Authorless AI-assisted productions

Recent developments impacting their protection in the European Union

by **Marta Duque Lizarralde and Christofer Meinecke***

Abstract: The question of whether AI-generated works can be protected by copyright has become a hot topic over the last few years. However, "AI-generated works", at least as currently defined in some policy and legal texts, do not exist. This article seeks to explain how machine learning and natural language processing, which are two subfields of Artificial Intelligence, are used in the creative process. It then outlines the obstacles that works created with the help of AI face in order to be classified as protectable subject matter. After that, it briefly analyses whether such works can be protected by existing related rights and concludes by discussing the arguments put forward in the academic literature in favour of the creation of a new exclusive right to encourage investment in "creative AI".

Keywords: Copyright; Authorship; Originality; AI-generated works; Authorless AI-assisted productions

Recommended citation: Marta Duque Lizarralde and Christofer Meinecke, Authorless AI-assisted productions: Recent developments impacting their protection in the European Union, 17 (2023) JIPITEC 84 para 1.

A. Introduction

1 In the report on intellectual property rights (IPRs) for the development of artificial intelligence (AI) technologies, published in October 2020, the European Parliament (EP) stressed that "the growing autonomisation of certain decision-making processes can give rise to technical or artistic creations."[1] Therefore, "assessing all IPRs in the light of these developments must be a priority for this area of EU law."[2] Such assessment is likely to address, amongst others, whether AI-generated outputs can be protected by IPRs. Should AI-generated results be protectable under IP, the next question would be whether an AI system could be recognised as the 'author' or the 'inventor' of such results. If not, it is necessary to discuss whether changes in the IP system are needed to encourage investment in AI technology. This article will be centred on the authorship claims.[3]

* Marta Duque Lizarralde, LL.M., is Research Associate, Doctoral candidate at the Technical University in Munich, Germany.Christofer Meinecke, M.Sc., is Research Assistant, Doctoral candidate at Leipzig University, Germany. The views expressed herein are those of the authors and do not necessarily reflect the opinions of former, present, or future employers or organisations. Any errors in the legal analysis remain those of Marta Duque Lizarralde. All links last accessed on the 24th of June 2022.

1 *European Parliament (EP) Report on intellectual property rights for the development of artificial intelligence technologies*, (2020/2015(INI) (2.10.2020), Explanatory Statement, <https://www.europarl.europa.eu/doceo/document/A-9-2020-0176_EN.html>.

2 *Ibid*, para. 14.

3 For an overview on the inventorship claims, see Daria Kim 'AI-Generated Inventions': Time to Get the Record Straight? ´(2020) *69 (5) GRUR International* 443,456; Kaelyn R. Knutson, 'Anything You Can Do, AI Can't Do Better: An Analysis of Conception as a Requirement For Patent Inventorship And A Rationale For Excluding AI Inventors' (2020) *11(2) Cybaris*; https://open.mitchellhamline.edu/cgi/viewcontent.cgi?article=1097&context=cybaris>; and Daria Kim, Maximilian

2 Although today's AI systems deliver far greater functionality and capabilities than software from the 80s[4], current discussions focus on the wrong question, that is, whether AI systems, without human intervention, are capable of creating copyrightable results. Instead, the real question should be whether creations generated with the assistance of AI, where the human contribution is not of an original nature, are protectable.[5]

3 This article aims to explain what is the role of AI in the creative process and the main obstacle against AI creations' eligibility for copyright protection, *i.e.*, meeting the requirement of originality. It also discusses briefly why some states' regulations on this issue do not address it satisfactorily. Next, it analyses whether such creations can be protected by existing related rights, or whether the creation of a new related right is needed for their protection.

B. Artificial Intelligence and the culture industry

4 The current surge in AI development began in 2013.[6] Several factors triggered the boom, including the increase in ICT R&D funding, which allowed for greater availability of computing power and connectivity, the enormous production of large volumes of data, and the improvements in algorithms.[7]

I. Examples of Artificial Intelligence systems used in the cultural industry

5 Various AI systems are used in the cultural industry. The most cited project so far is 'The Next Rembrandt', based on 168,263 pictorial fragments from 346 of the painter's works. To identify and classify the most common Rembrandt patterns, a facial recognition algorithm and a deep learning system were used. The result was then printed in 3D with more than 149 million pixels and in several layers to resemble an oil painting.[8] Other examples of well-known systems are 'Flow Machines', a system that generates melodies from a database of 13,000 roadmaps of different genres[9]; or 'Tencent Dreamwriter'[10], 'Automated

Alber, Man Wai Kwok, Jelena Mitrovic, Cristian Ramirez-Atencia, Jesús Alberto Rodríguez Pérez, Heiner Zille, ´Ten Assumptions About Artificial Intelligence That Can Mislead Patent Law Analysis´ (2021), *Max Planck Institute for Innovation & Competition Research Paper No. 21-18* <https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3910332>.

