The Issues of Humanoid Robots with Artificial Creativity in terms of Cultural Heritage and Art

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Abstract. Modern life is changing ever more complex and technologically. The technology is utilized in many ways in the life of humans, and even in many of them, human is used as supportive devices inside and outside of the human body. The greatest change in our lives is that human beings can produce more humanoid robots that can learn, plan, reasoning, problem solve, comment, feel, have intelligence. Because of this situation, many things will change in this life which is designed according to human beings. Cultural heritage and art will have an important place in these subjects. Nowadays, there is still discuss on the issues and limitations of cultural heritage and art subjects. Humanoid robots will add problems that await many solutions. When humanoid robots become so productive and become acceptable in society, there is no doubt that many complicated ethical issues will arise. These issues should be determined, discussed and solutions should be given as detailed as possible. The biggest problem of human being is that the solutions will not only be observed by human rights, but also the humanoid robots' rights to be taken into consideration at this time.

1. Introduction

Today, the influence of technology on human life is increasing day by day in modern life and many different complex technological products are being developed. Hardware and software products started to build strong links with the Internet. They are designed to help human works that are using internet and artificial intelligence technology. As a result of the advancement of these technology humanoid robots are doing works for humanity.

Recently humanoid robots are discussed with the development of their emotional intelligence that they can now do jobs based on creative intelligence. They work in many different areas that are difficult to do, especially artistic work, and this causes some new problems to arise and discuss.

How the art can be defined has been discussed for years, and is still debated. The content of art is expanding historically. The art evolved as it challenged the age, the values, taboos, rules and limitations of the era.

For the first time in 1956, the expression of "artificial intelligence", used by a group of researchers, has become one of the most common concepts in recent years. Artificial intelligence, as is known, is a computer or computer-controlled robot that analyses human thinking methods and develops similar artificial directives. Artificial intelligence is increasingly being used in more areas of daily life. Elon Musk, Stephen Hawking, Mark Zuckerberg, Bill Gates, and Ray Kurzweil have various ideas about artificial intelligence in the shaping of today's world. Many companies, automobile brands and social media networks have begun to benefit from the potential of artificial intelligence [1].

Artificial creativity is a multi-disciplinary software that combines the areas of artificial intelligence, cognitive psychology, philosophy and art.

Art is the study of ethics and aesthetics at the core, using knowledge as well. This research is easier to understand than scientific research at the same time. Art is influenced by science and technology. Today's technology offers possibilities that begin to use too. This is why a "Photoshop art" and "digital art" are mentioned.

The new generation humanoid robots can produce art-related products, thanks to their high-level experience, to comment on events. Nowadays, there is still a humanoid robot with a local culture. Because they interpret the events with the culture of the creators who created them.

There will be no humanoid robots produced by humans in a very short time, because there are other robots that produce and program humanoid robots. These trials have already begun, but they need more time to develop. In the near future, humanoid robots that can perform artificial creativity will be seen more often. In this study, it was evaluated what humanoid robots can produce for art and what kind of problems they face.

2. The relationship of technology to art

With the development of technology in the late 1980s and early 1990s, cybernetic organisms (cyborg), a combination of human and machine beings, were thought to be things that would be possible with the technology of the future. But many people around the world have gradually begun to turn themselves into a cyborg [2].

The Spanish avant-garde artist Moon Ribas is able to connect the chip on the inside of her elbow to an application on his phone and can feel the earthquakes happening in the world at that time. Figure 1 also appears to present her performance on the stage. The more severe the quake is, the more the device on Ribas's arm is vibrating. Turning these vibrations into a dance on stage, the artist is dancing with a kind of world by developing improvised choreography based on the severity of earthquakes [3].

Figure 1. Presenting performance on stage [4].

Performance artist Stearc implanted an artificial ear in the inner part of his left arm to transform his body into a listening device. The artist, who wants to put a microphone in this ear and connect the microphone to the Internet, aims to ensure that anyone who wants the voices in the environment can listen at any time [5].

Nowadays, many Internet-connected devices and smart applications emerged, so many branches of art have been very impressed with these technological products. Some of these branches of art are still debated whether they are artistic or not. In particular, the new generation of high-quality camera systems, which are also used in cinema, photography, and the drones used in some shots, have high-capacity

computers that work. In addition, virtual reality glasses, smart mobile phones, virtual reality applications, wearable technological equipment have been developed to provide users with a high sense of expertise.

Technology, which gives new ideas to the artist with its supporting technological products connected to many Internet sites. However, today, software-supported technologies are more prominent.

