Artificial Intelligence creates, invents … and challenges Intellectual Property Law

AI: the mind behind creative and innovative works. Can a sui generis system be a solution?

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ABSTRACT

Recent developments in technology are leading to the production of machines with the intellectual capacity to create and invent, just like humans. Artificial Intelligence (AI) is challenging copyright and patent law, as the actual author and inventor is no longer a natural person, but a machine. This article focuses on creative and innovative outputs generated autonomously by AI and scrutinises whether and to what extent they are eligible for protection through traditional Intellectual Property (IP) rights. Lastly, this article seeks to determine whether the current legal system is able to deal with this phenomenon, as well as to present a solution that can do so, in the form of a sui generis system tailor-made for AI-generated materials.

1. INTRODUCTION

AI is a fascinating world that brings together experts from multiple fields to create machines and software with abilities similar to those of human beings. In fact, smart technologies can mimic some human behaviours, such as learning, creating, inventing, interacting with people and holding a conversation.[1] Despite its intriguing profile, AI can be seen as a threat to humankind, especially by those who have seen science fiction films like *The Terminator* or *The Matrix*, in which war ensues between humans and machines.[2] But leaving aside such an apocalyptic scenario, AI has become a burgeoning field of research, not only for computer scientists and engineers, but also for lawyers, policymakers and philosophers. If AI can mimic some activities of the human brain, and interact autonomously with human beings, many fields where AI is involved need to be regulated, in order to balance the need of progress with ethical issues and human rights.[3]

Recent developments in AI have resulted in machines and software with the "intellectual" capacity of creating and inventing. Hence, the field of IP Law has been influenced by this new world of intellectual creations that are not strictly shaped by human beings. AI challenges traditional notions of authorship and inventorship and some aspects of copyright and patent systems collide with AI-generated outputs. Therefore, legal answers on how to deal with this technology are necessary and urgent.

2. WHAT IS AI?

"Most people don't understand just how quickly machine intelligence is advancing, it's much faster than almost anyone realized."

- Elon Musk -

There has been much speculation about AI in the context of the future of the human race and its coexistence with intelligent machines. In fact, the term "Artificial Intelligence" was not coined in the last decade or during the so-called fourth industrial revolution (or "AI revolution").[4] Rather, it was introduced in 1956 by John McCarthy – though the study of machines with the ability to do intelligent things is even older, going back to 1950 and a mathematician, Alan Turing, who is considered "the father of modern computer science".[5] Even today we talk of the "Turing test", which finds that a machine can 'think' when it is able to imitate a human being so well that an interrogator cannot tell the difference between the answers of the human and the answers of the machine.[6]

In essence, AI systems could be described as software programs that interact with physical or digital environments and, which, by acquiring, collecting and interpreting data, decide the best actions to take in order to achieve a given goal.[7] Basic AI systems display three main capabilities: perception, reasoning/decision making and actuation.[8] These capabilities can be divided into two main groups: AI's capability to reason and its capability to learn. The first concerns the ability to transform data into knowledge in order to make a decision regarding which action to take to solve a problem.[9] The second refers to learning techniques, such as machine learning, neural networks[10] and deep learning.[11] Some of them do not allow the giving of a clear explanation of a machine's reasoning for certain decisions. For this reason, experts have coined the expression "black-box AI" scenario,[12] referring to the fact that the decision of an AI cannot always be explained and that the human factor is not decisive in every choice of an AI.[13]

Some authors propose a "multi-level model"[14] for discussing AI, where AI is divided into several levels. In parti-

cular, it has been proposed that Level 1 encompasses semi-autonomous AI systems, which have the same characteristics as software programs and are controlled by humans, but use advanced algorithms.[15] Level 2 includes fully autonomous AI systems that are dependent on data and more advanced AI systems able to generate unexpected outputs.[16] Furthermore, a third level has been hypothesised as a futuristic idea, based on the intersection of biological and digital intelligence.[17]

In copyright and patent law, the real obstacles arise when human intervention is minimal and the level of autonomy in AI systems allows them to create works of art and generate innovative ideas with algorithms that are self-assembling and not written by humans.[18]

3. IP RIGHTS CHALLENGED BY AI

3.1. Copyright challenges

Natural rights theorists[19] justify copyright protection because "it is the right thing to do", since the creative work generates from the author's mind, and therefore it is considered an expression of the author's personality.[20]

Other utilitarian theorists[21] stressed the necessity to give a reward to the author, who puts efforts into an artistic work.[22] Copyright and other IP rights are recognised to incentivise creativity and innovation, by allowing the author a monopoly to solely exploit the work for a certain period of time.[23]

