COPYRIGHT OWNERSHIP AND FAIR DEALING OF AI-CREATED WORKS

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Abstract: *This paper is focused on the copyright ownership of artistic works created by artificial intelligence («AI»), and related issues such as whether utilization of copyrighted prior works constitutes «fair dealing» under the current laws of Hong Kong. Justifications of the current scheme for copyright ownership have been analysed under three major legal theories for justifying the intellectual property system. It is found that the current legal framework is not perfect for balancing the interests between AI composers and the general public under a hypothesized scenario where AI composers are capable of learning and creating independently, and a proposal is provided accordingly.*

1. An Artificial Intelligence Composer - AIVA

The development of artificial intelligence («AI») has enabled artificially intelligent agents[1] to accomplish complicated tasks while improving its performance by machine learning. By means of appropriate learning algorithms with an adequate number of quality samples, AI could achieve higher performance than its human counterparts in certain areas like game playing, a fact that has been proved by AlphaGo's overwhelming wins over Go masters Lee Sedol[2] and Ke Jie.[3] AI is also being developed in some other areas like creation of artistic works, in which there are less restraints of expression and more subjective assessment standards of performance. A few AI artists have been known,[4] among which an AI composer named AIVA will be taken as an example for the discussion about copyright ownership and fair dealing issues of AI-created works in this paper.

AIVA is the abbreviation of the term «Artificial Intelligence Virtual Artist». Implemented by deep learning algorithms which use reinforcement learning techniques,[5] AIVA has been trained with a large collection of classical music partitions so that a mathematical model is created to represent what music is. The model is

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[1] POOLE, DAVID/MACKWORTH, ALAN/GOEBEL, RANDY, Computational Intelligence: A Logical Approach, Oxford University Press, New York 1998, pp. 12. In the book, an «agent» is defined as «something that acts in an environment», and a system that acts intelligently is called an «intelligent agent». I am of the understanding that «intelligent agents» includes naturally intelligent agents (i.e. human beings) and artificially intelligent agents (i.e. agents that are created by artificial intelligence techniques and exhibit a certain level of intelligence accordingly).

[2] AlphaGo beat the 18-time world Go champion Lee Sedol 4-1 in March 2016.
https://en.wikipedia.org/wiki/AlphaGo_versus_Lee_Sedol (accessed on 28 October 2018), 2018.

[3] AlphaGo beat Ke Jie, the then world No. 1-ranking Go player, 3-0 in May 2017.
https://en.wikipedia.org/wiki/AlphaGo_versus_Ke_Jie (accessed on 28 October 2018), 2018.

[4] In addition to AI composers, AI painters such as a generative adversarial network (GAN) have also been known. See, for example, WARD, TOM, AI Can Now Produce Better Art Than Humans. Here's How. https://futurism.com/ai-now-produce-better-art-humans-heres-how (accessed on 28 October 2018), 8 July 2017.

[5] KALEAGASI, BARTU, A New AI Can Write Music As Well As a Human Composer. https://futurism.com/a-new-ai-can-write-music-as-well-as-a-human-composer (accessed on 28 October 2018), 9 March 2017. According to this article, deep learning is a kind of machine learning having multiple layers of neural networks for processing information between the various input and output points. Reinforcement learning is a machine learning technique that does not require fixed training data sets having labelled inputs and

then used by AIVA to create unique music.[6] However, currently AIVA's compositions still require human input with regard to orchestration and musical production in order to be developed into full-blown music pieces.[7] In November 2016, AIVA's first studio album entitled «Genesis» was released, featuring 24 music tracks.[8]

Despite the fact that AIVA is still unable to compose music independently, it has already been registered with the France and Luxembourg author's right society (SACEM) as a composer, and all of AIVA's works are copyrighted under its own name.[9] That is, AIVA seems to have begun enjoying the copyright of its creation, which is somewhat controversial as artificially intelligent agents may not have been entitled to property rights, of which intellectual property rights including copyright are a subset. Should AIVA as an artificially intelligent agent be entitled to the copyright of its musical works, or the copyright should be enjoyed by the people who created and/or operated AIVA? Are licenses required for AIVA to be trained with copyrighted music pieces? Will the answers to the questions be different some day when an AI composer becomes capable to create its music independently? Relevant analysis and suggestions will be set forth in this paper with the current laws of Hong Kong taken as a starting point.

