



Study Guidelines

by Jonathan OSHA, Reporter General
Anne Marie VERSCHUUR, First Deputy Reporter General
Ari LAAKKONEN, Second Deputy Reporter General
Ralph NACK, Lena SHEN and Guillaume HENRY
Assistants to the Reporter General

2019 – Study Question

Copyright in artificially generated works

Introduction

- 1) Of all the technological advances that attract lawyers' attention, artificial intelligence (AI) stands as a good a chance as any of proving to be genuinely transformational. As more AI systems are deployed that can assist or replace humans in the performance of everyday tasks and creative endeavors, they will inevitably encounter the same kinds of IP questions as humans do.

Many questions arise for IP lawyers, such as: can something made by or using an AI system be a copyrighted work and, if so, where do the rights lie? Can an AI system invoke any exceptions or limitations and, if so, whose use and expression rights should the law balance against the exclusive rights of the author? How is any term of copyright protection measured if the author is a machine?

- 2) There is already a lively debate about whether the advent of AI challenges the fundamental assumptions, structures and concepts of copyright law, or whether current laws will suffice as long as its practitioners understand how the technology works. In part, these mirror familiar philosophical debates about the justifications for copyright protection.

If the rationale is to promote the progress of science and useful arts, it may be possible to make room for non-human authors, users and infringers. However, if copyright is conceived as a fundamental, moral right afforded to human creators, it is harder to accept protection for works created by algorithms, even as they learn to create stories, music and images that are indistinguishable from human works. There are also more practical questions around the relevance and application of classic copyright concepts such as reproduction, distribution, display and communication.

- 3) For the purposes of this Study Question, a work created in whole or in part using Artificial Intelligence (“AI”) is referred to as an artificially-generated work or an AI-created work.

Why AIPPI considers this an important area of study

- 4) At the current time, most jurisdictions appear to consider human intellectual authorship a prerequisite for copyright protection. However, that leaves open the question of whether a human who programs, trains or operates an AI application might qualify for authorship.

As AI systems become more pervasive, more able and more consequential, national copyright approaches may diverge further. Disputes are also likely around less philosophical aspects of copyright protection, from the delineation of the reproduction right to the need for new exceptions in areas such as text and data mining. From an economic point of view, investments in the field of AI are considerable, especially in the creation of works. One of the purposes of intellectual property is to encourage the creation of works. It is therefore important that the legal regime applicable to AI created works encourages these investments. Thus, this is an opportune moment for AIPPI to study the intersection of AI and copyright.

Definitions

- 5) In the context of this study, the term “Copyright” means the rights associated with copyright as set forth in the Berne Convention.
- 6) The term “Related Rights” means all other copyright-type rights, e.g. “related rights”, “neighbouring rights”, “sui generis rights”, etc.
- 7) The term “Economic Rights” means the exclusive rights of Copyright granted to the author, e.g. the right of reproduction.
- 8) The term “Moral Rights” means the rights of Copyright granted to the author apart from Economic Rights, e.g. the right to object to distortion of the work.

Scope of this Study Question

- 9) This Study Question seeks to establish if and under what conditions Copyright and/or Related Rights should be available for artificially-generated works.
- 10) This Study Question does not address the following related issues:
 - a. copyright infringement by artificially-generated works;
 - b. copyright in computer programs or algorithms used for artificial intelligence systems;

- c. copyright in intermediate works, *i.e.* works created during each step of the process. Only the final work (see below the diagram on paragraph 6 of the section “discussion”) is within the scope of this Study Question.

Previous work of AIPPI

- 11) AI was a major topic of discussion during the panel session on Big Data held at the Sydney Congress (2017). At the Cancun Congress (2018), a double-length Panel Session was dedicated to "Artificial intelligence - the real IP issues". These panel sessions generated lively debate and underscore the importance of this issue to the IP community.
- 12) AIPPI has not yet adopted a resolution related specifically to copyright on artificially-generated works. However, at the 1988 Executive Committee meeting in Sydney, AIPPI adopted a resolution on “Legal Protection of Computer Software” (Q57). Paragraph IV of the adopted resolution states:

IV. AIPPI considers that it should in the context of its previous work continue study on the following points: (...)

4. Is the author of a computer-generated work (which may itself be a program) the person who initiates the creation of the work?

AIPPI has passed no subsequent resolution on this topic.