1   Granmar, C. (2018) 'Artificial intelligence and fundamental rights'. Workshop description, 15–16 June 2018, Stockholm University.
2   Rocha, E. (2018) 'Sophia: Exploring the Ways AI May Change Intellectual Property Protections'. *Journal of Art, Technology & Intellectual Property Law* 28 (2), 126–146.
3   Granmar, C. (2018).
4   Regarding the fourth industrial revolution, see https://www.epo.org/news-issues/news/2017/20171211.html, (accessed on 4 February 2020); Chimuka, G. (2019) 'Impact of Artificial Intelligence on Patent Law. Towards a New Analytical Framework – [the Multi-Level Model]'. *World Patent Information* 59 (101926).
5   Smith, C., et al. (2006) 'The History of Artificial Intelligence'. *History of Computing CSEP* 590A, University of Washington, p.4.
6   Ibid., pp. 5 ss.
7   AI-HLEG 'Ethics Guidelines for Trustworthy AI' European Commission, 08.04.2019, https://ec.europa.eu/digital-single-market/en/news/ethics-guidelines-trustworthy-ai, (accessed on 5 February 2020), p. 36.
8   AI-HLEG 'A Definition of AI: Main Capabilities and Disciplines' European Commission 08.04.2019 https://ec.europa.eu/digital-sing-le-market/en/news/definition-artificial-intelligence-main-capabilities-and-scientific-disciplines (accessed on 6 February 2020), p. 3.
9   Ibid.
10 Ibid., p. 4: "[N]eural networks […] is loosely inspired by the human brain in that it has a network of small processing units (analogously to our neurons) with lots of weighted connections among them."
11 Ibid., p. 4: "[D]eep learning […] refers to the fact that the neural network has several layers between the input and the output that allow to learn the overall input-output relation in successive steps. This makes the overall approach more accurate and with less need of human guidance."
12 Ibid., p. 5.
13 Ibid.; Granmar, C. (2019) 'Artificial Intelligence and Fundamental Rights from a European Perspective' in *Artificial intelligence and fundamental rights*, Granmar C., Fast Lappalainen K., and Storr C. (eds.), p. 25.
14 Chimuka, G. (2019).
15 Ibid., pp. 5-6.
16 Ibid., pp. 7-8.
17 Ibid. p. 9. See also the research project *Neuralinks*, led by Elon Musk https://www.dezeen.com/2019/07/22/elon-musk-neura-link-implant-ai-technology/ (accessed on 6 February 2020).
18 Chimuka, G. (2019), p. 9.
19 Locke, J. (1698); Hughes, J (1988) 'The Philosophy of Intellectual Property', 77 Georgetown LJ 287; Bently, L., Sherman, B., Gangjee, D., and Johnson, P. (2018) 'Intellectual Property Law', Oxford University Press, p. 40.
20 Bently, L., et al. (2018), p. 40.
21 Mill J.S., (1862) 'Principles of Political Economy' (5th Edition), New York, Appleton.
22 Bently, L., et al. (2018), pp. 40-41.
23 Ballardini, R.M., He, K., and Roos, T. (2019) 'AI-Generated Content: Authorship and Inventorship in the Age of Artificial Intelligence' in *Online Distribution of Content in the EU*. Pihlajarinne, T., Vesala, J., and Honkkila O. (eds.), p. 132–133; De Cock Buning, M. (2016) 'Autonomous Intelligent Systems as Creative Agents under the EU Framework for Intellectual Property'. *European Journal of Risk Regulation*, 7(2), pp. 129-130.

Evidently, these theories are based on the human being as the only possible (and – formerly – only foreseeable) author of literary, artistic or musical works (the so-called anthropocentric vision).[24]

Nevertheless, in our digital environment, AI machines are also able to create works of art. For instance, the *Next Rembrandt*[25] produces paintings using a 3D printer, controlled by an AI with a facial recognition algorithm that analyses the paintings of Rembrandt and creates new paintings that replicate his style.[26] Hence, computers are no longer mere tools, like brushes or pens, used by artists to create art.[27] Nowadays, AI machines can make most of the decisions in the creative process without being specifically directed by humans.

3.1.1. Who is the author?

In the current copyright system, AI is not taken into consideration as a possible creator of a literary, artistic and musical work. In the Berne Convention,[28] despite that no clear definition of *author* is provided, it is possible to deduce that the only imaginable author is a human being. There are references to the nationality of the author[29] and the death of the author.[30] The TRIPS Agreement[31] considered "the life of a natural person"[32] for the term of protection. As for the European legal framework, the Term Directive[33] refers explicitly to the life of the author[34] and the Software Directive[35] seems to provide a general and consolidated rule according to which natural persons are generally the only ones entitled to authorship.[36]

The only jurisdiction that seems to consider works generated by computer programs is the UK Copyright, Designs and Patents Act 1988 (CDPA), according to which "the author shall be taken to be the person by whom the arrangements necessary for the creation of the work are undertaken".[37] Even if one were to apply this provision to modern AI creative systems, uncertainty would remain in the identification the person who made the necessary arrangements. Was it the person who operated the computer? Was it the programmer?[38] Or was it the data trainer?[39]

3.1.2. Originality criterion challenged

AI also challenges another requirement that needs to be met: originality. A work is original and therefore eligible for copyright protection if it is the *author's own intellectual creation*.[40] In *Infopaq*,[41] the Court of Justice of the European Union (CJEU) has harmonised the standard of originality for every subject matter, not only for databases, computer programs and photographs. In *Painer*,[42] the CJEU further stated that an intellectual creation is the author's own if it reflects their personality; this occurs when the author is able to express their creative abilities by making free and creative choices.[43]

Based on the interpretation of the CJEU, the threshold of the originality test seems to be strictly connected to the human being as the only imaginable author of a creative work. In fact, if a work is original in the meaning that it must reflect the personality of the author and have their unique and personal touch, such work is regarded as an extension of the author's persona[44] – something that even advanced AI systems do not (yet) have.

3.2. Patent challenges

Patent monopoly is not so different from the copyright system; it has been seen as a reward for the contribution of the inventor and their intellectual activity. It is considered a natural right of inventors.[45] However, the common justification for granting patents seems to lie in the public benefit (the so-called "information function" of the patent system).[46] An inventor should obtain a monopoly for an innovation, if the public can benefit from it in return. The rationale underpinning this theory can be seen in the fact that the inventor must disclose the invention by publishing it in the patent application, in exchange for a monopoly of 20 years.[47] Without the possibility of obtaining this form of protection, new technologies would remain secret.[48] Such justifications for the patent system could be challenged by modern technologies, where AI systems demonstrate the capability of producing innovative materials, with little involvement of any human being in the inventive process.