3.   Artificial intelligence in art

In the recent past, now and in the future, artificial intelligence continues to help the artist and critics in many areas of art. It is becoming more and more beneficial in every stage. Many films and novels can predict the continuation of the series.

Artificial intelligence was used in novel writing. Harry Potter, a legendary fantasy novel series, was read by an artificial intelligence, and then using this software to write a storyline as a continuation of the series. The story was about Harry's close friend, Harmonie and his family [6].

After thinking, it is capable of transforming photos and pictures in the use of imagination. Researchers have designed an artificial intelligence program that can switch images from a picture to a computer that can change the photos or paintings they upload in a variety of ways. In this way, they can make many famous paintings a real photograph, while also placing the different type or colour of the objects found in the photos.
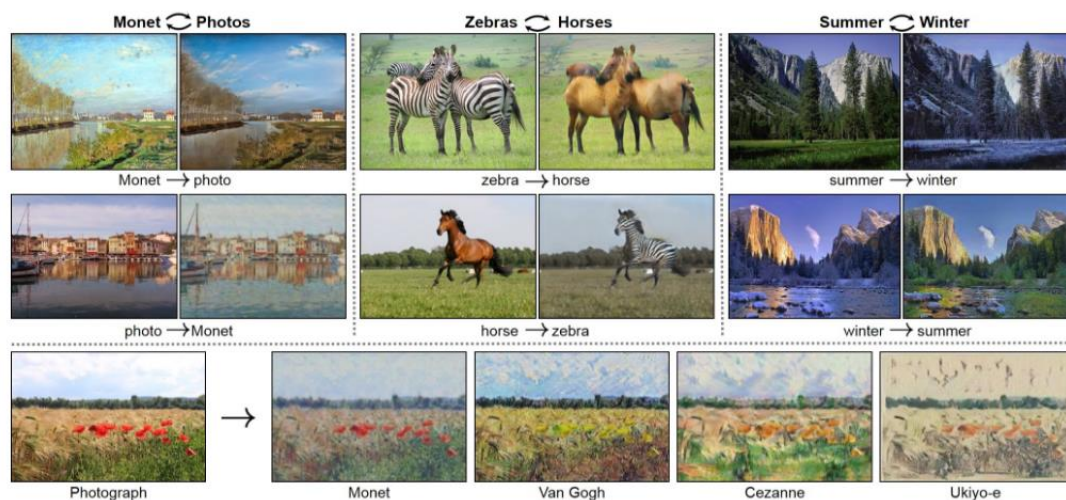

Figure 2. Image to image translation samples [7].

Their algorithm learns to automatically "translate" an image from one into the other and vice versa their method applied to several translation problems shown in Figure 2 [7].

In another article, a newly developed software is used to distinguish the origins of famous tableware of historical value from fake ones. Fraud in artwork is difficult to understand and requires a number of professional processes that require high cost. Art historians benefitted from technology for many years already to distinguish fake tables. Infrared scanning systems and many electronic inspection techniques were not able to fully reveal fraud. With artificial intelligence, fake tables can be distinguished without the need for human interpretation. The software for this, looking at the brush strokes on the charts, gives the result about the original condition of the table in a short time. Researchers at Rutgers University in Netherlands and the government-affiliated art organizations; Around 300 paintings by Picasso, Matisse,

Modigliani and other famous artists examined the original parts of the artist, which allocated to 80000. Then these analyses were taught to artificial intelligence software. The software has reached its capacity to identify each original brush stroke. At the same time, the software is receiving support from machine learning to distinguish the shapes of brush marks based on specific characteristics. So as the painting is introduced to the system, artificial intelligence is starting to give better results. Because the machine learning algorithm is trained on certain features, it is said to be the most ambitious artificial intelligence project ever made in this area.

In all the brush strokes that are unique to the artists themselves, there are different strengths. So it's even harder for the software to distinguish the original ones. Researchers proved how successful the system was by obtaining an 80% accuracy in the first stage. In the later stages, artificial intelligence has been made to recognize a single brush stroke to distinguish the original paintings from the fake ones. As it is known, it takes years to specialize in paintings as a human art history expert and to the same level as the software. In fact, the research team says the software exceeds the level that a human can reach [8].

In fact, now it's thinking and able to distinguish and physically apply. A robot can write with very difficult and complex kinematic control algorithms and image processing application on nowadays. The first created font database and human movements propose a robotic calligraphic system that uses Chinese characters and English to write words. The three-dimensional motion detection is working an input device to create the font database and capture the human arm orbits. Thus, this study created a humanoid robot that can write handwriting like humans [9].