Discussion

- 1) In the fields of creations likely to be protectable by copyright, artificial intelligence has already made it possible to create artificially-generated works in a wide variety of areas: poems, literary works, novels, news articles, music, paintings and other artworks, *etc.* As explained in more detail below, human intervention in the process of creating an artificially-generated work may occur in a number of different ways or, potentially, may not occur at all. This Study will address Copyright and Related Rights protection for artificially-generated works.
- 2) *Definition of Artificial Intelligence.* An inquiry into artificially-generated works must start with an understanding of what artificial intelligence (“AI”) is. However, AI is a broad and rapidly evolving field that defies simple definition. Often AI is characterized generally as the ability of a computer to mimic human intelligence, such as the ability to reason and to learn from past experience.

See, *e.g.*, the following definition from

<https://www.britannica.com/technology/artificial-intelligence:>

Artificial intelligence (AI), *the ability of a digital computer or computer-controlled robot to perform tasks commonly associated with intelligent beings. The term is frequently applied to the project of developing systems endowed with the intellectual processes characteristic of humans, such as the ability to reason, discover meaning, generalize, or learn from past experience.*

Such definitions, however, are simultaneously too broad and too narrow for present purposes.

They are too broad because to consider the copyright implications of artificially-generated works it is necessary to understand that AI, at its core, is a set of complex algorithms that are run iteratively on an input data set to produce a desired result. The design of those algorithms, the choice of which algorithms to apply, the data set that is input, and the nature of the desired result are all choices that must be made by humans or, in some cases, by another AI-enabled process.

These definitions are too narrow because by comparing AI to human intelligence they exclude the multitude of AI applications that are not directed to mimicking human intelligence but rather to processing, interpreting, and taking actions on very large quantities of data in a manner human intelligence is unsuited to do.

Recognizing that there is no universally applicable definition of AI, for the purposes of this Study Question and in order to have a concrete frame of reference for analysis of the copyright issues, we adopt the following definition:¹

Artificial intelligence is an entity (or collective set of cooperative entities), able to receive inputs from the environment, interpret and learn from such inputs, and exhibit related and flexible behaviours and actions that help the entity achieve a particular goal or objective over a period of time.

Three examples of AI-created works follow to illustrate application of this definition.

3) Example 1: AI-created artwork

On October 25, 2018, CHRISTIE'S auctioned a painting created by an AI program for \$ 432,500.²

A collective of artists called Obvious has created this work.

¹ Daniel Faggella, Emerj, <https://emerj.com/ai-glossary-terms/what-is-artificial-intelligence-an-informed-definition/>

² This artwork was not the first artificially created work sold at auction, but the first sold by one of the most prestigious auction houses in New York.

The collective of artists explains the creation process on its website (<http://obvious-art.com/>).

Data Selection

We carefully select a large number of input images with common visual features. The goal is to create a new sample that shares these features.

Image Creation

We use GANs³: two algorithms compete. The "generator" creates new images by trying to fool the "discriminator" into thinking generated images are real.

Training

The resolution of the generated image is enhanced using upscaling algorithms that infers a high definition version of the image.

Production

The image is printed on canvas with inkjet, framed and signed with the math formula showing the relation between generator and discriminator.

4) Example 2: AI-created musical work

The Flow Machines project, by Sony Computer Science Laboratory, aims to create music with the assistance of algorithm / programme / software. It is characterized as "augmented creativity", meaning that a human is involved in creation of the work, but is assisted by an AI process.

The project is described as follows:⁴

³ **Generative adversarial networks (GANs)** are defined as "a class of artificial intelligence algorithms used in unsupervised machine learning, implemented by a system of two neural networks contesting with each other in a zero-sum game framework. (...) One network generates candidates (generative) and the other evaluates them (discriminative). Typically, the generative network learns to map from a latent space to a particular data distribution of interest, while the discriminative network discriminates between instances from the true data distribution and candidates produced by the generator. The generative network's training objective is to increase the error rate of the discriminative network (i.e., "fool" the discriminator network by producing novel synthesised instances that appear to have come from the true data distribution)".

In practice, a known dataset serves as the initial training data for the discriminator. Training the discriminator involves presenting it with samples from the dataset, until it reaches some level of accuracy. Typically the generator is seeded with a randomized input that is sampled from a predefined latent space (e.g. a multivariate normal distribution). Thereafter, samples synthesized by the generator are evaluated by the discriminator. Backpropagation is applied in both networks so that the generator produces better images, while the discriminator becomes more skilled at flagging synthetic images. The generator is typically a deconvolutional neural network, and the discriminator is a convolutional neural network » https://en.wikipedia.org/wiki/Generative_adversarial_network

⁴ <https://www.flow-machines.com/>

The centre of the Flow Machines project is Flow Machines Composer. This system is the culmination of music research for more than 20 years at Sony CSL's Paris office. It has been (sic) constructed from the analysis of the variety of music know-how music is added, use the tip software technology, according to the instruction of the artist, you can generate freely the melody of different styles.