[24] De Cock Buning, M. (2016), 310–322; Lauber-Rönsberg, A. and Hetmank S. (2019) 'The Concept of Authorship and Inventorship Under Pressure: Does Artificial Intelligence Shift Paradigms?'. *Journal of Intellectual Property Law & Practice* 14 (7), 570–579.

[25] https://www.nextrembrandt.com/ (accessed on 6 February 2020).

[26] Guadamuz, A. (2017) 'Artificial Intelligence and Copyright'. *WIPO Magazine* 5/2017, p. 3; Ballardini, R.M., et al. (2019), p. 121.

[27] Guadamuz, A. (2017), p. 2.

[28] Berne Convention for the Protection of Literary and Artistic Works of 1886.

[29] Article 3 Berne Convention.

[30] Articles 6bis (2), 7(5), 7bis Berne Convention.

[31] Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS) of 1994.

[32] Article 12 TRIPS Agreement.

[33] Directive 2006/116/EC on the term of protection of copyright and certain related rights (Term Directive).

[34] Article 1 (1)(2) Term Directive.

[35] Directive 2009/24/EC on the legal protection of computer programs (Software Directive).

[36] Article 2(1)(2) Software Directive.

[37] CDPA 1988 Section 9 (3).

[38] Bently, L., et al. (2018), p. 128; see also Bonadio, E., Mcdonagh, L., and Arvidsson, C. (2018) 'Intellectual Property Aspects of Robotics'. *European Journal of Risk Regulation* 9 (4), p. 664.

[39] See for instance Yanisky-Ravid, S. and Liu, X. (2017) 'When Artificial Intelligence Systems Produce Inventions: The 3A Era'. *Cardozo Law Review*, 39 (6).

[40] Article 3(1) Directive 96/9/EC on the legal protection of databases of 11 March 1996 (Database Directive); Article 1(3) Software Directive; Article 6 Term Directive.

[41] Judgment of 16 July 2009, *Infopaq International A/S v Danske Dagblades Forening*, C-5/08, EU:C:2009:465.

[42] Judgment of 1 December 2011, *Eva-Maria Painer v Standard Verlags GmbH*, et al., C-145/10, EU:C:2011:798.

[43] Ibid., [88], [89].

[44] Bently, L., et al. (2018), p. 40.

[45] Ibid., p. 397.

[46] Ibid.

[47] Article 63 (1) EPC 2000.

[48] Bently, L., et al. (2018), p. 398; see Article 83 EPC 2000.

An example of an AI system able to generate new ideas without any specific objective is DABUS, a "Device for the Autonomous Bootstrapping of Unified Sentience", by Stephen Thaler.[49] DABUS can perform "brain-like functions" using artificial neural networks.[50] It has created two patentable subject matters: a plastic food container based on fractal geometry and a flashing light to signal an emergency.[51] Both patent applications were refused by the European Patent Office (EPO)[52] on the grounds that they did not meet the legal requirements of the European Patent Convention (EPC 2000), as the inventor must be a human being and not a machine.[53] In fact, the applicant stated DABUS as the inventor,[54] as it was the machine that made the inventions and recognised the novelty of its own idea before any natural persons.[55] The applicant also claimed that "inaccurately listing a natural person as inventor would be misleading to the public",[56] and therefore contrary to the principle that the applicant must indicate the actual deviser of the invention.[57]

3.2.1.   Who is the inventor?

A recent study on inventorship and AI commissioned by the EPO specified that the inventor, in most jurisdictions, must be a natural person.[58] The EPC 2000 does not provide a clear definition of inventorship, nor does it specify that an inventor must be a human being. However, following on the reasoning of the EPO in the DABUS decisions, it seems clear that the patent office only accepts applications that identify a natural person as the inventor.[59] Currently, AI systems have no legal personhood and hence cannot hold rights deriving from the status of inventor. Therefore, they cannot transfer or assign any rights, nor own an invention.[60] The solution adopted by the EPO is that the owner of an AI machine is also the owner of any output created by that machine.[61]

3.2.2.   The inventive step challenged

One of the requirements of patentability that is challenged by AI is the inventive step.[62] A person skilled in the art must find the invention non-obvious in order for it to pass this test. Therefore, the threshold in patent law has always been based on the fictional character of a human person skilled in the art, who is uninventive and conservative, with average knowledge and skills relevant in the field of the invention.[63]

It is argued that if AI systems were to be used as a routine tool in the inventive process, the threshold of the inventive step would consequently need to be raised, as a person skilled in the art would routinely use AI.[64] On the one hand, inventions generated by AI may be obvious to a person skilled in the art who has access to AI.[65] On the other hand, if the skilled person did not adapt in step with technology, all AI-generated inventions would be non-obvious.[66] Thus, the threshold of the inventive step would instead be too low.[67]

