesting contradiction to this test was of " The Argument from Consciousness." This goes as even if the machine manages to mimic human being over a casual conversation that doesn't mean it truly understands the true essence of being a human. This contradiction also states that even if a machine is able to mimic a human being but it won't be able to write a poem or create music as a response to the conversation since the machine can only response to text without understanding the emotions of the human on the other end thus this test fails to truly answer the question whether machine can think ?". Hence proving that this test alone could not determine the intelligence of a machine because it also could not interpret a masters painting which only human can do. Alan argued that it was impossible to say whether machine was feeling unless you were yourself a machine, and therefore there is was no way to contradict this or prove it otherwise. This is how Alan Turing negated this contradiction about " The Argument from Consciousness,"; raised by Professor Jefferson.

Even if a machine was able to pass the Turing test will it be considered as an Intelligent being? Who can perceive emotions and feeling and take a decision based on feelings rather than algorithms and pre-coded programs?

1.3   Lady Lovelace Question

Ada Lovelace daughter a very famous British poet Lord Byron, herself very well known; mathematician and computer programmer, was also a friend and a co-collaborator with Charles Babbage, she also contributed to the creation of the " Analytical Engine".[2]
 It's during this period when she realised that his complex analytical machine was able to solve the most complex formulas or even create a very elaborate scientific piece of music and have a very high computing power. Yet it was not

to be mistaken at any point that the machine could not do that all by itself or have the power to "think".

As she put it " The Analytical Engine has no pretensions whatever to originate anything. It can do (only) whatever we know how to order it to perform " If what Ada Lovelace meant is that "the computer can only what we order it to do" then yes that's correct.

But we must keep that in mind that this question was first asked way before the programmers knew how to create a self-learning algorithm which enables machines to learn from their surrounding and conversations. The technology has developed to such an extent the machine can recognise face and dialects. Which means the question asked by Lady Lovelace is nullified by the growth of technology and time.

1.4   Types of Artificial Intelligence.

Artificial intelligence has grown and developed beyond our imagination in the last decade . But it is very important to understand that the basic idea about artificial intelligence is the capability of a machine to think and perform like a human being. Artificial intelligence can be further divided into two different kinds of AI. Such as Strong Artificial Intelligence and Weak Artificial Intelligence[4]. Strong Artificial Intelligence is the machines that are capable of making its own decisions based on its own understanding of the situation without any human manipulation, therefore they are considered to be "smart". Whereas on the other hand, weak artificial intelligence is the machines that are not particularly smart or self-capable but with the help of algorithms and programs, it can be made to look smart and capable.

1.4.1 *Weak AI*

Further talking about weak artificial intelligence, this kind of AI has been around for a very long time and is in a very advanced stage since their conception, it's been tested and tried and is still being looked into to further develop the technology, its very vividly used in the gaming industry, as gamer when you set a match again computer you think you are actually playing a game against a self-aware and self-capable computer who is making all the decisions for itself. But, that's not the case all the steps that a computer takes in a game while playing against a human player are predetermined and is entered into the game with the help of algorithms and programs. Weak Artificial is developed with a mindset of machines helping us humans to accomplish some mundane tasks like placing objects on the conveyer belt or driving a car or an autopilot etc.

1.4.2 **Strong AI**

Whereas on the other hand Strong Artificial Intelligence, the latest growing obsession in the world of Artificial Intelligence, it's very new and not much development has happened in this field at the moment. The Ultimate Idea is to create machines that are self-aware and can be considered as intelligent beings who can make their own decisions and can function without any human interference. Currently, there are not any specific examples of Strong Artificial Intelligence .

1.5   **Deep learning with artificial intelligence**

Deep learning is the is become the most commonly heard terminology when we speak about Artificial intelligence, big data, and analytics, it's the next big thing in the world of Artificial intelligence. It shows great promise for the future developments of various industries and even in the field of art.

