

The IPKat

Passionate about IP! Since June 2003 the IPKat has covered copyright, patent, trade mark, designs, info-tech, privacy and confidentiality issues from a mainly UK and European perspective. Read, post comments and participate!

The team is Eleonora Rosati, Annsley Merelle Ward and Merpel. E-mail the Kats here!

The team is joined by GuestKats Kevin Bercimuelle-Chamot, Alessandro Cerri, Anastasiia Kyrylenko, Nedim Malovic, Marcel Pemsel, Henry Yang and Anna Maria Stein.

SpecialKats: Verónica Rodríguez Arguijo (TechieKat), Hayleigh Boshier (Book Review Editor), Rose Hughes (PatKat), Tian Lu (Asia Correspondent) and Chijioke Okorie (Africa Correspondent).

InternKats: Jocelyn Bosse, Aleksandra Czubek and Chiara Gallo.

[Home](#) [A bit more about the IPKat](#) [The IPKat Team](#) [Kats' posts](#) [Kats of the Past & Emeritus Kats](#) [Forthcoming Events](#) [Topics](#) [Policies](#)

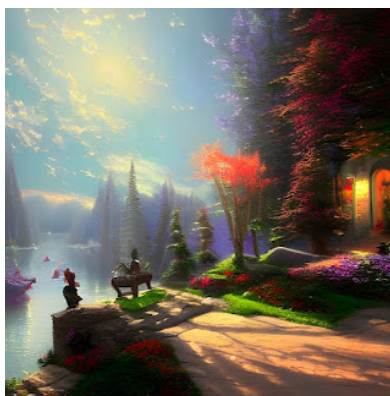


[Home](#) / [copyright protection](#) / [how images are made via AI](#) / [IP alternatives to copyright](#) / [latent diffusion](#) / [randomness factor](#) / [How artificial intelligence works in relation to copyright](#)

How artificial intelligence works in relation to copyright

👤 Neil Wilkof Friday, December 02, 2022 - [copyright protection](#), [how images are made via AI](#), [IP alternatives to copyright](#), [latent diffusion](#), [randomness factor](#)

Kat friend **Jakub Wyczik** provides an enlightening discussion of how AI and the law, especially copyright, intersect, with particular attention to the technical operation of AI.



Images generated using text-to-image technology, including **DALL-E 2**, **Midjourney**, and **Stable Diffusion**, have become a main topic in AI. Not only do many express wonder about how these systems work, but there is even doubt whether such users even have rights to such outputs. Let us briefly examine how these systems work and then consider how intellectual property law relates to them.

How it's made

Knowing how something works is necessary when discussing law and technology. To create a system that can generate new paintings in the style of famous artists, one would have to learn to paint in their style. However, what is a style, if not a set of specific common characteristics. We can use computers and data science for this purpose. To do so, we need to create a large set of images labeled with descriptions of their content.

Then we perform the learning process. Most of the image-generating solutions employ a technique called "**latent diffusion**." It is a way of creating algorithms (models) that use noise. First, the software turns the original image into noise, namely a random pattern of pixels (such as white noise or snow). Then, by trial and error, the computer gradually tries to reproduce the original image until it learns to do it almost perfectly.

During the above learning process, the program tries to find statistical relations between certain words and images, primarily where pixels of specific colors are usually located relative to each other for a given object. With current computers, this process can be performed automatically on many billions of images. One of the latest systems, Stable Diffusion, uses the **LAION-5B database** of five billion graphics scraped from the Internet.

If we already have an algorithm that can reproduce familiar shapes, we can also use it to create new images. However, the starting point for creation must be some description of the desired result, the so-called "prompt." So, a user types in the prompt and runs the program. The computer then creates noise based on a "seed," which is some value generated randomly by default.

The starting point can sometimes also be a particular graphic to which the noise will be added. Then, similar to the learning process described above, one begins with noise and description and then tries to guess what the image looked like at the beginning.

The point is that this image never existed. Although the model absorbs artists' styles, it should never duplicate any image from the training set (**see more, here, in my guide to Disco Diffusion**).