However, it is currently assumed that the inventive step will not be modified by inventions involving AI, as the person skilled in the art has access to all knowledge of the field, including AI technology. Nevertheless, it is also assumed that if what many engineers are predicting turns out to be true – that AI will reach the level of human intelligence in about a decade[68] – AI machines would improve to such an extent that all inventions would be rendered obvious.[69]
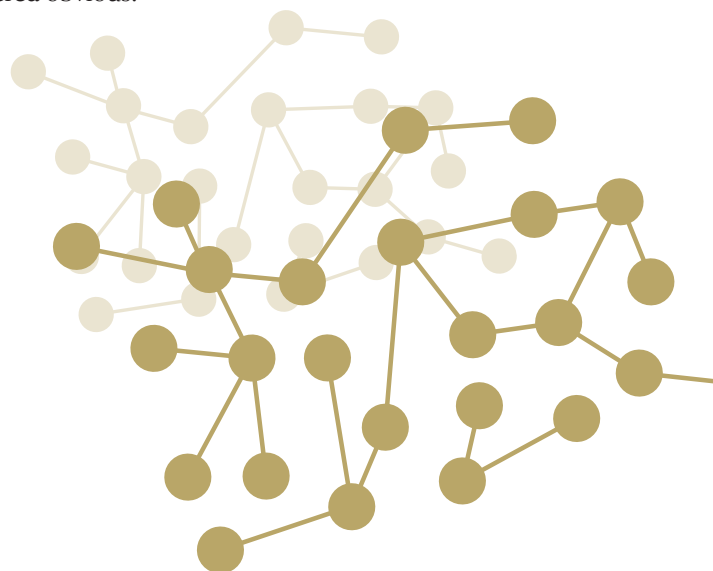
[49] http://www.imagination-engines.com/ and https://www.bbc.com/news/technology-49191645, (accessed on 22 February 2020).

[50] http://imagination-engines.com/iei_dabus.php (accessed on 22 February 2020).

[51] Abbott, R. (2019) 'The Artificial Inventor Project'. *WIPO Magazine* 6/2019.

[52] EPO decisions of 27 January 2020, on EP 18275163 and EP 18275174.

[53] EPO https://www.epo.org/news-issues/news/2020/20200128.html (accessed on 23 February 2020).

[54] EPO decision of 27 January 2020, on EP 18275163, [3].

[55] Ibid. [5].

[56] Ibid., [12].

[57] Ibid.; Patents Act 1977, s. 7(3).

[58] Shemtov, N. (2019) 'A study on inventorship in inventions involving AI activity' commissioned by the EPO, p. 10; Five IP Offices (2018) 'Report from the IP5 expert round table on artificial intelligence' https://www.fiveipoffices.org/wcm/connect/fiveipoffices/5e2c753c-54ff-4c38-861c-9c7b896b2d44/IP5+roundtable+on+AI_report_22052019.pdf?MOD=AJPERES&CVID= (accessed on 23 February 2020).

[59] See Articles 60 (1), 62, 81; Rules 20, 19(1)(3) EPC 2000.

[60] Shemtov, N. (2019), p. 25.

[61] EPO decision of 27 January 2020, on EP 18275163, [32].

[62] Article 56 EPC 2000.

[63] Bently, L., *et al.* (2018), pp. 582-584.

[64] Blok, P. (2017) 'The Inventor's New Tool: Artificial Intelligence - How Does It Fit in the European Patent System?'. *European Intellectual Property Review* 39 (2), 69-73.

[65] Modkova, A. and Vara, H. (2018), 'The Robot Revolution - Reinventing Inventorship'. *Intellectual Property Forum: Journal of the Intellectual and Industrial Property Society of Australia and New Zealand, 111, p. 16.*

[66] Ibid.

[67] Abbott, R. (2019) 'Everything is Obvious'. *UCLA Law Review* 66 (1), p. 5.

[68] Ibid., pp. 4–5.

[69] Ibid., p. 8.

3.3. Flaws in the copyright and patent systems for AI-generated outputs

The traditional IP rights seem to be unsuitable for protecting AI-generated materials. Neither copyright nor patent rights provide certain and stable legal solutions for investors who want to protect valuable assets deriving from AI systems.

(i) *Copyright*. A work that lacks human intervention is generally not suitable for copyright protection.[70] In primis, this is because the author must be a natural person – but, even if an AI system could be recognised as a legal entity and thus eligible for authorship, the originality standard as interpreted by the CJEU, could not be met by a non-human author.[71] Therefore, changes in the system would be needed: the originality requirement should be adjusted for AI,[72] a different legal term that does not start its calculation from the death of the author should be introduced, and moral rights should be allocated differently.[73] As a consequence, this would result in a separate copyright system for AI-generated works ("robot copyright").[74]

(ii) *Patent*. Including AI-generated inventions in the framework of the current patent system would mean that a natural person should qualify as the inventor, such

that a "proxy human inventor"[75] would be named even if this was not the actual deviser. However, such a patent could be challenged and invalidated before courts if it was proved that an AI system was responsible for the invention and that the natural person had been wrongly designated.[76] Furthermore, considering the peculiarity of the AI field, many actors could claim inventorship. At least ten stakeholders that could qualify for inventorship have been identified.[77] One example is the software programmer who creates the AI system. However, it could be argued that he/she is not entitled to rights related to the patentable inventions autonomously and unpredictably generated by that AI.[78] The data supplier might also claim inventorship, as he/she is the operator who has fed the AI system with the data necessary to achieve a target.[79] But what happens when an AI is incorporated into a robot able to find its way in physical space and acquire data on its own?[80] Many parties could have an interest in being recognised as the inventor, but none of them could qualify as such in a traditional patent meaning because of a lack of "technical contribution".[81]

Problems concerning the sufficiency of disclosure might also arise. According to Rule 42(1)(c) and (e) EPC 2000, an invention must be described in terms of its structure and its function, and the description must disclose any feature in sufficient details to allow a skilled person to create the invention without undue burden and the need to adopt inventive skills.[82] Even if the input and output for an AI-generated invention are known, what happens in between may be obscure and difficult to explain, as it can remain unknown even to the person who has programmed and input data into the AI system.[83] The description of the decision process does not guarantee that the result will be the same, even if the exact same process is performed and the same data are provided.[84] If the examining division finds a patent application insufficient, the onus of proving that the invention can be created based on what is disclosed in the claims shifts to the applicant.[85] Thus, an applicant who intends to patent an AI-generated invention could be discouraged from doing so, if there is a risk that the requirement of sufficient disclosure might not be satisfied due to the so-called "black box problem".[86]