Deep learning has been around a very long time but this field of technology has been under different names broadly speaking deep learning was known by the name cybertronics in the 1940s-1960s and later in the years from 1980s-1990s it was under the name of Connectionism. It is only since 2006 it has been known as deep learning. The field has been rebranded many times depending on the researcher who was developing this technology at that period of time.

Deep learning is very commonly used by industry giants likes google in its voice, face and image recognition with the help of algorithms which makes the machine very intuitive. You can even see deep learning being used by online e-commerce sites and online streaming platforms such as Netflix and Amazon which decides on what you should watch next or what you should buy according to your previous choices.

Deep learning is considered as the cutting edge technology for the industry since it's giving the machines the power to solve real-world problems with the help of neural networking, which in place empowers the machine to mimic our human-like decision-making capabilities.

Let's try and understand how Deep learning works in a very basic way which in reality is very complicated and has many layers involved in it. The main and the most important thing which is involved in deep learning is data, in this process, the machine is fed with a huge amount of data which it uses to interpret the other data based on the previous data fed to it. The machine asks a series of questions which needs a binary answer like true and false. Then the machine classifies all the data received by the user and uses this data provided by the user to make decisions based on them.

Let's look at a practical example of how deep learning machines can be used to differentiate between wine and beer. First, it would be given a huge database of different kinds of beers and wines their different alcohol content and colors and shapes of glasses which are used, all this data can be manually entered or either by the internet the machine can gather all the information and classify them in a respected order in it finds there . next, it would use the newly created database with all the information that has gained to text the beverage in real life with the help camera and alcohol meter to determine the colour and alcohol content of the beverage determining whether its wine or beer. just as humans it learned the difference in a different kind of beverage, the machine "learned" with the help of all the information which was passed to it in the form of binary information through neural networks and could decide the difference between the two.

This at the moment looks pretty straightforward, but where the deep learning comes in is as time passes the model learns from the various different tests it has conducted to determine the difference between the two different beverages, as in it learns from its mistakes and rectifies it. just the way we do it as humans.

1.6   Artificial Intelligence vs Human .

The most crucial goal for AI developers is to surpass human intelligence in many different fields such as games, art, and autonomous vehicles. Not so long back in 2015. Google's DeepMind AlphaGo an Artificial Intelligence designed to play the game Go, defeated the world champion Lee Sedol in a five-day match.[6]

AlphaGo uses machine learning to train itself by studying thousands of games played by a professional human player. It then plays against itself to improve itself using reinforcement learning. As computing power has evolved exponentially, computers have become better

than humans at computation. The game of Go is so complicated, and with so many possible moves which are impossible to predict. When AplhaGo started playing against Lee Sedol, there were many possibilities which AlphaGo could not have foreseen.

At the end of the Game, AlphaGo defeated Lee Sedol 4 against 1. I think this game shows the power of machine learning systems and the speed at which these systems are getting stronger.

Another very famous example of Artificial Intelligence vs. human is Google's Voice AI Duplex. Google's CEO Sundar Pichai, Introduced Duplex in an annual developers conference in front of an audience of 7,000 guests[7]. The AI made two reservations in front of the attendees to a hair salon and hotel. AI's voice could not be differentiated from a human's voice and was able to successfully book the appointments. It even used human verbal ticks like "umm" and "ah." This use of human verbal ticks was something never seen before. It was believed that it was the first time that Artificial intelligence had passed the Turing test.

Later google clarified that duplex has not passed the Turing test since at the moment AI duplex is only trained to make these two kinds of reservation. Non the less we get to see how advanced our AI systems are getting.

Chapter II - Effects of Technology

2.1   Effect of technology on Art

Technology and art have gone hand in hand for many years, but before we get into the role of computers and algorithms which play a very important role in today's generative art. I would like to briefly discuss some historical events in which technology has played an important role in further shaping that particular art form. Such as photography and animation.

