

**AI and Creativity: *Should the intellectual property of
AI-generated graphic arts be protected?***

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Abstract

Artificial Intelligence (AI) has been a megatrend of this decade. Through the techniques of big data and deep learning, many things that are used to be impossible can be done by AI. In some fields, AI can even outperformed human easily. This indicates that the day that AI are able to complete independent creations without relying on humans is coming. To be more precise, it may be happening already. The World Intellectual Property Organization (WIPO) proposed that intellectual property shall include rights relating to works resulting from intellectual activity. However, most of the current intellectual property rights regulations lack a description of the applicability of AI-generated content. Therefore, this article aims to discuss whether the intellectual activity involved in AI-generated graphic arts should be recognized and how to deal with the issue of AI-generated graphic arts' intellectual property rights based on the rationality and practicability of governing.

According to the definition of intellectual property and the purpose of building a sound environment in the industry, this paper argues that a portion of AI-generated graphic art that originality and creativity can be

identified should be protected by intellectual property rights. The intellectual property should be owned by AI itself and the right can be exercised by a specified human agent or a legal person that can be the subject of rights.

Introduction

Starting from the 1950s, when the term “artificial intelligence” (AI) is first coined by John McCarthy (McCarthy et al., 1955), the research on AI has never stopped. The origin of AI can be traced back to the concept of “thinking machine” raised by Alan Turing (Turing, 1950). At that time, a generation of researchers were exploring the possibility of computer solving the given complex problems, while today, people are expecting AI to not only solve existing problems passively but also generate, in other word, create content independently.

The rapid development of AI has expanded the field of AI-generated contents. Ranging from text, audio, image to invention are all different forms of AI-generated content. However, this paper will focus on graphic arts, which have been close to the public since pictures made by AI art generator apps goes viral easily on social media recently. For example, the Voila AI Artist that creates Pixar-style cartoon selfies and the cartoon lens offered by Snapchat.

This paper will divide the question: “Should the intellectual property of AI-generated graphic arts be protected?” into three parts. First, is AI-generated graphic arts really an intellectual property? Second, should the governments protect this kind of intellectual property? Third, if it should be protected, who should own the right of the intellectual property?

Is AI-generated graphic arts really an intellectual property?

According to the definition provided by the World Intellectual Property Organization (WIPO), intellectual property means the legal rights which result from intellectual activity in the industrial, scientific, literary and artistic fields (WIPO, 2008). Unquestionably, graphic arts’ intellectual properties are protected. Yet, the situation of having a non-human creator is hardly considered in the current regulation, causing an ambiguous zone of interpreting the role of AI in creating artworks.

The mainstream perspectives of interpreting AI’s role for the governance purpose can be classified into a few different perspectives, for example, considering it to be a tool or thinking it as an animal. Considering AI a tool that helps human create an artwork may resolve the dispute of

recognizing its intellectual property. Using painting brush or digital art software does not affect the intellectual property right of the creator's artwork. To push this aspect further, it could be reasonable to say that AI-assisted art's intellectual property should be recognized and belongs to the artist involved in the creation. But when it comes to AI-generated artwork that has no human artist engaged, the originality and the thinking process that reflects the intellectual part in intellectual property will be more difficult to identify.

On the other hand, using the animal perspective to see AI creating art may have a significant difference from the viewpoint of seeing AI as a tool. Before AI artist exists, there were precedents for animal creation. Famous examples are like Suda, an elephant that learned how to draw and paint, and monkeys that could take selfie. Leaving the question of "whether the animals create art consciously or not" aside, the animal-generated arts are original intellectual works. Although the animals may be trained by zoologists, most of the human artists are also professionally trained and it does not affect the artworks' intellectual property.

Nathaniel Rochester, one of the pioneers of the field of AI, have proposed

that the difference between creative thinking and unimaginative competent thinking lies in the injection of some randomness guided by intuition (McCarthy et al., 1955). Based on this point of view, animal-generated arts tend to be in the category of creative thinking, while AI-generated works generally depends on unimaginative competent thinking.

The above statement refers to the vision in 1955, when AI was in the early stages of development. The technological acceleration of these years has made a great impact on the AI industry. The diverse machine learning models invented today may cause some variability in the above statement since the way today's AI dealing with tasks and the things could be done is totally different from the 1950s. Today's machine learning methods can be roughly divided into three types according to different training models and algorithms. They are supervised learning, unsupervised learning, and reinforcement learning. Different training models directly influence AI 's performance and whether “creative thinking” can be identified in AI-generated art.