70 De Cock Buning, M. (2016), p. 10.
71 Judgment of 16 July 2009, *Infopaq International A/S v Danske Dagblades Forening*, C-5/08, EU:C:2009:465; Judgment of 1 December 2011, *Eva-Maria Painer v Standard Verlags GmbH*, et al., C-145/10, EU:C:2011:798.
72 Lauber-Rönsberg, A. and Hetmank S. (2019), p. 576.
73 Ibid., pp. 576–577.
74 Ibid.
75 Gervais, D. (2020) 'Is Intellectual Property Law Ready for Artificial Intelligence?'. *GRUR International* 69 (2), p. 118.

76 Ibid.
77 Yanisky-Ravid, S. and Liu, X. (2017), p. 2231.
78 Ibid.
79 Ibid., p. 2232.
80 The AI-generated invention may belong to the public. Ibid., pp. 2232, 2234.
81 Ibid., p. 2233. See also Shemtov, N. (2019), p. 30.
82 EPO Guidelines for Examination "Sufficiency of disclosure", F. III. 1.
83 Five IP Offices (2018), p. 3, D.8.
84 Ibid.
85 EPO Guidelines for Examination "Sufficiency of disclosure", F. III. 1.
86 See Chapter 2; Granmar, C. (2019), p. 25.

87 Ballardini, R.M et al. (2019), p. 132–133; De Cock Buning, M. (2016), p. 322.
88 De Cock Buning, M. (2016), p. 322.
89 Thampapillai, D. (2019) 'Copyright and Works of Non-Human Authorship: An Australian Prospective' in *Artificial Intelligence and Fundamental Rights*, Granmar C., Fast Lappalainen K., and Storr C. (eds.), p. 69.
90 Ballardini, R.M. et al. (2019), pp. 132–133.
91 Ibid., p. 129; Lauber-Rönsberg, A. and Hetmank S. (2019), p. 579.
92 See for instance Ballardini, R.M. et al. (2019), pp 133-135 and Lauber-Rönsberg, A. and Hetmank S. (2019), pp. 578-579.

4. POSSIBLE SCENARIOS FOR AI-GENERATED OUTPUTS

Scholars have described scenarios in which different legal solutions are applied to situations where an AI is the main character behind works of art and inventions.

(i) *AI-generated outputs as public domain.* A possible scenario is that neither creative works nor inventions generated by autonomous AI with little or no human intervention would be protected by IP rights. Thus, they would fall in the public domain and it has been said that this solution would possibly benefit society as a whole.[87] Indeed, AI does not need to be rewarded for the work that it creates and no incentives are necessary,[88] so the theories that justify copyright and patent protection do not apply and fit into the scheme of AI-generated outputs. However, this option is not entirely satisfactory, as "computer-generated works can be both useful and valuable".[89] In fact, it has been observed that other instruments would be used by owners of AI systems to protect their outputs (trade secrets, *in primis*).[90] Hence, such scenarios might lead to inventions being kept secret and no investments being made in new technologies, with possible arrest of innovation and development.[91]

(ii) *AI-generated outputs being protected under copyright and patent law.* Another possible scenario that has been suggested[92] is to protect AI-generated outputs under the framework of copyright and patent law, although a different approach and changes in the legal systems would be needed. It has also been suggested that legal personhood should be granted to AI,[93] with a similar status that corporations have, in order to bear rights and obligations,[94] with AI recognised as the author/inventor of a work/invention. For instance, the European Parliament in 2017 issued a resolution[95] aiming at adopting legal solutions for AI issues, such as introducing an electronic personhood for at least the most sophisticated autonomous robots.[96] This resolution received criticism and has gone unheard by the Commission thus far.[97] At a national level, initiatives that aim to recognise AI as something more than a machine seem to have appeared on the horizon, though it has been observed that those attempts are still far from being considered full recognition of a legal status for AI.[98]

(iv) *Contractual tools for protecting AI-generated outputs.* A further solution that has been suggested is to leave protection of AI-generated works and inventions to private contracts, so that private investors could decide on a suitable regime to apply to an AI output, without having regulations interfere therewith.[99] However, leaving economic rights that arise from valuable inventions or works of art to contractual freedom alone could lead to imbalances in bargaining power and to legal uncertainty.

(v) *A sui generis solution.* Arguably, none of the aforementioned alternatives seems to offer a suitable solution for AI-generated outputs, as they do not provide stability and a clear legal environment. Therefore, another option could be to create a *sui generis* system tailormade for when AI is the "author" or the "inventor". When a particular subject matter is unsuitable for fitting into a specific legal form of protection, it is not uncommon to create an *ad hoc* regime that takes into account the particular aspects that make it fall outside the scope of protection.[100] The reason for creating a special regime is generally apparent from the subject matter that cannot find protection under the typical IP rights. *Sui generis* systems are implemented to encourage investments and prevent market failure.[101] A *sui generis* system displays unique characteristics, specifically tailormade for the subject matter that it protects, and usually differs from the typical IP rights as regards the requirements for a subject matter fall within their scope.[102] Other elements are generally also adapted, such as the period of protection or the time when the rights conferred starts running.

[93] See Ballardini, R.M. et al. (2019), pp. 130–132; Davies, C. R. (2011) 'An Evolutionary Step in Intellectual Property Rights – Artificial Intelligence and Intellectual Property'. Computer Law & Security Review, 27 (6).