These examples shows that the new technology was seen as a threat to displace the traditional artist, but in reality, these new technologies opened up new possibilities and roles for the artist. In many cases if you bought a complete outsider and presented the work created using the machine and new technology, the person would immediately give all the credit to the machine failing to understand that the artist behind the machine who gave the machine a set of algorithms to execute is still the true author of the work created. The onset of new technology generally creates a fear of displacement among traditional artists, but I feel the new technology does not cut off the traditional artist but instead equips them with something more powerful and capable. In fact, they give the artist an opportunity to explore new styles and variations of their own works. These new technology opened up a whole new world for the creators and the consumers because of its easy accessibility to everyone who was curious about these new machines and technology.

2.2   Photography as Art.

Photography has been one of the most important inventions that come in mind while we are talking about technology and art. Before photography became the most common techniques to capture the real world, paintings were the most common method used, and the artists were able to create some of the most photorealistic paintings during this period.

On the other hand today we are flooded with an incredible number of photographs because of the ease of creating pictures when compared to hand painted realistic renders of the world around us by the artist which was considered to be a skill which only very few artists had in those days."From today, painting is dead." Paul Delaroche, A French painter at Daguerreotypes demonstration in 1839.[8]

In 1839, two photographic techniques were invented one was Daguerreotypes by Louis Daguerre who was a French artist himself and the other technology was the William Henry Fox Talbot's Negative-Positive process. These two were are the only two methods used to create practical records of the world. Next few decades the Daguerreotype became the standard practice because it was readily available compared to the Tablo's negative-positive method which was restricted by patents. However, later due to the further development of the negative-positive method, daguerreotype had become obsolete. During that period portraits were the most popular subject this luxury of portraits painted by artists was only available for the aristocrats and the wealthy. In the early 18th century several inexpensive methods were created such as the silhouettes,(Figure 1) in which the artist would cut out an outline of the person on a black paper, which would generally take much time to create a single silhouette portrait, and for this technique the side profile of the person is preferred cause this angle enables you to see the contour of the face . On the other hand, the daguerreotype provided a much more economical way of creating a realistic portrait of the person. Even tho the method of making these photographs were complicated and slow to such an extent that one would have to strap the head of the person to the backrest of the contraption and even grip the handle firmly to avoid any movement while making the portraits. Since each exposure would take anywhere from 5 to 10 minutes of exposing the plate. Due to the low sensitivity of the chemicals used to expose the picture.
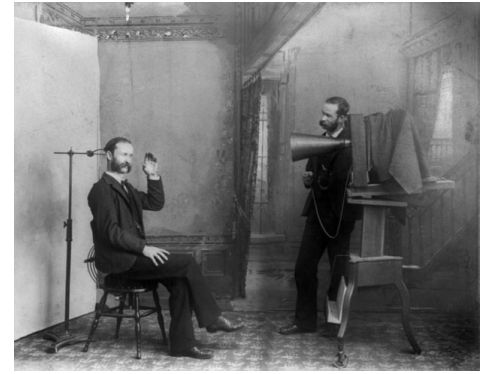
Figure 1 (a) Antique 18th Century Silhouette Portrait of Richard Jones.

    (b) Daguerreotypes Of Louis Daguerre

    (c) In this trick photograph, originally titled 'Wheeler's Freak', a photographer appears to be photographing himself in his studio. Photograph by A.H. Wheeler, circa 1893.

The question which has baffled artists for decades, is photography art? After decades of debating and trying to put a label on the medium, it finally divided into three central ideology. Many people believed photography could not be considered as art since it was wholly mechanical and it did not require human creativity. Many artists from this period were against photography and saw it as a threat to real art, at an early meeting of the Photographic Society of London, one of the members made a statement that the technique was " too literal to compete with the work of art" because it failed to elevate the imagination.[9] The second view about photography was that it could be useful for the artist, such as a reference for their paintings or drawing, but they made it clear to make sure that photography should not be considered in par with drawing and paintings. finally, the third group compared photography with etching and lithography and believed that it could become an actual significant form of art such as painting.