2. Legal Framework of Copyright Ownership and Fair Dealing

2.1. The Berne Convention

The laws on copyright protection are not the same in different jurisdictions, but have been largely harmonized as most of the countries are members of the Berne Convention for the Protection of Literary and Artistic Works (the «Berne Convention»), which now has 176 signatories,[10] and the various principles and requirements provided for in the Berne Convention have largely been incorporated into the national laws or become effective otherwise.

The Berne Convention is silent on whether the author, which is the subject of copyright to an original creation, has to be a human being. In fact, the author can be a legal person in certain jurisdictions.[11] It is thus conceivable that an artificially intelligent agent could also be entitled to copyright if it were granted a status of a person according to the law.

It has also been explicitly provided for in the Berne Convention that the copyright includes the economic rights, which protect the economic value of the copyrighted work, and the moral rights, which are inalienable rights of the author, and these two kinds of rights are independent from each other.[12] That is, the author's moral rights will remain even after the economic rights are assigned or licensed to another party. The moral rights provided for in the Berne Convention include the right to claim authorship of the copyrighted work, the right to object to any distortion, mutilation or other modification of, or any other derogatory action in relation to the copyrighted work.[13]

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outputs, but allows the AI to «find its own way» around the training data without being given any explicit instructions, which is most suitable for learning of creative art pieces.

[6] AIVA TECHNOLOGIES (the company that operates AIVA), AIVA – Artificial Intelligence Virtual Artist. http://www.aiva.ai/about (accessed on 28 October 2018), 2018.

[7] KALEAGASI, BARTU, A New AI Can Write Music As Well As a Human Composer. https://futurism.com/a-new-ai-can-write-music-as-well-as-a-human-composer (accessed on 28 October 2018), 9 March 2017.

[8] The Wikipedia entry of «AIVA». https://en.wikipedia.org/wiki/AIVA (accessed on 28 October 2018), 2018.

[9] Id.

[10] A list of contracting parties to the Berne Convention is maintained by the World Intellectual Property Organization (WIPO) and available at http://www.wipo.int/treaties/en/ShowResults.jsp?lang=en&treaty_id=15 (accessed on 29 October 2018).

[11] For example, Article 11 in the Copyright Law of the People's Republic of China provides that an author of a work may be a natural person, a legal person or any other kind of organization.

[12] Article 6bis of the Berne Convention.

[13] Id.

The Berne Convention also states that copyrighted works could be used for free under certain circumstances such as quotation of lawfully published works, illustration of literary or artistic works for teaching, etc. as «compatible with fair practice», but has left the task of providing for specific fair use circumstances to legislators of the contracting parties.[14]

2.2. Current Laws in Hong Kong

The Copyright Ordinance (Cap. 528) of the Hong Kong Special Administrative Region (the «Copyright Ordinance») has largely inherited the British copyright laws, and provisions related to the discussion on copyright ownership and fair dealing of AI-created works are summarized as follows.

- **Authorship:** AI-created artistic work likely falls within the category of «computer-generated works», in which circumstance «the author is taken to be the person by whom the arrangements necessary for the creation of the work are undertaken.»[15]
- **Copyright Ownership:** In general terms, the author of a work should be the first owner of the copyright unless the work is an employee work, a commissioned work, or any other special circumstance exists as provided for in the law.[16] For a piece of music composed by an AI composer operated by a company (e.g. AIVA Technologies in the AIVA case), the music piece would likely be an employee work, and the ownership of the copyright should depend on agreements between the author and his or her employer, which is likely the company that operates the AI composer, if any.[17] If there are no such agreements, the company would likely be the first owner of the copyright.
- **Moral Rights:** No rights to be identified as the author or the rights to object to derogatory treatment of the work are conferred for computer-generated works.[18]
- **Fair Dealing:** A number of circumstances have been provided for in the Copyright Ordinance as acts permitted in relation to copyrighted works. The most relevant provision to this paper is Article 38(3), which sets forth the tests applied by the court to determine whether dealing with a copyrighted work is fair dealing for research and private study:
  - the purpose and nature of the dealing, including whether the dealing is for a non-profit-making purpose and whether the dealing is of a commercial nature;
  - the nature of the work;
  - the amount and substantiality of the portion dealt with in relation to the work as a whole; and
  - the effect of the dealing on the potential market for or value of the work.

3. Analysis and Proposal

Analysis will be conducted for the copyright ownership and fair dealing of AI-created artistic works with AIVA's compositions as an example. Justification of the current arrangements will be discussed, and a preliminary proposal will be made in view of possible future development, i.e. AI composers may be further developed and capable of composing musical works on their own initiative.