[94] Zibner, J. (2019), 'Artificial Intelligence: A Creative Player in the Game of Copyright'. *European Journal of Law and Technology* 10 (1), p. 12.

[95] European Parliament Resolution of 16 February 2017 Recommendation to the Commission on Civil Law Rules on Robotics (2015/2103 (INL)).

[96] Ibid., 59 (f).

[97] Azam, M. (2019) 'Artificial Intelligence and EU Law: Balancing Risk, Innovation and Public Good' in *Artificial intelligence and fundamental rights*, Granmar C., Fast Lappalainen K., and Storr C. (eds.), pp. 106–108.

[98] For example, the humanoid-robot Sophia was granted citizenship by Saudi Arabia, (https://www.hansonrobotics.com/sophia/ accessed on 6 February 2020); a chatbot programmed to be a seven-year-old boy became the first AI to be granted official residency in Tokyo (https://www.newsweek.com/tokyo-residency-artificial-intelligence-boy-shibuya-mirai-702382, accessed on 11 April 2020); a "robot agent" is under examination in Estonia as a legal status for AI (https://e-estonia.com/estonia-accelerates-artificial-intelligence/, accessed on 11 April 2020), and Shemtov, N. (2019), pp. 25, 26.

[99] Davies, C. R. (2011).

[100] Kur, A. and Dreier, T.K. (2013) 'European Intellectual Property Law: Text, Cases and Materials'. Cheltenham: Edward Elgar, p. 323.

[101] Ibid.

[102] Ibid.

5. PROPOSAL: A SUI GENERIS SYSTEM FOR AI-GENERATED OUTPUTS

"When an AI machine makes choices, the legal situation changes."

- Daniel Gervais -

The creation of a *sui generis* system may be an adequate way to mitigate the problems concerning AI-generated materials. It could provide answers to questions regarding whether or not such works should be protected and under which regime, since the existing IP rights do not offer stable or certain solutions.[103]

5.1. A two-pronged approach

The proposed *sui generis* system for AI-generated outputs would use a two-pronged approach, adapted for the type of AI in question. Going back to the two models of AI,[104] the *sui generis* regime would come into play for AI systems that belong to "Level 2", where the outcome of an AI is unpredictable. In the case of AI at "Level 1", where the outcome is predictable and the target set by a natural person who could qualify as author or inventor, the copyright and patent regimes would apply.

This dual system could nevertheless cause some problems, for instance in determining if an AI-generated output belongs to "Level 1" or "Level 2" and therefore whether it should be protected by copyright/patent law or by the special regime. Problems could also arise in case of infringements, giving a burdensome task to courts that have to identify which type of AI has been employed.[105] In such a scenario, a possible distinction could be drawn based on the results and whether these were expected or not. If the result was predicted and the target for the AI was directed by the person who programmed the machine, then the AI would likely belong to "Level 1". On the other hand, if the programmer and other persons involved were totally unaware of the outcome of the AI and the result was unpredictable, this would prove that the AI-generated output had been created by a "Level 2" AI. Furthermore, in this system, a specific AI division that deals only with AI technologies, consisting of experts of the field, could be implemented in both courts and offices.

5.2. Rationale

The rationale of such a *sui generis* system for AI-generated outputs can be recognised in the need to reward not the AI itself, but the investments made in AI technologies, and thus to encourage research, development and innovation.[106] A stable and clear legal system[107] that can ensure protection for AI-generated outputs is desirable in order to achieve this.

Indeed, AI technology is a valuable asset, not only in itself, but also for what it is able to create and invent.[108] Machines are becoming smarter, with the capacity of creating works that are arguably of higher quality than those produced by humans,[109] and of processing a huge amount of data[110] faster than a single person or a team would be able.

5.3. Works of art and inventions under the same system

The proposed *sui generis* system would apply to both AI-generated works of art and AI-generated inventions. Having two separate systems would be unnecessary, as the outcome in both cases is a result of the same form of technology. Both paintings and innovative objects would be created by AIs through similar processes. However, depending on the characteristics of the output, two routes could be taken: non-registration in the case of artistic, literary and musical works (as for copyright) and registration in the case of technological innovations (along the lines of the patent system).

5.3.1. Works of art

AI can create valuable works by meeting on-demand requests from the public in less time and at lower cost than a human and could be more adaptable than a human to consumers' needs.[111] Those characteristics are sufficient elements for attracting investments in AI-generated art.

Databases that are not original in the sense of being the author's own intellectual creation, but when substantial investments have been made, are granted a *sui generis* protection.[112] The same logic could apply for AI-generated works, so that the focus would not be on the originality criterion, as has been construed by the CJEU, but on the form of expression.[113] A work, autonomously created by an AI system, for which investments have been made, and that is original in the sense of not being a copy of an existing work, would be enough to grant protection under this *sui generis* system.[114]

Furthermore, much like in the copyright system in European jurisdictions, no form of registration would be needed, so that the system would be appealing enough for the rights holder to seek protection in case of infringement.

5.3.2. Inventions

When it comes to AI-generated inventions, a justification for a *sui generis* protection as an alternative to the typical patent monopoly may be seen in the subject matter at hand. Indeed, it has been observed that an AI-generated invention is a "computational invention" that needs protection because certain creations are possible only thanks to machines that are able to analyse huge amounts of data.[115]

Therefore, the system should be adapted to the peculiarity of the "inventor" and the generated subject matter. As the main challenge is the inventive step requirement, inspiration could be taken from the "innovation patent" of the Australian patent system, as some scholars have already suggested.[116] The "innovation patent" was introduced to protect innovations that have a short market life and do not meet the higher inventive standard of the patent system. This system was made especially for small and medium-sized enterprises, to allow them to quickly and inexpensively gain protection for new innovations.[117] Instead of the inventive step, an "innovative step" is needed. This requires that an invention is "different from what is known before and the difference makes a *substantial contribution* to the working of the invention".[118] When

it comes to AI-generated inventions, a similar requirement that substitutes the inventive step could apply: novelty, industrial application and an "innovative step" could be seen as conditions tailored for such computational inventions.