Supervised learning uses datasets that are labeled by human, which means that data are preprocessed based on human's understanding of data. Supervised learning algorithms is often used in image and object recognition to increase the efficiency and accuracy of AI, telling the AI the correct output of the data supports AI to classify data and build up regression models at a fast pace. Unsupervised learning whereas uses unlabeled data to discover patterns that help solve for clustering or association problems, which is particularly useful when subject matter experts are unsure of common properties within a dataset (IBM Cloud Education, 2020). Another mainstream training model used today is reinforcement learning. It is widely known and heated discussed after the debut of AlphaGo. As the first computer program to defeat a Go world champion, AlphaGo Zero mastered the most challenging classical game for AI by applying the reinforcement learning method (Deepmind, n.d.). Unlike supervised learning and unsupervised learning, reinforcement learning does not rely on human knowledge but discover knowledge through continuous self-reinforcement learning under established rules. As an example, AlphaGo Zero was not fed with any human professional players data and was trained solely by self-play reinforcement learning,

starting from completely random behavior and continued without human intervention for approximately three days. Notably, although AI trained by supervised learning was better at predicting human professional moves, the self-learned player defeated the human-trained player within the first twenty-four hours of training, suggesting that AlphaGo Zero may be learning a strategy that is qualitatively different to human play (Silver et al., 2017). This result inferred that AI applying reinforcement learning algorithms may be creative. In fact, AlphaGo Zero has even invented original moves that have never been discovered by human in the history of Go. Among these three training methods, reinforcement learning has the largest space for AI to play freely considering it was given no knowledge of the domain beyond basic rules. Contrarily, supervised learning restricts AI from deviating the set correct answer, therefore, it is believed to be the least free model.

Today's AI art generator widely adapts either the Neural Style Transfer machine learning model or the Generative Adversarial Networks (GAN) machine learning model. Neural Style Transfer is a name for a family of algorithms that are used to apply the style of one or more existing images

to an input image. Using the supervised learning method, AI can accurately learn the feature of an art style and turn the selected image into a specified art style. Popular AI-generated arts on the social media are usually generated by AI applying this method and is often criticized for being like a fancy filter. AI art generators build in this method are more likely to be considered as a tool since the artwork created does not have its originality and the output result can be easily predicted due to the lack of randomness. To be more concrete, it works like a math function that assigns outputs that follow a designed pattern to given inputs. The other kind of AI-generated arts is based on GAN, a method that are originally designed for unsupervised learning. This algorithm generates new original images from scratch by having two neural networks trained together, one named generator which never seen art before and the other named discriminator which is given a vast database of human art in different styles from throughout history. Through the two networks' continuous contest against each other, the generator network gains the ability of generating original art that cannot be detected as fake by the discriminator network (ART AI, n.d.). Deepfake, one of the controversial applications of AI, uses the GAN algorithm. The originality of artworks

done by GAN arts generators can be supported referring to the reason that the generator creates its work from scratch and has never been fed with human data directly. Yet, its originality is after all limited by the indirect intervention of human data. Using the reinforcement learning model may further raise the originality of AI-generated art, nevertheless, due to the lack of rules of art, human operators are required to design an environment, including visuals, a reward function, agents, transition dynamics, and state and action spaces to help the AI build up the basic rules to follow. The complexity of using reinforcement learning makes reinforcement-learning-based (RL-based) generative art less accessible than other deep-learning generative art. Consequently, there are very few RL-based AI art generator on the market (Luo, 2020). Despite the fact that RL-based AI art generator is rarely seen, it does guarantee its works a considerable degree of creativity and should be put under the protection of intellectual property.

Should the governments protect the intellectual property of the creative/original AI-generated graphic arts?

After establishing the AI-generated graphic arts that should belong to intellectual property, the legitimacy of its protection by the government is the next question raised in this issue. Countries generally have laws to protect intellectual property for two main reasons. One is to give statutory expression to the rights of creators and innovators in their creations and innovations, balanced against the public interest in accessing creations and innovations. The other is to promote creativity and innovation, so contributing to economic and social development (WIPO, 2008).

