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Artificial intelligence and copyright

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The rise of the machines is here, but they do not come as conquerors, they come as creators.

PHOTO: J. WALTER THOMPSON AMSTERDAM

Google has just started funding an artificial intelligence program that will write local news articles. In 2016, a group of museums and researchers in the Netherlands unveiled a portrait entitled The Next Rembrandt, a new artwork generated by a computer that had analyzed thousands of works by the 17th-century Dutch artist Rembrandt Harmenszoon van Rijn. A short novel written by a Japanese computer program in 2016 reached the second round of a national literary prize. And the Google-owned artificial intelligence company Deep Mind has created software that can generate music by listening to recordings.

Other projects have seen computers write poems, edit photographs and even compose a musical.

Computers and the creative process

Robotic artists have been involved in various types of creative works for a long time. Since the 1970s computers have been producing crude works of art, and these efforts continue today. Most of these computer-generated works of art relied heavily on the creative input of the programmer; the machine was at most an instrument or a tool very much like a brush or canvas. But today, we are in the throes of a technological revolution that may require us to rethink the interaction between computers and the creative process. That revolution is underpinned by the rapid development of machine learning software, a subset of artificial intelligence that produces autonomous systems that are capable of learning without being specifically programmed by a human.

A computer program developed for machine learning purposes has a built-in algorithm that allows it to learn from data input, and to evolve and make future decisions that may be either directed or independent. When applied to art, music and literary works, machine learning algorithms are actually learning from input provided by programmers. They learn from these data to generate a new piece of work, making independent decisions throughout the process to determine what the new work looks like. An important feature for this type of artificial intelligence is that while programmers can set parameters, the work is actually generated by the computer program itself – referred to as a neural network – in a process akin to the thought processes of humans.

Implications for copyright law

Creating works using artificial intelligence could have very important implications for copyright law. Traditionally, the ownership of copyright in computer-generated works was not in question because the program was merely a tool that supported the creative process, very much like a pen and paper. Creative works qualify for copyright protection if they are original, with most definitions of originality requiring a human author. Most jurisdictions, including Spain and Germany, state that only works created by a human can be protected by copyright.

But with the latest types of artificial intelligence, the computer program is no longer a tool; it actually makes many of the decisions involved in the creative process without human intervention.

Commercial impact

One could argue that this distinction is not important, but the manner in which the law tackles new types of machine-driven creativity could have far-reaching commercial implications. Artificial intelligence is already being used to generate works in music, journalism and gaming. These works could in theory be deemed free of copyright because they are not created by a human author. As such, they could be freely used and reused by anyone. That would be very bad news for the companies selling the works. Imagine you

invest millions in a system that generates music for video games, only to find that the music is not protected by law and can be used without payment by anyone in the world.

While it is difficult to ascertain the precise impact this would have on the creative economy, it may well have a chilling effect on investment in automated systems. If developers doubt whether creations generated through machine learning qualify for copyright protection, what is the incentive to invest in such systems? On the other hand, deploying artificial intelligence to handle time-consuming endeavors could still be justified, given the savings accrued in personnel costs, but it is too early to tell.

Blurring the lines between art and technology, researchers in the Netherlands challenged themselves to create a new Rembrandt masterpiece using cutting-edge information technologies (photos: J. Walter Thompson Amsterdam).

Legal options

There are two ways in which copyright law can deal with works where human interaction is minimal or non-existent. It can either deny copyright protection for works that have been generated by a computer or it can attribute authorship of such works to the creator of the program.

About The Next Rembrandt

The Next Rembrandt is a computer-generated 3-D–printed painting developed by a facial-recognition algorithm that scanned data from 346 known paintings by the Dutch painter in a process lasting 18 months. The portrait consists of 148 million pixels and is based on 168,263 fragments from Rembrandt's works stored in a purpose-built database. The project was sponsored by the Dutch banking group ING, in collaboration with Microsoft, J.Walter Thompson marketing consultancy, and advisors from TU Delft, The Mauritshuis and the Rembrandt House Museum.

To my knowledge, conferring copyright in works generated by artificial intelligence has never been specifically prohibited. However, there are indications that the laws of many countries are not amenable to non-human copyright. In the United States, for example, the Copyright Office has declared that it will "register an original work of authorship, provided that the work was created by a human being." This stance flows from case law (e.g. *Feist Publications* v *Rural Telephone Service Company, Inc. 499 U.S. 340 (1991)*) which specifies that copyright law only protects "the fruits of intellectual labor" that "are founded in the creative powers of the mind." Similarly, in a recent Australian case (*Acohs Pty Ltd* v *Ucorp Pty Ltd*), a court declared that a work generated with the intervention of a computer could not be protected by copyright because it was not produced by a human.

In Europe the Court of Justice of the European Union (CJEU) has also declared on various occasions, particularly in its landmark *Infopaq* decision (C-5/08 *Infopaq International A/S* v *Danske Dagbaldes Forening*), that copyright only applies to original works, and that originality must reflect the "author's own intellectual creation." This is usually understood as meaning that an original work must reflect the author's personality, which clearly means that a human author is necessary for a copyright work to exist.

The second option, that of giving authorship to the programmer, is evident in a few countries such as the Hong Kong (SAR), India, Ireland, New Zealand and the UK. This approach is best encapsulated in UK copyright law, section 9(3) of the Copyright, Designs and Patents Act (CDPA), which states:

"In the case of a literary, dramatic, musical or artistic work which is computer-generated, the author shall be taken to be the person by whom the arrangements necessary for the creation of the work are undertaken."