5.4. Ownership

The main feature of the suggested system would be that identifying who is the author or the inventor of a protected work would no longer be necessary, because it would only apply to AI-generated outputs. The AI (at "Level 2") would be considered "the mind" behind the creation. This would eliminate the need for identifying a natural person that should be named the author or inventor of such work in order to make it eligible for copyright or patent protection.[19]

As Abbott suggested,[120] the owner of the AI system ("chattel") seems to be a suitable person for assigning ownership of the derivative output.[121] This would incentivise inventions and would also be consistent with the way in which personal property is generally treated in legal systems.[122] Another reason that the owner of the AI machine should be the owner of the AI-generated output is found in the logic that applies to the database system. The rights holder in that case is the maker of the database and the person who invests money and time in it.[123] The same rationale – to protect and incentivise investments in technology – would apply in the proposed *sui generis* system for AI-generated output. Therefore, having the person (or corporation) that invests in and owns the AI technology be the owner of its output could be seen as a consequence and an extension of their property rights.

The same conclusion could also be reached by applying the rules that usually operate in employment cases, for both copyright and patent systems, and in most of the IP-related *sui generis regimes*, where the choice is usually left to Member States. If an employee develops an invention in the course of employment, the ownership rights would as a general rule automatically be assigned to their employer.[124] As for AI-generated outputs, it has been suggested that an AI would operate as an "employee" (although this position has been criticised, as there is no employment relationship in the legal sense if the employee does not have legal personhood).[125] The rightful owner of the rights to the output would be the "employer", who would likely also be the owner of the machine.[126]

Once the owner of the AI-generated output has been identified and the economic rights allocated, the system would operate like any other; thus, transferring rights through negotiation and contractual tools would be permitted.[127]

[103] See for instance Davies, C. R. (2011), Azam, M. (2019) and Modkova, A. and Vara, H. (2018).

[104] See Chapter 2. For a complete analysis, see Chimuka, G. (2019).

[105] Lauber-Rönsberg, A. and Hetmank S. (2019) p. 577.

[106] Modkova, A. and Vara, H. (2018), p. 1.

[107] See for instance recital 12 Database Directive.

[108] See for instance Zatarain, J.M.N. (2017) 'The Role of Automated Technology in the Creation of Copyright Works: The Challenges of Artificial Intelligence'. *International Review of Law, Computers & Technology* 31(1), p 92; Zibner, J. (2019), p. 1.

[109] Zatarain, J.M.N. (2017) p. 95.

[110] Ibid., p. 96.

[111] Lauber-Rönsberg, A. and Hetmank S. (2019), p. 578.

[112] Article 7 (1) Database Directive.

[113] Thampapillai, D. (2019), p. 78.

[114] See for instance Davies, C. R. (2011), pp. 608–609; see also Dickenson, J., Morgan, A., and Clark, B. (2017) 'Creative Machines: Ownership of Copyright in Content Created by Artificial Intelligence Applications'. *European Intellectual Property Review* 39 (8), pp. 457–460; Thampapillai, D. (2019); Lauber-Rönsberg, A., and Hetmank S. (2019), pp. 574–575.

[115] Abbott, R. (2016) 'Hal the Inventor: Big Data and its Use by Artificial Intelligence' in *Big Data Is Not a Monolith*, Sigimoto, C. R., Ekbia H. R., and Mattioli, M. (eds.), p. 197.

[116] Modkova, A. and Vara, H. (2018), p. 16.

[117] https://www.ipaustralia.gov.au/patents/understanding-patents/types-patents (accessed on 2 April 2020).

[118] https://www.ipaustralia.gov.au/patents/applying-patent/innovation-patent-application-process (accessed on 2 April 2020).

[119] Abbott, R., (2016, 2019); Modkova, A. and Vara, H. (2018); Davies, C. R. (2011).

[120] Abbott, R. (2016) 'I Think, Therefore I Invent: Creative Computers and the Future of Patent Law'. *Boston College Law Review* 57 (4), p. 1114.

[121] Ibid.

[122] Ibid., for an in-depth analysis see pp. 1114, 1117.

[123] Recital 41 Database Directive.

[124] Bently, L., et al. (2018), pp. 134–136, and 629 ss. (Art. 60 EPC 2000 only specifies the national law that applies).

[125] Shemtov, N. (2019), p. 33.

[126] Davies, C. R. (2011), p. 618.

[127] Abbott, R. (2016) 'I Think, Therefore I Invent: Creative Computers and the Future of Patent Law', p. 1115.

5.5. Moral rights and attribution rights

In the proposed *sui generis* system, no moral rights or attribution rights would need to be assigned. This system would only apply to works and inventions developed by an AI where the involvement of a human being had been minimal. Consequently, there would be no legal grounds to assign moral rights or attribution rights, since no human being would have substantively participated in the creative process.[128] The AI would in fact be considered the "mind", which (at least for now) would not need to be morally rewarded. Furthermore, the proposed solution would not require granting legal personhood to AI, meaning that no rights or obligations would need to be recognised for an AI.