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[14] Articles 10 and 10[bis] of the Berne Convention.
[15] Article 11(3) of the Copyright Ordinance.
[16] Article 13 of the Copyright Ordinance.
[17] Article 14(1) of the Copyright Ordinance.
[18] Articles 91(2) and 93(2) of the Copyright Ordinance.

3.1. Copyright Ownership and Fair Dealing Analysis Under the Current Hong Kong Laws

As can be seen from the above, while the person who makes the necessary arrangements to enable the AI composer to compose a musical work may be deemed as the «author» of the work, there are no moral rights conferred to this person under the current laws of Hong Kong. Accordingly, it would be appropriate to indicate the name of the AI composer as the author, but such an indication may not be protected by the Copyright Ordinance. The first copyright owner would likely be the company that operates the AI composer unless otherwise agreed by the related parties. Either way, this would ensure that the company or whoever had invested in the programming and/or training of the AI composer benefit from the economic rights associated with the copyrighted work.

AIVA's learning data are exclusively classical music for which copyright protection has long expired.[19] However, suppose a future AI composer would like to learn to produce some modern music in Hong Kong, and requires learning of a large collection of copyrighted musical works of the desired style. In this hypothetical scenario our fair dealing question would arise: if a human artist wants to learn from a certain music style, she can simply purchase relevant albums and listen to the music tracks as many times as she wants, and compose musical works of similar styles. This will not infringe the copyright of the prior works which she has studied as long as she did not «copy» the prior works. However, if a person purchases the same collection of copyrighted music tracks, and inputs them to the AI composer for producing copyrighted music, would it be fair dealing, or does that person have to obtain a special license from the copyright owners of the prior works?

Note that the hypothetical AI learning case is different from the human artist case in that the prior works have to be «copied» as they are input to the AI composer, while the human listening does not entail any «copying», an act that is prohibited by the law when conducted on a copyrighted work unless authorized by the copyright owner.[20] That is why we have to resort to fair dealing, which is an exception to copyright infringement, in the hypothetical AI learning case. However, when we look at the four tests suggested in Article 38(3) of the Copyright Ordinance one by one, the answer would likely be «no fair dealing» as will be explained below.

- **The purpose and nature of the dealing:** the copying of the prior works was to provide input to the AI composer's neural network as training data, so that the AI composer would be enabled to compose a similar style of music. If we regard the AI composer as a «computer program» as indicated in the current Copyright Ordinance,[21] the nature of the dealing could be to improve the performance of the «computer program», which is arguably a product of the company that operates the AI composer. Moreover, given that the AI-composed musical works would be copyrighted and have the potential to create economic benefits, the dealing could hardly be deemed non-profitable in nature.
- **The nature of the work:** the prior works are music tracks produced by the artists for sale. They are commercial products in nature, a fact that might be against the fair dealing arguments from the AI composer's side.
- **The amount and substantiality of the «portion»:** the prior works are copied in their entireties in order to be input to the AI composer as a computer system. No valid argument for the AI composer.

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[19] Kaleagasi, Bartu, A New AI Can Write Music As Well As a Human Composer. https://futurism.com/a-new-ai-can-write-music-as-well-as-a-human-composer (accessed on 28 October 2018), 9 March 2017.

[20] As provided for in Articles 22 and 23 of the Copyright Ordinance, the copyright owner has the exclusive rights to copy the work, and «[c]opying of a work means reproducing the work in any material form. This includes storing the work in any medium by electronic means.» In fact, the term «copyright» has indicated in itself that it substantially includes the «right to copy.»

[21] The analysis in this paper is based on the assumption that AI-composed works fall within the category of «computer-generated works» as provided for in the Copyright Ordinance. In this sense, the AI composer may be regarded as an advanced program resided on the computer.

- **The effect on the potential market or value of the prior works:** the AI composer would be capable of producing a large amount of musical works of similar styles, so that the potential market of the prior works would likely be affected negatively.

In sum, there may not be much room for the AI composer's operators to argue «fair dealing» under the current Hong Kong laws. This means that the operators would have to take license from the copyright owners of the prior works to be used as training samples.

3.2. Justification of the Current Scheme of Copyright Ownership

In this section, three major legal theories, namely the labour theory, the utilitarian theory and the personality theory for justifying the intellectual property system are used for preliminary analysis of how the current scheme of copyright ownership is justified. Further, analysis will be made to a hypothetical case, in which AI composers may learn from prior works and compose music on their own initiative. A proposal on copyright ownership and related fair dealing issue will be made in the next section accordingly.