Furthermore, section 178 of the CDPA defines a computer-generated work as one that "is generated by computer in circumstances such that there is no human author of the work". The idea behind such a provision is to create an exception to all human authorship requirements by recognizing the work that goes into creating a program capable of generating works, even if the creative spark is undertaken by the machine.

Addressing ambiguity

This leaves open the question of who the law would consider to be the person making the arrangements for the work to be generated. Should the law recognize the contribution of the programmer or the user of that program? In the analogue world, this is like asking whether copyright should be conferred on the maker of a pen or the writer. Why, then, could the existing ambiguity prove problematic in the digital world? Take the case of Microsoft Word. Microsoft developed the Word computer program but clearly does not own every piece of work produced using that software. The copyright lies with the user, i.e. the author who used the program to create his or her work. But when it comes to artificial intelligence algorithms that are capable of generating a work, the user's contribution to the creative process may simply be to press a button so the machine can do its thing. There are already several text-generating machine learning programs out there, and while this is an ongoing area of research, the results can be astounding. Stanford PhD student Andrej Karpathy taught a neural network how to read text and compose sentences in the same style, and it came up with Wikipedia articles and lines of dialogue that resembled the language of Shakespeare.
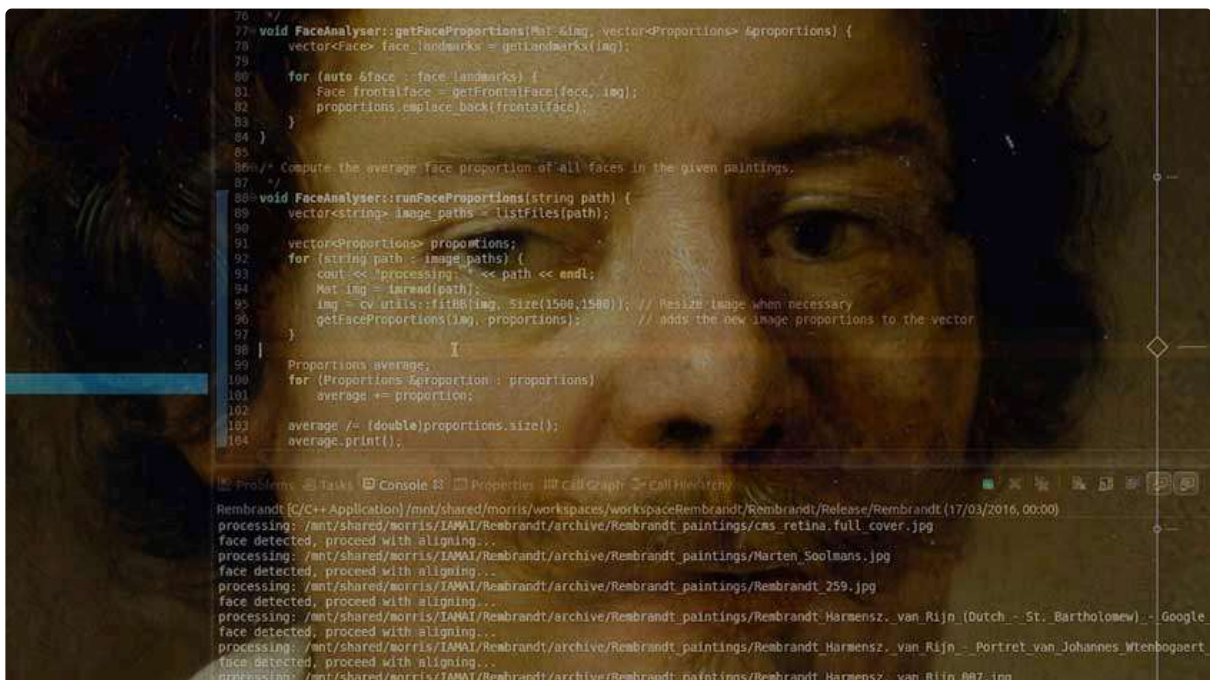
The use of artificial intelligence by artists is becoming more widespread, blurring the distinction between works created by a human and those created by a computer. This has interesting implications for copyright law, which generally only protects works created by a human (photo: J. Walter Thompson Amsterdam).

Some case law seems to indicate that this question could be solved on a case-by-case basis. In the English case of *Nova Productions* v *Mazooma Games* [2007] EWCA Civ 219, the Court of Appeal had to decide on the authorship of a computer game, and declared that a player's input "is not artistic in nature and he has contributed no skill or labour of an artistic kind". So considering user action case by case could be one possible solution to the problem.

The future

Things are likely to become yet more complex as use of artificial intelligence by artists becomes more widespread, and as the machines get better at producing creative works, further blurring the distinction between artwork that is made by a human and that made by a computer.

Monumental advances in computing and the sheer amount of available computational power may well make the distinction moot; when you give a machine the capacity to learn styles from large datasets of content, it will become ever better at mimicking humans. And given enough computing power, soon we may not be able to distinguish between human-generated and machine-generated content. We are not yet at that stage, but if and when we do get there, we will have to decide what type of protection, if any, we should give to emergent works created by intelligent algorithms with little or no human intervention. Although copyright laws have been moving away from originality standards that reward skill, labour and effort, perhaps we can establish an exception to that trend when it comes to the fruits of sophisticated artificial intelligence. The alternative seems contrary to the justifications for protecting creative works in the first place.

Granting copyright to the person who made the operation of artificial intelligence possible seems to be the most sensible approach, with the UK's model looking the most efficient. Such an approach will ensure that companies keep investing in the technology, safe in the knowledge that they will get a return on their investment.

The next big debate will be whether computers should be given the status and rights of people, but that is a whole other story.

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