By the early 19th-century realist painters such as Gustave Courbet and Jean Auguste Dominique Ingres were creating some of the most realistic painting with exceptionally well-detailed portraits and landscapes which had never been seen before. However, thanks to all the developments and improvements in photographic techniques, and the camera had become lighter, portable and affordable by both professional and amateur artists. Realistic photographs had become a common way to capture the real world.

In 1885, there was a new art movement called pictorialism with one purpose of making photography an art form. The interesting fact was when the pictorialist artist started creating photographs with an atmospheric feel to the pictures they created, they had much more artistic control on the photograph and they would tweak the images in the darkroom and try and replicate the hazy effect of paintings similar to the painting style oh the great French realist painters. It was very fascinating to see how these pictorialist artists were trying to blur the line between painting and photography and yet create a new medium of expression within itself. Eventually, photography was firmly established as an art form.

This piece of history teaches some very important lessons which are directly relevant when it comes to Artificial Intelligence as an artistic tool.

Just as how photography was not considered as an art form and was looked at as a threat for the traditional artists. Artificial intelligence as an artistic tool is looked under the same light, questioning its authenticity as an artistic medium because it's completely based on algorithms and its mechanical nature and questioned how art created by algorithms be creative. The same way how new technology like photography breathed new life to an old art form, I believe AI would do the same and be eventually fully recognized as an artists tool to create art.

2.3 3D computer animation as Art

3D Computer animation is an art platform which was pioneered by Pixar Animation Studios. They were the first group of artists who put a team of artists and engineers together to create 3D animation(Figure 2). Edwin Catmull was the mind behind the growth of 3D animation. He was an animation enthusiast who received a Ph.D. in Computer science in 1974. During his studies, he invented several algorithms and programs which are still being used in the animation industry.[10]

Computer animation was another significant change in the classical animation industry that scared the traditional artists who were creating animated movies using the cell animation technique. Which meant the artist would have to manually draw 25 frames of the drawing to achieve 1 second of smooth animation, what this meant is a production company would have to hire 200 or more highly skilled animators to produce a feature-length movie. Animators from Disney were scared that computer would end up taking their jobs away. It was a common misconception that the computer would be able to create all the animation in just one press of a button and the character would start moving by itself. In reality, computer animation is very labor intensive work and requires highly skilled animators for all the small details necessary to create an animation.

In the early 90s the classical 2D animation style was left behind and slowly the 3D animation took over because of the easy accessibility and it was the future of the animation. Today the 2D animation sector in Disney is shut and the all the energy and skill is focused towards 3D animation, today computer animation is flourishing in so many different industries and not just animated movies but also live action films, commercials, and video games. This sudden growth of animation industry has provided so many

animators with new opportunities which would have not been possible if they were still doing cell animation (frame by frame) .

The reason for this example here was not to show loss of employment but instead to show how technology and art came together to create something so new and which has open up so many new possibilities .

(a)

Figure 2: (a) In 1972 Ed Catmull (founder of Pixar) and his colleagues created the world's first 3D rendered movie, an animated version of Ed's left hand.

Chapter III : What is art?

3.1   What is an artist?

So far we have seen how technology in the past has become an essential tool for the artist to venture into new possibilities in their particular fields of expertise. We understand how technology is only used as a tool for the artist and how it's not become an artist by themselves. Why is that? Even tho they can perform some human task like speak, search, differentiate between the two different objects and also drive a car. The reason why I feel that has not happened yet is that art is social, it has specific roles to play in society or expectations to be fulfilled, and algorithms have a predictable outcome due to automation. Art as invoked a dialogue between the artist and the viewer for generations and in all cultures around the world. Further we will see what are some the prerequisite requirements to be an artist.

3.2   Art Is Social.

For thousands of years, humans have created and indulged in art and why? Because art has been a method of communication and expression between people. Artists often say art for them is a tool for personal expression, which is an act of communication.