Google continues to work to speed up the learning process. One of them is the website named AI Experiments (artificial intelligence experiments). In this study, people can play with artificial intelligence programs from the website and as they are played, these virtual machines develop themselves. Thus, with the data collected from humans, it is used to produce more humanoid outcomes. All these technological products, demands and the curiosity of human beings, caused the emergence of humanoid robots and their artificial creativity.

4. Artificial creativity of humanoid robots

Thanks to technology, humanoid robots ' senses and their ability to interpret will begin to increase. Furthermore, researchers at MIT's Computer Science and Artificial Intelligence Laboratory (CSAIL) are able to learn how human feel emotionally through wireless signals [10].

In this way, a humanoid robot will be able to measure how humans react to events at that time. It will be able to feel human's instant feelings from news in the media, from their statements on the street, and reflect their feelings into productive work as they interact. This will have a positive effect on artificial intelligence, giving artificial creativity a spirit. These sensors and databases can create artificial conscience. It can create instant feelings through instant events, various parametric data, and social interaction. Based on these feelings, it can make a picture, it can write a poem, it can prepare a music, or a different kind of products. It could be an emotional expression, a physical expression. It will even improve itself by watching the effects of these outputs on humans. It will soon be possible to measure and change the effectiveness of the sensory music, then it is preparing and to get a better result. This will ensure that there are as many alternatives as possible.

Creativity is the phenomenon of creating something new and valuable in a way. Creativity is the ability to solve problems outside of existing options. In psychology and cognitive science, this research area is called creative problem solving. Artificial creativity should be a program that can model and continually improve the creative intelligence that fulfills the role of the potential of the creative minds of human as a target.

Based on its historical development, the subject of creativity has been tried in many artistic fields and every study show that they can be more successful in getting humanoid results. First of all, computational creativity in the generation of visual art has had some notable successes in the creation of both abstract art and representational art. The most famous program in this domain is Harold Cohen's AARON, which has been continuously developed and augmented since 1973. Other software artists of note include the NEvAr system (for "Neuro-Evolutionary Art") of Penousal Machado. NEvAr uses a genetic algorithm to derive a mathematical function that is then used to generate a coloured three-dimensional surface. The artist Krasimira Dimtchevska and the software developer Svillen Ranev have created a computational system combining a rule-based generator of English sentences and a visual composition builder that converts sentences generated by the system into abstract art. The Painting Fool, developed by Simon Colton originated as a system for overpainting digital images of a given scene in a choice of different painting styles, colour palettes and brush types. Given its dependence on an input source image to work with, the earliest iterations of the Painting Fool raised questions about the extent of, or lack of, creativity in a computational art system. In August 2015 researchers from Tübingen, Germany created a convolutional neural network that uses neural representations to separate and recombine content and style of arbitrary images which is able to turn images into stylistic imitations of works of art by artists such as a Picasso or Van Gogh in about an hour. Their algorithm is put into use in the website DeepArt that allows users to create unique artistic images by their algorithm. In early 2016, a global team of researchers explained how a new computational creativity approach known as the Digital Synaptic Neural Substrate (DSNS) could be used to generate original chess puzzles that were not derived from endgame databases. The DSNS is able to combine features of different objects (e.g. chess problems, paintings, music) using stochastic methods in order to derive new feature specifications which can be used to generate objects in any of the original domains [11].

With the addition of many technology companies, these developments have become more widespread. A new study by Google's artificial intelligence company DeepMind revealed that "imagination" was added to artificial intelligence. This innovation; it means that artificial intelligence systems are able to think about the movements they are doing and gain the ability of reasoning. This system contains the "imaginary coder", which helps you to decide what estimates are useful or useless about what is happening around artificial intelligence. Google's artificial Intelligence laboratory, AI Lab and DeepMind are working to make artificial intelligence, plan for the future, and even dream. Given the fact that artificial intelligence is based on algorithms, it is not possible for now to replace human intelligence. Artificial intelligence does not gain human skills, such as reasoning or critical thinking, but develops a profound understanding of effects and outcomes. The Google's artificial intelligence is that it uses the basic skills of human used. This system uses a combination of reinforced learning that involves learning by means of trial and error, so deep learning can process large amounts of data in a very similar way to the human brain [12].

In one example, the company's project is from Magenta. Magenta, which Google has developed with art and music focus, is trying to develop artificial intelligence's music ear. Neural networks and artificial intelligence, which learned four music notes, formed a piano melody with these notes. After learning the artificial intelligence by listening to the notes, it tries to play the music instrument himself. Developing an application that helps the artist in a creative way, from an intelligence that is targeted with the magenta, to a self-made art. These algorithms, which are capable of painting and music for the moment, seem to force mathematics in the future [13].