Through the work of artists using this system, music score of new music will be generated.

From here it is the same as the process of regular music production, arrange using the digital audio studio etc., create lyrics, perform with the artists, and after mixing, mastering, etc., music will be produced.

Relative to Example 1, it can be seen that the human takes a more substantial role in the production of the resulting work although this process is facilitated by AI.

5) Example 3: AI-created written work

Researchers have developed an algorithm that aims to create sonnets, *i.e.* poems of the type popularised by Shakespeare, made up of 14 lines structured as 3 quatrains (4 lines) and a couplet (2 lines)⁵.

The researchers modelled both content and forms jointly with neural architecture, composed of 3 components: language model, pentameter model and rhyme model.

They fed the algorithm with 2685 sonnets. The algorithm then created new poems.

AI-created poems are then (i) evaluated by crowd workers (they had to guess which poem is human-written poem and which is AI created) (ii) and rated by English literature experts.

- 6) *The creative process of an artificially-generated work.* The creative process of an AI-created work is not homogeneous. As illustrated by the examples above, the role of the human in the process can take many forms. Today, artificially-generated works are generally not created without any human intervention. Indeed, the creative process involves most often several human persons who may have one or more of the following roles:

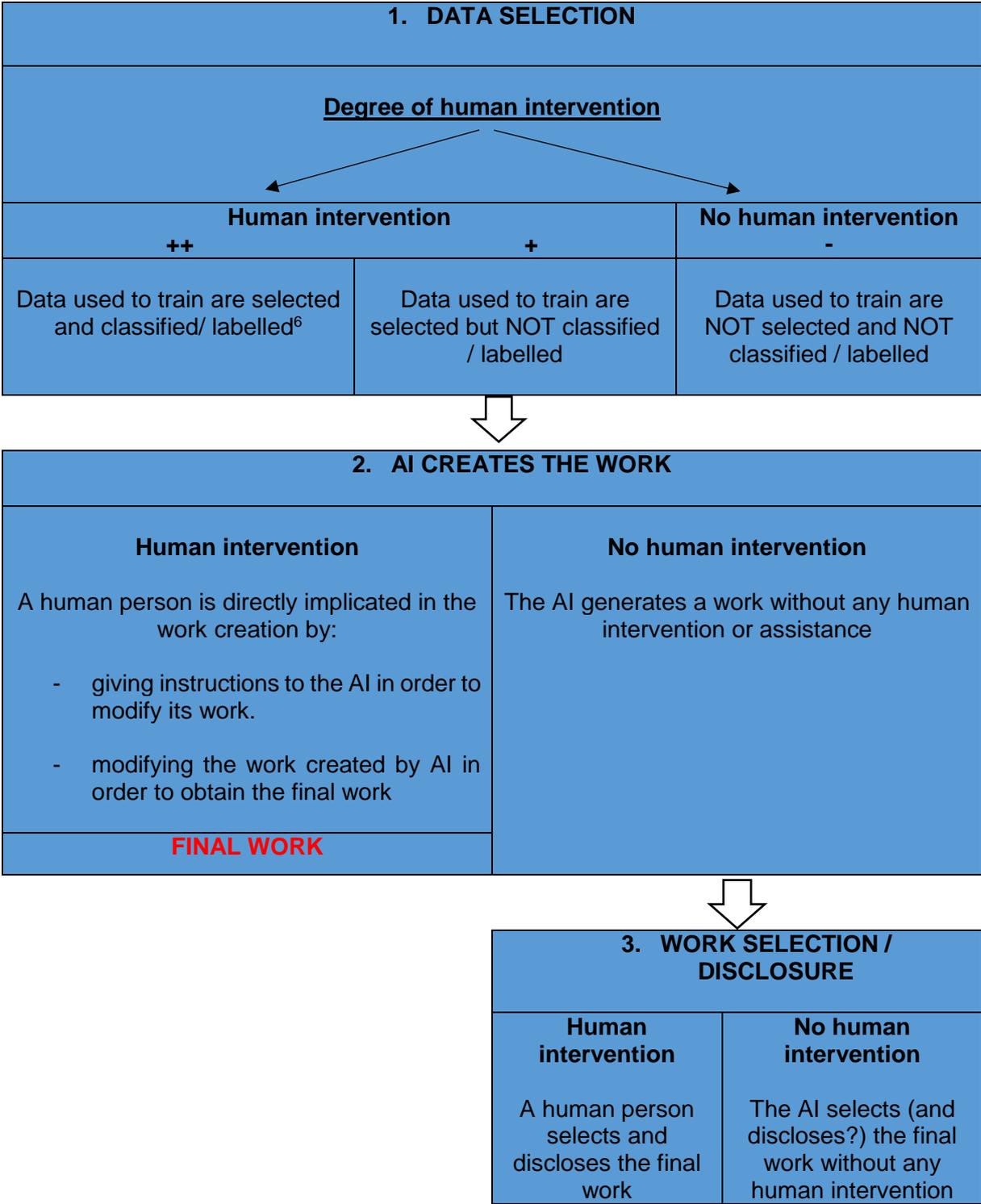
- programmers and mathematicians develop AI algorithms or “entities” that can receive certain types of inputs and interpret and learn from those inputs to achieve a desired output or goal;