It is believed that every human born is an artist because we humans are considered as social creatures. Even the most skilled artist painting the most brilliant portraits or the most realistic landscape is deemed to be an artist. But even a kid's drawing which might be only appreciated by his family is also considered as art.

Dutton in his book makes a solid point,[11] which I will try and summarise, creating art served several functions for our ancestors such as art was used as a fitness signal for mating and sexual selection. The technique was used for displaying wealth and status.

Storytelling was one of the oldest forms of art along with music and dance, these forms of art were used to strengthen social bonds with the community.

As you see the most of these art forms were social, art was born as a form of communication and sharing between people. In today's world art may have evolved into many different styles in different parts of the world, but they still do share the various social functions that it did centuries ago.

3.3   Non human Authors

Looking at our previous examples, we have seen how technology and algorithms have advanced through time, and still the current latest algorithms are not considered as artists. There are a few more examples of beautiful creations created by authors or process that are non-human. These examples are to support further the theory of who can we call as an artist in real sense.

3.3.1 *Natural Process:*

Earth holds some of the unique and brilliant creations such as the Himalayas, the grand canyons and something as surreal and beautiful as Zhangye Danxia Landform (Figure 3)is not considered as an art. Delicate structures which are instinctively created by animals such as honeycombs and corals are not found as an art. This example shows that just because a particular creation is complex or beautiful, it doesn't mean it is art since there is no creative social communication in these.

3.3.2 *Animals :*

Some captive animals such as elephants, and chimpanzee have been trained to create scribbles on canvas with using paints or markers whichever is possible to uses, Theoretician are very critical about animal made art. Usually, the trainer or the owner of

the animal would hold the canvas in front of the animal and letting them throw the paint at it. He would decide when the work is finished, and he later selects which artwork is worth displaying. In the whole process, we can see that the animal has no interest in the creation or even that it has no say in what he wants to display. I feel this kind of art was a result of a media stunt. Back in 2005, three artworks painted by an ape was sold for USD 25,000 [12] (Figure 4)in an elite auction house in London, that makes it the highest ever paid for art by a nonhuman author.

The importance of this discussion is not to see if animals can be referred to as an artist but to see how we determine what qualifies as art. There have been studies to see how animals behave around the art they created, to see if that particular animal has any attachment to the work to determine if that artwork is some personal expression which we humans still don't seem to understand.
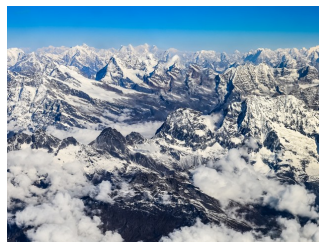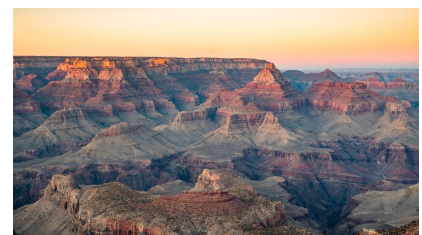
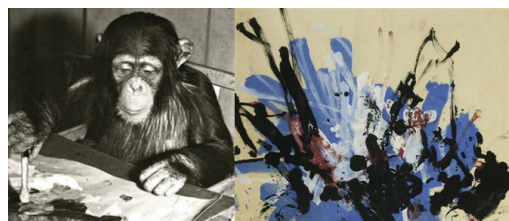| (a) | (b) | (c) |

Figure 3: (a)Rainbow Mountains,China. (b)The Himalayas. Nepal. (c) The Grand Canyon, USA.

| (a) | (b) |

Figure 4: (a) Elephant painting a portrait. (b) Congo the Chimp, London's Sensational 1950s Abstract Painter

Chapter IV: Artificial Intelligence and Art.

4.1   A Machine with an Intent

We have spoken about various reasons why algorithms cannot be referred to as an artist. There is another theory behind this ideology. In today's art world the role of the artist is to supply the intent and the idea for the work. There are many examples in today's art world such as Jeff Koons who hires crowd workers to bring his ideas to reality and Even artist who work with algorithm and art together such as Scott Drave's Electric Sheep. Keeping such examples in mind, we can say that all we need is a computer that can create an intent for the work created by it.