Element of randomness eliminates the work

Some might say that the same prompt means the same picture. Generated images are different, however, because of a specific randomness factor. Two users who use the same system and prompt will get different results. First, it is all about the above-mentioned "seed." The illustration below shows the results using the same prompt with a random seed value (noise).



"Highly detailed painting of wilderness by Florent Lebrun, trending on Artstation" (Disco Diffusion)

Even choosing the same seed mostly will not bring identical results. The images will be similar because the system performed the same generation process. However, they will be slightly different, as if two people painted the same landscape.



"Beautiful painting of the Polish landscape by Thomas Kinkade," seed: 21 (Disco Diffusion)

Nevertheless, since there is some degree of predictability, can one speak of a work? According to the United States Copyright Office, there is no author-human in such a case (**see Thaler's case**). However, this is nothing new. Several cases have weighed in on the issue of whether there is a work when external randomness occurs.

Thus, the case concerning a selfie allegedly taken by a monkey concluded that there could be no work because copyright does not apply to a monkey. It is not enough to decide to travel to Indonesia, befriend the animals, and set up the camera (**check IPKat post here**).

In the same way, **the garden in Chicago's Grant Park is not a work**. Authorship must result from an entirely human undertaking. Plant colors, shapes, or textures come from nature, not the gardener's mind.

Even if a human creates an initial image or prompt, this does not extend to the generated elements. Thus, one could only obtain protection for the structure of reworked images. The same applies to the common additional functions of such systems: inpainting (changing elements already existing in the image) and outpainting (painting an image beyond its original borders).

The situation would be similar to **photobashing** (using multiple digital assets such as pictures, models, and textures to transform them into new forms). Nevertheless, one should remember that even human contribution can be excluded by the "merger doctrine" or certain statutory exceptions (e.g., as "words and short phrases" - **37 CFR § 202.1(a)**).



Initial image--"Highly detailed painting of beautiful castle by Canaletto" (Stable Diffusion)

Still, one may ask how to distinguish a human creation from a machine? That is the key, devilishly difficult issue. Sometimes it is possible to quickly determine whether there is a watermark on the work (DALL-E 2) or that the file contains relevant metadata. Nevertheless, both the former and the latter can be removed quite easily.

If not the user, then perhaps the manufacturer of the model?

Sometimes one might argue that the creator of the model is the author of its outputs. The author believes that the answer to is "no." The model does not contain any copies of works. It is only a set of parameters derived from training data.

It is impossible to predict all results, just as Microsoft cannot predict what an Office user will create. Of course, this does not affect some restrictions on using someone's programs, but it is just a matter of choosing the proper license (e.g., **Disco Diffusion under MIT and Apache 2.0**).

How to live with the issue?

Let's start with the hope that copyright will survive and include protection for the outputs of AI. In practice, however, unless there is international harmonization on

the issue, it will lead to balkanization on what is protected in the context of AI. The upshot is that a revision or a new legal regime may be necessary, especially if the courts are reluctant to confer such creations.

In the interim, at least, related rights, trade secrets, or protection against unfair competition, might provide some helpful alternatives. [A similar view was expressed in the 1980's when the legal community began to confront protection of computer software.] Related rights will only apply to video or audio, and, in any event, they are not universally recognized around the world.

Unfair competition and trade secrets protection were never designed to address ownership issues. More generally, why copyright law cannot provide the solution is the topic for a separate post.

The post was written as part of the results of a research project funded by the National Science Centre, Poland, grant no. 2021/41/N/HS5/02726.

All graphics were created using generative systems (AI).

THE IPKAT LICENSES THE USE OF ITS BLOG POSTS UNDER A CREATIVE COMMONS ATTRIBUTION-NON COMMERCIAL LICENCE.

PRINT THIS POST

SHARE THIS:

[f Facebook](#) [t Twitter](#) [in LinkedIn](#)

How artificial intelligence works in relation to
copyright

PREVIOUS

IPKat Book of the Year Awards 2022!

NEXT

[BREAKING] UPC and Sunrise start dates pushed back by 2 months to 1 March 2023

Powered by Blogger.