3.2.1. The Labour Theory

According to the labour theory, a person creates enjoyable goods by exerting labour, so that this person is entitled to own the creation. The same holds true for the creation of this person's mind.[22]

Copyrights are granted to people who have created original works. In the current AI composer scenario, the human creation is the AI composer itself, including various structures, algorithms and code that constitute the AI composer. In this regard, it is natural for the people who created the AI composer and who conducted the training or otherwise added to the AI composer's capabilities to enjoy the economic benefits associated with the finished product (i.e. the AI composer's compositions).

However, when the hypothetical case in which the AI composer creates art pieces at its own free will is considered, it could require little labour for a well-trained AI composer to compose a music track, a full album having a dozen of music tracks, or even larger amount of musical works given the high processing capabilities of computers. Assuming that the labour of humans spent to create the AI composer has been duly rewarded otherwise, it would be difficult to justify the granting of the economic benefits associated with copyrights to the AI composer as compensation for its labour exerted.

3.2.2. The Utilitarian Theory

From a utilitarian perspective, intellectual property rights are granted to encourage innovation. Protection of intellectual property rights provides incentives to promote creativity and publicity.[23]

By granting economic rights of the copyright to the company that operates the AI composer or the related investors, the people are incentivized to improve the performance of the AI composer and thus creating art pieces with higher quality. Some scholars have expressed their support of the idea that intellectual property should be given to creators or operators of AI in order to incentivize the development of the AI industry. For example, Andres Guadamuz stated that granting copyright to operators of AI would make sure that «they will get a return on their investment.»[24] Raquel Acosta proposed an alternative approach, in which the machine-generated works should flow into the public domain provided that «the protection of the machine or its code itself is incentive enough.»[25]

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[22] HUGHES, JUSTIN, The Philosophy of Intellectual Property, Geogetown Law Journal, December 1988, 77 Geo. L.J. 287, p. 6-28.

[23] BURK, DAN/LEMLEY, MARK, Policy Levers in Patent Law, Virginia Law Review, 2003, Vol. 89, No. 7, p. 1597-1599.

[24] GUADAMUZ, ANDRES, Artificial Intelligence and Copyright. WIPO Magazine. http://www.wipo.int/wipo_magazine/en/2017/05/article_0003.html (Accessed on 30 October 2018), October 2017.

[25] ACOSTA, RAQUEL, Artificial Intelligence and Authorship Rights. In: Lewin, Adam, (Ed.), JOLT Digest by Harvard Journal of Law & Technology. http://jolt.law.harvard.edu/digest/artificial-intelligence-and-authorship-rights (Accessed on 30 October 2018), 17 February 2012.

In the hypothetical case, as the AI composer would have the potential to produce a large amount of musical works having similar styles, it is a question whether such production should be incentivized at all. Assuming that the initial human investment on the development AI composer has been recouped otherwise, it may not be advisable to incentivize the AI composer for increased production.

3.2.3. The Personality Theory

Under the personality theory, a person has certain inalienable rights based on personal expressions in his/her creation; at the heart of the personality theory is the concept of human will, personality, and freedom.[26]

The AI composer's expressions are not directly controlled by the programmers or trainers of the AI composer. Accordingly, there are certain personal expressions by the AI composer itself, which the programmers and trainers may be entitled to exploit as part of their copyrights. However, it is hardly justifiable to grant moral rights to the programmers or trainers for the AI composer's compositions as if they were created by those humans. If any moral rights should be granted, nobody but the AI composer would be entitled to them.

That said, whether or not the AI composer would have standings to receive the moral rights will depend on the development in robot laws, in particular with regard to robots» entitlement to property rights. Based on the development level of the AI composer, it could fall within the category of third-existence (i.e. below the singularity point) or Human-Based Intelligence (HBI) (i.e. after passing the singularity point),[27] and it could be granted full-blown copyright, or at least inalienable moral rights thereof under differently designed schemes of property right ownership.

In view of the above analysis, the current scheme of granting economic-right-only copyright to the humans is generally justifiable, but new schemes of copyright ownership and fair dealing for AI-created works may be necessary to accommodate the development of AI and robot laws.

4. Proposal on Copyright Ownership and Fair Dealing for AI-Created Works

The following proposal is made with respect to the aforementioned hypothetical case. Specifically, it is assumed that with the development of AI, AI composers are capable of learning any style of music and composing new art pieces on their own initiative. It is further assumed that the human investment and labor spent on the development and training of the AI composers can be rewarded otherwise.