Suppose someone builds a machine with a basic procedural algorithm to create an intent for the device and make it work in such a way that it could hire crowd workers and with their help was able to create a certain kind of artwork. Hypothetically speaking, if this artwork was to be exhibited in an art gallery, giving credit to the machine, and also disclosing the complete procedure of how the artwork came to life. The main question is when the audience comes to see the work would credit the machine as an artist or credit the artist who created the device.

I believe that in general, the majority of the audience would credit the device builder as the artist in this case. Even if the art created turns out astonishingly beautiful, it is doubtful if the machine would be held responsible for it more than the humans involved in the process of creating the art. So the question is, are we humans as an artist just a machine with an intent? I believe no because art is supposed to be social.

4.2   Not So intelligent Artificial Intelligence

There has been a huge media hype around Artificial Intelligence, On March 2016, Google's in house artificial intelligent model AlphaGo defeated Lee Sedol who at that time was the best human Go player in the world. AlphaGo defeated Lee Sedol 4-1, this moment was one of the defining moments like IBM Deep Blue beating chess champion Garry Kasparov in 1997. Deep Blue did lose the first match against Kasparov in 1996. Algorithms are often attributed as if they have the same human consciousness as human. Conversely, we have not wholly figured out the human consciousness, let alone being able to embody consciousness within an algorithm.

Artificial intelligence, when compared to human intelligence, is brittle and bespoke. An MIT robotics professor Rodney Brooks states " I think people see how well [an algorithm] performs at one task and they think it can do all the things around that, and it can't." He made this statement after he interviewed the team behind the AlphaGo in London, Rodney relayed the story that while talking to the team he asked what would have happened if the game played on 29 x 29 board instead of 19 x 19 sized board. AlphaGo team admitted to him that even if there were a slight change in the size of the board " we would have been dead." [13]

Current status of artificial intelligence is like tourists in a new city who narrate and repeat a few phrases which they learned while traveling but they will never be able to understand the foreign language or culture truly.

Artificial intelligence is far from being entirely autonomous to be free from human interference.

4.3   Artificial Intelligence as a tool for artist.

For centuries automation and technology has been looked at like a significant threat to the artists, every new technology we currently use for photography, film, and music we use

these new technologies as basic brush and paint to achieve our goal. They have not by any sense have taken over an artists job entirely off their hands. But instead, they have helped the artist by automating some of the time consuming manual processes. This automation helps the artist to be more productive and creative rather than being a threat to their art.

Significant Companies like Adobe which creates the industry standard creative tools,[14] have already since added AI to their software only in the hopes to make the workflow of the artist easier and faster by eliminating all the tedious non-creative works — giving the artist more change to experiment with his Idea. These new features have incorporated very subtly, but the effect on the workflow is very much appreciated and visible.

Tatiana Mejia who leads Adobe AI platform, Sensei states that most creatives are not afraid of AI taking over their jobs, and they could see more potential for AI and machine learning to take over the tedious and uncreative tasks from their hands. Such as tools like content aware fill in Adobe Photoshop and After Effects. This algorithm can read the image and help us remove some object from the foreground of the picture and fill the space with what matches the background perfectly. This tool is beneficial, mainly when used for videos. To accomplish this result in a matter of a few minutes which otherwise would take a couple of hours or more. AI would make the work faster, but they still need an artist to control it. "Creativity is profoundly human. Ai cannot replace the creative spark."Tatiana Mejia.

In short, our current understanding of artificial intelligence is that all the art algorithms and machine learning which used in the software are tools for artists; they are not themselves an artist.