⁵ <https://arxiv.org/pdf/1807.03491.pdf>

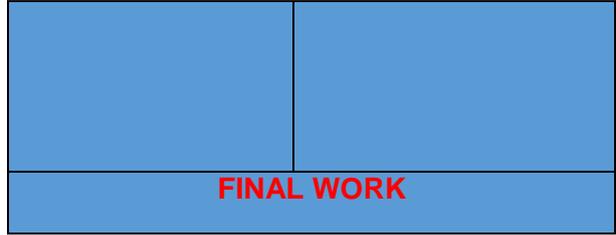
- humans determine the data set, e.g., paintings, literary works, music, *etc.*, that are input to the entities; and

- humans may ultimately select one or more works from a large number of works created using artificial intelligence based upon human tastes, preferences, and opinion.

Human intervention is summarized in the diagram below:



⁶ Data selection means that a human choose the data to be put in the AI system. Data classification or labelling means that a human classifies with specific criteria the data to be put in the AI system.



- 7) To provide a concrete basis for analysis of this Study Question, the following **Working Example** is adopted:

Step 1: One or more AI entities are created that are able to receive inputs from the environment, interpret and learn from such inputs, and exhibit related and flexible behaviours and actions that help the entity achieve a particular goal or objective over a period of time. The particular goal or objective to be achieved is selected by a human and, for purposes of this Study Question, involves generation of works of a type that would normally be afforded copyright protection.

Step 2: Data is selected to be input to the one or more AI entities. The data may be prior works such as artwork, music or literature as in the examples above. The data also may be inputs from sensors or video cameras or input from other sources, such as the internet, based on certain selection criteria.

- a. [Case 2a]. The data or data selection criteria are selected by a human.
- b. [Case 2b]. The data or data selection criteria are not selected by a human.

Step 3: The selected data is input to the one or more AI entities, which achieve the particular goal or objective over time by generating “new works” that are not identical to any prior work.

- a. [Case 3a]. A human makes a qualitative or aesthetic selection of one work from the new works.
- b. [Case 3b]. No human intervention is involved in selection of a work from the new works.

You are invited to submit a Report addressing the questions below. Please refer to the 'Protocol for the preparation of Reports'.

Questions

I. Current law and practice

Please answer all questions in Part I on the basis of your Group's current law and practice.

To answer questions 1 to 11, please base your answers on the Working Example. If you believe that reference to other scenarios/examples is useful, please raise such scenarios/examples and their relevance to the questions presented.

- 1) Does your current law / practice contain laws, rules, regulations or case law decisions specifically relating to Copyright and/or Related Rights in artificially-generated works? If YES, please describe.

A. Application of general Copyright criteria to artificially-generated works

Authorship

- 2) Does your current law / practice require that a work has to be created by an identified author (natural or legal person) to be protected by Copyright?⁷
- 3) Does your current law / practice require that a work has to be created by a human to be protected by Copyright?⁸
- 4) Could one or more of the natural persons involved in the process of the Working Example be qualified as authors of the resulting work in your jurisdiction?
 - a. The authors of the program or code that defines the AI entities⁹?
 - b. A human who defines the particular goal or objective to be achieved by the AI entities?
 - c. A human who selects the data or the data selection criteria (inputs)?
 - d. A human who selects a particular artificially-generated work from multiple works generated by the AI entities?
 - e. Someone else?