5.6. Conferred rights

The rights conferred by this *sui generis* system would depend on the output itself. This does not cause any specific problems, as the output is either an invention or an artistic, literary or musical work, which would likely be protected by copyright or patent if the inventor or the author had been a natural person.[129] It seems logical that the rights conferred to the owner would be the same as those conferred to the author/inventor – excepting only the moral rights. Therefore, an AI-generated work of art would confer to its owner the exclusive rights of reproduction, communication to the public and distribution, rental or lending right, public performance right and right of adaptation.[130]

As for AI-generated inventions, direct and indirect infringements would likely apply as they do to patentable subject matters.[131] In particular, the output of an AI would likely be a product[132] and therefore the owner would be entitled to make, dispose of, offer to dispose of, use, import or keep the product.[133]

5.7. Term of protection

Calculating the term of protection for AI-generated outcomes might be a difficult task. In fact, it has been observed that an AI is "potentially immortal",[134] as an AI is able to reprogram itself and change continually.[135]

On the one hand, it could be argued that an AI system is first and foremost a software system, albeit a complex one. For computer programs, a proposed term of protection in a hypothetical *sui generis* system would be significantly shorter than the monopoly granted by the typical IP rights. Software develops quickly and 5 years should be enough to recover investments.[136] On the other hand, it has been observed that an AI system is fed with data that could have a long lifetime. The data provided to an AI could be considered a collection of data and therefore protected under the database system, with a duration of 15 years.[137] However, some data might need to be updated constantly and the value of the trained AI would therefore be shorter.[138]

Both theories are reasonable, but some concerns could be mentioned. Even if an AI is seen a software system, in accordance with the first theory, the resulting complex outputs may not be ideally protected by a monopoly that only lasts 5 years. As regards the second theory, the complexity of the system may need constantly updated information and in similar cases the output could be the result of data gathered from the physical environment,[139] meaning that the data change with the surroundings. A monopoly that lasts for 20 years or more, as in the case of patent and copyright, has been observed to potentially have "a chilling effect on innovation".[140]

A feasible solution that is proposed here could be to grant protection for a period in between that offered to software and databases - in this instance, 10 years could be a suitable solution for both the artistic and innovative outputs of an AI. The fast pace of technological develop-

[128] Abbott, R. (2016) 'Hal the inventor: Big data and its use by artificial intelligence', p. 194.

[129] Thampapillai, D. (2019), p. 83.

[130] Bently, L., et al. (2018), pp. 141 ss.

[131] Ibid., pp. 637 ss.

[132] Abbott, R. (2016) 'I Think, Therefore I Invent: Creative Computers and the Future of Patent Law', p. 1086.

[133] Bently, L., et al. (2018), p. 638.

[134] Davies, C. R. (2011), p. 619.

[135] Ibid., p. 613.

[136] Toeniskoetter, S. B. (2005) 'Protection of Software Intellectual Property in Europe: An Alternative Sui Generis Approach'. *Intellectual Property Law Bulletin*, 10 (1), pp. 76, 78.

[137] Article 10 (1) Database Directive. See also Lauber-Rönsberg, A. and Hetmank S. (2019), p. 575.

[138] Credit to Fredrik Öhrström, lecturer at Stockholm University for the LL.M. Program in European Intellectual Property Law 2019/2020 in Software Patents and Free Software.

[139] Yanisky-Ravid, S. and Liu, X. (2017), pp. 2232, 2234.

[140] Modkova, A. and Vara, H. (2018), p. 16.

[141] Toeniskoetter, S. B. (2005), p. 80.

[142] Article 63 (1) EPC 2000.

[143] CDPA 1988, s. 12 (7).

[144] Commission Staff Working Document, 'Liability for emerging digital technologies', SWD (2018) 137 final, p. 2.

[145] Communication from the Commission 'Artificial Intelligence for Europe', COM(2018) 237 final, p. 15.

[146] Kontzer, T. (2015) 'Should We Truly Be Afraid of . . . Robots? Hawking, Gates, Musk Worry Artificial Intelligence Could One Day Eclipse the Human Variety, Then All Bets are Off'. *Investor's Business Daily* https://advance-lexis-com.ezp.sub.su.se/api/document?collection=news&id=urn:contentItem:5FH6-84D1-JCBB-K4JC-00000-00&context=1516831 (accessed on 9 April 2020).

[147] Artificial General Intelligence (AGI) refers to "a computer able to perform any intellectual task a person could [...]", Abbott, R. (2019) 'Everything is Obvious', p. 4.

ment could be seen as the factor that might justify a shorter period of protection, which would nevertheless be suitable for recovering investments. A shorter period of protection could be counterbalanced by creating an easier and less expensive way to access the protection system.[141]

The 10 years of protection for an AI-generated invention could start from the date when the application is filed (along the lines of the patent system),[142] while it, in the case of an AI-generated work, could start from the end of the calendar year in which the work was made (along the lines of the UK copyright system for computer-generated works).[143]

6. CONCLUSIONS

In order to take advantage of new technologies, investments need to be made. In order to secure such investments, a "clear and stable legal framework" is crucial.[144]

In light of the need to provide legal certainty and a predictable and reliable legal environment for AI, as expressed by the Commission,[145] the proposed *sui generis* system for AI-generated outputs – whether works of art or inventions – could be a suitable solution. The current IP systems for copyright and patents appear to be unable to provide legal stability, since many issues and implications related to AI-generated outputs remain unresolved. While those implications do not seem to preoccupy legal experts, it is arguable that in the long run, adjustments or an entirely new system would be needed. As leading figures of technology now call for public discussion about regulating AI,[146] the same attention should be given to AI in this specific field of law. Why wait until the situation evolves into "Artificial General Intelligence"?[147] Why not act now, with a system that can provide more legal certainty?

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