Conclusion

To answer the question of this essay, I would say No artificial intelligence is not an art movement of this century, but a very prominent part of today's art world. After looking at all the examples of how technology and art have evolved so far, I don't believe in the near future we could call any algorithm module as an "artist." Art is a social activity. As far as I understand Machine learning has not yet developed to such an extent that it could have it's own conscious mind to create art to express itself or to convey a message as a human artist would.

My main focus of this essay was to focus on the positive effects of technology on art and how it has played an import role in the evolution of art in all the fields, rather than to be looked at as a negative entity. I feel we are very fortunate to witness the growth of art as it unfolds in front of us and allowing us to explore ever more powerful tool. These fantastic artists always have inspired me and made me wonder about the new possibilities. Such as Michel Gondry's Like a Rolling stone, Bob Sabiston's Snack and Drink, Jason Salavan's The top grossing Film of all time, Danny Rosin's Wooden Mirror and Goro Fujita's Virtual reality paintings are few of the works that have affected me in last few years.

For centuries art has evolved through different periods, keeping it vital and technology is one of the main factors for evolution and innovation. Today we can see so many young artists venturing into new paths and exploring the unknown possibilities. Artists are not afraid of the latest technology but instead eager to incorporate them into their workflows as a tool. Their work will for sure transform art like never before.

References

[1] Chris Smith, Brian McGuire (2006),The History of Artificial Intelligence, University of Washington, p4-p7

[2] Terry Dartnall (1994), Artificial Intelligence and Creativity, Kluwer Academy Publisher, p3-p4

[3] A.M Turing (1950), Computing Machinery and Intelligence, Oxford University Press, p13

[4] Ralph (2016),(online)[cit. 2019-01-01]. Available at :https://www.difference.wiki/strong-ai-vs-weak-ai/

[5] Bernard Marr,(online),[cit. 2019-02-12]. Available at :https://www.bernardmarr.com/default.asp?contentID=1214

[6] Louise Coppey, (2018),(online),[cit.2019-02-24]. Available at: https://medium.com/point-nine-news/what-does-alphago-vs-8dadec65aaf

[7] Artem Oppermann, (2018),(online),[cit. 2019-02-24]. Available at: https://towardsdatascience.com/did-google-duplex-beat-the-turing-test-yes-and-no-a2b87d1c9f58

[8] Marvin Heiferman, (2018),(online)[cit.2019-02-28]. Available at:https://siarchives.si.edu/blog/photography-murdered-painting-right

[9] Peter Galassi, (1981),Before Photography: painting and invention of photography, Publisher: The Museum of Modern art, p11-p12

[10] David.A.Price, (2008),The Pixar Touch:the making of a company, Publisher: Random house inc, p10-p34

[11] Denis Dutton, (2009), The art Instinct : Beauty, Pleasure and Human Evolution. Publisher: Bloomsbury Press, P29-p46

[12] Jane Desmond, (2016),(online), [cit. 2019-03-29]. Available here:https://www.washingtonpost.com/news/animalia/wp/2016/09/07/zoos-make-money-selling-paintings-made-by-animals-are-they-art/?noredirect=on&utm_term=.a585bfe33bb0

[13] Ron Miller, (2017),(online),[cit. 2019-04-01], Available here :https://techcrunch.com/2017/07/25/artificial-intelligence-is-not-as-smart-as-you-or-elon-musk-think/

[14] Dami Lee, (2019),(online),[cit.2019-04-20]. Available here: https://www.theverge.com/2019/2/1/18192858/adobe-sensei-celsys-clip-studio-colorize-ai-artificial-intelligence-art

Acknowledgement

First of all, I am especially grateful to my mentor Josef Ledvina for sharing expertise, and sincere and valuable guidance and encouragement extended to me throughout my thesis. Due to time and personal ability, the author did not analyse and demonstrate this thesis more deeply and accurately, but I will continue to explore this topic further and hope it can be done better. I take this opportunity to express gratitude to all of the Department faculty members for their help and support. I also thank my parents for unceasing encouragement, support, and attention. I am also grateful to my partner who supported me throughout this venture.