Originality

- 5) If, in your jurisdiction, originality is a requirement for a work to be protected by Copyright, could an artificially-generated work qualify as an original work in your jurisdiction?

Supplementary criteria

- 6) If there are supplementary or other requirements for a work to be protected by Copyright in your current law / practice, can an artificially-generated work in accordance with the Working Example fulfill them?

Original ownership

- 7) Assuming that, under your current law / practice, an artificially-generated work is protectable by Copyright, who would be the “first owner” of the Copyright, *i.e.* the person defined by the law as the *original owner*?

⁷ By answering this question, don't take into consideration anonymous works and pseudonym works. Please also note that this question is independent from the question of the rights holder.

⁸ Please note that this question is independent from the question of the rights holder.

⁹ As noted in Paragraph 2 of the Discussion above, “AI entities” refers to the system(s) that creates the AI-created work and does not refer to a legal or juridical entity.

- 8) Under your current law / practice, could an AI system or machine be qualified as a juridical entity capable of holding Copyright or Related Rights?
- 9) Does your current law / practice allow non-humans and/or non-juridical entities to hold Copyright?

Term of protection

- 10) Assuming that, under your current law / practice, an artificially-generated work is protectable by Copyright, what is the term of protection?

B. Application of Related Rights criteria to artificially-generated works

- 11) Could a work created with the process of the Working Example be protected by any type of Related Rights? If YES, please answer the following sub-questions:
 - a. What type(s) of Related Rights would be applicable?
 - b. What would be the requirements for protection by Related Rights?
 - c. Who would be the original owner of the Related Rights?
 - d. What would be the term of the protection?

II. Policy considerations and proposals for improvements of your Group's current law

- 12) Could any of the following aspects of your Group's current law or practice relating to artificially-generated works be improved? If YES, please explain.
 - a. Requirements for artificially-generated works to be protected by Copyright and/or Related Rights?
 - b. Ownership of artificially-generated works?
 - c. Term of protection of artificially-generated works?
- 13) Are there any other policy considerations and/or proposals for improvement to your Group's current law falling within the scope of this Study Question?

III. Proposals for harmonisation

Please consult with relevant in-house / industry members of your Group in responding to Part III.

To answer questions 14 to 32, please base your answers on the Working Example. If you believe that reference to other scenarios/examples is useful, please explain such scenarios/examples and their relevance to the questions presented.

- 14) In your opinion, should Copyright protection and/or Related Rights protection for artificially-generated works be harmonized? For what reasons?

If YES, please respond to the following questions without regard to your Group's current law or practice.

Even if NO, please address the following questions to the extent your Group considers your Group's current law or practice could be improved.

- 15) In your opinion, should artificially-generated works be protected by Copyright and/or Related Rights? For what reasons?

A. Copyright protection of artificially-generated works

- 16) Should intervention by a human be a condition for Copyright protection of an artificially-generated work? If yes, at which step or steps in the Working Example would human intervention be required?
- 17) Should originality be a condition for Copyright protection of an artificially-generated work?
- 18) What other requirements, if any, should be conditions for Copyright protection of an artificially-generated work?
- 19) Who should be the original owner of the Copyright on an artificially-generated work?
- 20) What should be the term of Copyright protection for an artificially-generated work?
- 21) Should Economic Rights differ between artificially-generated works and regular works?
- 22) Considering existing exceptions to Copyright, should any exceptions apply differently to artificially-generated works versus other works?

23) Should there be any new exceptions to Copyright specifically applicable to artificially-generated works?

24) Moral Rights

- a. Should moral rights be recognized in artificially-generated works?
- b. If yes, what prerogatives should the moral rights include (for example, the right to claim authorship of the work, the right to object to any distortion, mutilation or other modification of the work)?
- c. If yes, who should exercise the prerogatives of moral rights?

B. Related Rights protection of artificially-generated works

25) Considering existing Related Rights, should any Related Rights apply to artificially-generated works?

26) Should there be any new Related Rights specifically applicable to artificially-generated works?

27) If an existing or new Related Right is applicable to artificially-generated works, what requirements should be conditions for protection?

28) Which Related Rights' economic rights and moral rights should apply to artificially-generated works?

29) Who should be the original owner the Related Right?

30) What should be the term of protection of the Related Right?

31) Please comment on any additional issues concerning any aspect of Copyright protection and Related Rights protection for artificially-generated works you consider relevant to this Study Question.

32) Please indicate which industry sector views provided by in-house counsel are included in your Group's answers to Part III.