The proposal may be called a «moral-rights-only» scheme, in which the AI composer is granted moral rights but not any economic right. That is, the AI compositions would flow into the public domain without anyone having to get a license to utilize it. That said, the moral rights of the AI composer should be respected nonetheless.

The AI composers may still «listen to» other artists» works to continuously enrich its machine learning. However, the utilization of the «heard» works would be non-profitable in nature because no economic rights would be granted to the AI composer's output. This would likely change our «fair dealing» analysis regarding at least the purpose and nature of the dealing. In addition, the laws might also need to be changed to make sure no special license would be required for the AI composer to listen to prior works provided that the access to the prior works is not illegal. That is, the AI composer would be able to listen to normally purchased music tracks as a human artist would normally do. Even though the AI composer's «copying» of the prior works could be inevitable as mentioned previously, it would be deemed «fair dealing» for «private study» purpose or the like without being prohibited by the copyright law.

A comparison between the current scheme and proposed «moral-rights-only» scheme is illustrated in Table 1 below.

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26 HUGHES, JUSTIN, The Philosophy of Intellectual Property, Geogetown Law Journal, December 1988, 77 Geo. L.J. 287, p. 28–34.

27 WENG, YUEH-HSUAN, Robot Law 1.0: On Social System Design for Artificial Intelligence. In: Barfield, Woodrow/Pagallo, Ugo (Eds.), Research Handbook of Law and Artificial Intelligence, Edward Elgar Publishing, Forthcoming December 2018.

Compared Aspect	Current Scheme (HK Law)	Proposed Scheme (Hypo Case)
Moral Rights	N/A	AI
Economic Rights	Human	N/A
License of Learning Inputs	Likely Required (No Fair Dealing)	Not Required (Fair Dealing)

Table 1: Comparison of Current and Proposed Schemes on Copyright Ownership and Fair Dealing for AI-Created Works

An extension to the proposed scheme is the «copyleft» proposal, which is similar to the above proposal that anyone may copy, use, adapt or distribute the AI-created work for free. However, the «copyleft» proposal further requires that any copies or adaptations made by users of the initial AI-created work be bound by the same licensing agreement as attached to the initial work. That is, it would be required that the copies or adaptations derived from the initial work should be free for anyone to copy, use, adapt or distribute, contributing to the free availability of the initial work and all derivative works.[28]

5. Conclusion

In summary, for AI-created works, only the economic rights of the copyright are available to the humans that made and/or operated the AI composer at least under the current laws of Hong Kong. If copyrighted prior works were to be employed for training of the AI composer, «fair dealing» would unlikely be established, and the operator would have to take a license from the copyright owners of the prior works.

It is expected, however, that AI composers will be capable of perform learning and compose music at their own free will. In this hypothesized scenario, the current legal framework may not be appropriate to protect the interest of the general public. A proposal is made to grant moral rights to AI composers, but the AI-created works should be contributed to the public for free. Accordingly, «fair dealing» should be established for the AI composers» learning activities. The proposal may be extended by incorporating the «copyleft» scheme, by which copies or adaptations derived from the initial AI-created works should inherit the same license agreement and be distributed for free as well.

The interplay of AI and intellectual property will continue to be a hot topic for discussion with the development of AI. On one hand, the intellectual property system functions to protect and promote certain innovation and creations. On the other hand, innovation reshapes the society and precipitate improvements of the intellectual property laws. In the world of AI, however, an unprecedented situation is encountered where innovation is endowed with the ability to create or even innovate. Would the current intellectual property schemes still work to encourage AI's creations, or would it still be necessary to encourage such creations at all? Given the different nature of AI's learning and creating mechanisms from that of humans, it will not be surprising if a major paradigm shift is going to take place in the intellectual property law area to cope with AI innovators and creators. This paper, however, has focused on proposing mild improvements to the existing intellectual property laws based on established legal practice and conservative prediction of AI's development level. It is believed that such a mild approach will have more practical value and help maintain the consistency and stability of current legal systems.

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[28] The Wikipedia entry of Copyleft. https://en.wikipedia.org/wiki/Copyleft (accessed on 30 October 2018), 2018. The concept of «copyleft» is not new, and I suggest that the idea of requiring free distribution of derivative works in the current «copyleft» scheme be incorporated in the proposed scheme without change. There are different copyleft license agreements maintained by different organizations available, and copyright owners (note that «copyleft» is not contradictory to the current copyright laws, but is a framework to promote free availability of works under the current copyright system) have options. In the extended proposal, the copyleft scheme may be codified by legislative bodies, or the copyright owners may still choose from multiple license agreements available in the society depending on the actual situation.