The program, Google Deep Dream, is already drawing beautifully from many of us. The Program scans millions of photos by pixel pixels, defining entities, identifying the colours and all the tones, and then scanning the boundaries between objects. It's making a catalogue of all the artifacts and photographs it has scanned over time. It organizes and categorizes objects with similar characteristics and then uses them to create compositions on landscape templates shown in Figure3.

Figure 3. A sample of Google Deep Dream algorithm [14].

An algorithm developed with a joint study of Rutgers University, Charleston College and Facebook Artificial Intelligence labs, works with a new technique 2-step. First, the section called "distinctive" is loaded with tens of thousands of works by thousands of artists. Then the second part called "creative" begins to create images randomly. These two parts are trying to trick each other. The "distinctive" eliminates the works produced by the "creative" by making comparisons with the works that are uploaded to it. As a result, artificial intelligence produced so convincing works of art that even art experts were surprised. The experts couldn't figure out which paintings were produced by human, which were produced by artificial intelligence. A machine that works with artificial intelligence managed to produce unusual-style pictures and the products that were introduced won the admiration of many people. When artificial intelligence began to produce paintings, people were invited to investigate online to evaluate these products. These people didn't know that the painting they were going to take were made by a machine. The participants were asked how complex and original each picture was. They were also asked if the paintings inspired them and if they enjoyed looking at these works. A surprising result came out, and the paintings made by the machines received higher scores in most cases than those made by human [15].

These studies show that more soulful and insightful robots will always be created. These robots will reveal the product with more humanoid emotions. In addition, these humanoid robots will evolve into various levels according to their level of sophistication and interpreter coding. This will lead to the creation of a digital culture of humanoid robots. This will evolve by changing the level of technology in the age and the culture of the creators ' perspectives.

5. Conclusions:

At present, it is not possible to determine what boundaries and rules of art should be. Even cinema and photography are still being discussed. Even the 'Dada' movement, which ignores the essence, form and language conception of art theories, and which is close to the futurism movement, has laid the groundwork for the surrealism movement, should be discussed according to many critics. From this

point of view, if the humanoid robots provide the art world, they will find themselves more difficult on the verge of such discussions. In the near future, the works of humanoid robots can only be regarded as technological products that can help artists.

Humanoid robots will be able to give better results if they live in this world like humans with their high sensors and a well-coded evolutionary software. Perhaps it can be experienced in an age when humanoid robots can produce and evaluate their own works in a world that is more active in the far future.

Furthermore, these products may also become a digital cultural heritage for the future. In this regard, however, another problem is faced. It's ethical. The copyright of the productions is the humanoid robot itself? Or programmer? Or are they a common product of the owners that the uploaded data? At this point, it may seem too simple, but what happens if artificial intelligence starts writing its own software? If the programmer or the software company of artificial intelligence becomes the owner of the emerging products, an artificial intelligence that can think about things that a human can't even imagine, can become the owner of everything over time.

Patents are often given to inventions that are the product of the human mind. But what if the most important question of the recent time is to invent a non-human resource like artificial intelligence? Should computers be able to obtain patents as inventors? Ryan Abbott, professor of law at the University of Surrey [16], thinks computers should be able to get patents. He is also a member of the US Patent and Trademark Office (USPTO), who is requesting a fundamental change in this field. He also emphasized that computers should be defined as inventors, thus contributing to the development of more creative computers and the development of more innovative in society. It turns out that the existing patent laws do not accept that non-human inventors are producing products that can be challenged, that creative computers, the foundations of the inventor's concept, and perhaps the entire patent system need to be re-examined. It is not difficult to get a patent if there is something that can be protected by a patent. A patent may be granted if the criteria are met. According to the current rules, there are three basic criteria for getting a patent: the invention must be innovative, it must be very different from the existing technology and be useful. If these criteria were produced entirely by a computer or artificial intelligence, the patent was awarded. As a simple solution to this situation, the patent can be given to people who develop that artificial intelligence. But if more than one artificial intelligence comes together to produce a common product, then who will be given the patent? These issues are uncertain for now. However, it is clear that a solution should be produced soon.

With advances in artificial intelligence development, it is necessary to be treated with foresight. Artificial intelligence will radically change the labour market and social interactions. People need to think more about this issue and find ways to make everyone benefit from these developments as a society. All this work means we are at the crossroads. A new limit of artificial intelligence will become soon. These recent developments seem to make artificial intelligence more powerful, more human-like and we are not ready this technological progress. We need to more discuss and change something about this new life standard.

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