Undoubtedly, the invented AI itself fully meet these two protecting reasons, but when it comes to the AI-generated arts, the existence of the first reason about the rights of creators is questioned. How do we protect a non-human's intellectual property right?

As a matter of fact, the forementioned example about animal-generated artworks were not granted with the right of intellectual property in practice. The United States Copyright Office clarified that because copyright law is limited to “original intellectual conceptions of the author”, the copyright office will refuse to register a claim if it determines that a human being did not create the work and only works created by a

human being can be copyrighted under United States law, which excludes photographs and artwork created by animals or by machines without human intervention (The U.S. Copyright Office, 2014). Similar interpretation on the animal-generated content can also be found in the UK's Copyright, Designs and Patents Act 1988 and Germany's copyright law. In contrast, the UK and EU regulation of computer-generated content is more flexible in protecting their intellectual property right, which they may also tend to protect the intellectual property right of AI-generated arts in future regulations (Bulushi, 2019). While in Taiwan, the interpretation of the legal provisions of intellectual property right requires the protected work to be created by human intelligence, indicating to be more inflexible than the UK and EU (Intellectual Property Office, Ministry of Economic Affairs, 2008).

By considering the value of AI-generated art, this paper believes that there is no significant difference between the value of human art and AI-generated art. Art is regarded as a manifestation of human culture, and the technology invented by human, is also part of human culture. Refusing providing appropriate right protection to these AI-generated art is

unfavorable to the overall development of the industry and is disguisedly attacking innovation and creativity. Besides, different from animal-generated arts, there is hardly an ethical issue such as violating animals' right of AI-generated art. As mentioned, deepfake is also a kind of AI-generated graphic art. Thus, opponents may contend that recognizing AI-generated arts' intellectual property will encourage the dissemination of deepfake images. However, the reason that cause deepfake to be inappropriate is that it reproduced unauthorized pictures. Such a problem should be a violation of the copyright of the unauthorized pictures or a violation of the rights of portraits, which should be fined or improved in accordance with the related law, rather than prohibiting AI works from being protected by the intellectual property rights.

Who should own the right of the intellectual property?

Stakeholders of the AI-generated graphic arts' intellectual property includes AI itself, the development team (the inventor), the owner of the AI, and other contributors who creates the offered data. Among these stakeholders, the development team (the inventor) owns the intellectual property of the AI itself, the owner right of the AI is owned by the owner,

and other creators that create data fed in the AI is like the author of a reference. According to the legislative explanations of intellectual property law, intellectual property is supposed to be granted to the creators, which is also the reason why the U.S. Copyright Office refused to register an intellectual property if it determines that a human being did not create the work. As the creator of the original AI-generated graphic arts, the intellectual property should belong to AI itself. Some people may claim that the inventor or trainer of the AI is the creator of the intelligence, thus should own the creations' intellectual property. While this may be the case, the intelligence of the development team or the trainer is only involved in the creation of the AI itself, but not involved in the creation generated by AI. To provide an analogy, the inventor of printer does not own the intellectual property of all documents printed by the printer. Nevertheless, despite that AI is not a subject of rights under the current law, its intellectual property rights should still not be held by any human-beings. Considering the practicability of intellectual property rights protection, this paper suggests that there should be an agent that are allow to substitute AI to exercise some of its right, for example, publishing. The default agent of the intellectual property may be the user

or, if there is no user, the owner of the AI when it generates the works, the agent can either be a natural person or a legal person. However, no one except the AI art generator may claim that other people are the creators of the artwork generated.

Conclusion

In conclusion, the discussion about the intellectual property of AI-generated graphic arts can be divided into two situations. AI-generated graphic arts with originality/creativity and AI-generated graphic arts without originality/creativity. Original AI-generated graphic arts are often created by AI trained by using unsupervised learning or reinforcement learning. Only if originality/creativity can be discovered in AI-generated graphic arts, the intellectual property right of AI-generated graphic arts should be protected. Moreover, referring to the regulation in different countries, it is found that admitting the intellectual properties of computer-generated arts are not without precedent, for example, the UK and EU's regulations shows a certain degree of flexibility. According to the U.S. Copy Right Office's opinion, human should not own the intellectual property of contents that are not created by human, no matter it is animal-generated or AI-generated. Based on this thought, this paper argues that intellectual property should be owned by AI itself and the right can be exercised by a specified human agent or a legal person that can be the subject of rights.

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