4 For an overview of the debate on how computer programs may affect the IP legal framework at the time, see Timothy L. Butler, ´Can a Computer be an Author, Copyright Aspects of Artificial Intelligence´ (1982) *4 Hastings Comm. & Ent.L.J.* 707,747; Pamela Samuelson, ´Allocating Ownership Rights in Computer-Generated Works" (1985) 47 *Berkeley Law Scholarship Repository* 1186,1224; and Ralph D. Clifford, ´Intellectual Property in the Era of the creative Computer Program: Will the True Creator Please Stand Up?´(1997), 71 *Tulane Law Review* 1676,1702. For a distinction between the elaboration of computer programs and the creation of ML models, see Begoña Gonzalez Otero, 'Machine Learning Models under the copyright microscope: is EU Copyright fit for purpose?' (2021) *GRUR International* 1043,1055.

5 James Grimmelmann, ´There's No Such Thing as a Computer-Authored Work – And It's a Good Thing, too´ (2016), *39 Colum. J. L. & Arts* 403.

6 WIPO, WIPO Technology Trends 2019, 30,36 <https://www.wipo.int/edocs/pubdocs/en/wipo_pub_1055.pdf>

7 *Ibid;* Josef Drexl, Reto M. Hilty et al., 'Technical Aspects of Artificial Intelligence: An Understanding from an Intellectual Property Law Perspective, Version 1.0' (2019) <https://ssrn.com/abstract=3465577>; Annoni Alessandro; Benczur Peter; Bertoldi Paolo; Delipetrev Blagoj; De Prato Giuditta; Feijoo Claudio; Fernandez Macias Enrique; Gomez Gutierrez Emilia; Iglesias Portela Maria; Junklewitz Henrik; Lopez Cobo Montserrat; Martens Bertin; Figueiredo Do Nascimento Susana; Nativi Stefano; Polvora Alexandre; Sanchez Martin Jose Ignacio; Tolan Songul; Tuomi Ilkka; Vesnic Alujevic Lucia, *'Artificial Intelligence: A European Perspective'* (Publications Office of the European Union, 2018), 19, 24; See the EC ISA2 webpage: <https://ec.europa.eu/isa2/news/european-commission-has-announced-investment-€92-billion-align-next-long-term-eubudget-2021en>: In Europe, for example, €2.5 billion is planned to help spread AI across the European economy and society between 2021 and 202.

8 See "The Next Rembrandt": <https://www.nextrembrandt.com/>.

9 See Flow Machines: <https://www.flow-machines.com/>; James Vincent, ´This AI-written pop song is almost certainly a dire warning for humanity´ (*The Verge, 2016*) <https://www.theverge.com/2016/9/26/13055938/ai-pop-song-daddys-car-sony>.

10 See Kan He, ´Another decision on AI-generated work in China: Is it a Work of Legal Entities? ´ *(The IPKAT, 2020*) <Another decision on AI-generated work in China: Is it a Work of Legal Entities? – The IPKat (ipkitten.blogspot.com)>; and Vivian Demonts and Ivy Liang, ´Is the Chinese 'Dreamwriter' Case Really a Groundbreaking Case for AI-Generated Works? *(GOWLING GWL, 2020)* <https://gowlingwlg.com/en/insights-resources/articles/2020/china-dreamwriter-case/> explaining the *Shenzhen Tencent v Yinxun* case, before

Insights natural language generation (NGL)'[11], and 'Editor'[12], AI systems that operate in the field of 'automated' or 'robojournalism'. But there are many more. For instance, platforms such as 'Artbreeder'[13] allow the collaborative creation of new images by modifying existing ones and combining their style using neural networks; or systems such as 'GhostWriter'' enable the creation of books from an initial story outline. [14]

II. Fundamentals on the functioning of Artificial Intelligence

1. Definition of "Artificial Intelligence"

6 There are different definitions of AI. For the purposes of this article, the authors will follow the World Intellectual Property Organization (WIPO) definition, according to which AI is "a discipline of computer science that is aimed at developing machines and systems that can carry out tasks considered to require human intelligence."[15] It is important to note, however, that the WIPO definition includes 'human intelligence', which is conflicting with the definition applied by most AI researchers, that focus rather on 'intelligent agents', precisely to avoid the problem of measuring 'human intelligence'.[16] In any case, the goal of AI is to automate and accelerate the performance of an intellectual task, traditionally performed by humans, through systematisation. The tasks that AI systems can accomplish are becoming progressively more complex, but their purposes remain limited. Since current AI systems can only perform specific tasks, they belong to the category of narrow AI, but not to the category of 'artificial general intelligence' (AGI), which would encompass systems that can undertake any intellectual endeavour. The latter remains in the realm of science fiction.[17]

2. Machine Learning

7 Machine learning (ML) is the most prominent subfield of AI. It aims to create pattern-recognition models that 'learn' to make predictions about new data by adjusting to previous data.[18] There are three main types of ML: supervised, unsupervised, and reinforcement. In supervised learning, the system is trained with labelled data and must be able to apply this knowledge to recognise the labels in a new dataset. This requires that the correct labels are provided in the first place.[19] On the contrary, unsupervised learning involves providing unlabelled training data samples with the goal of covering the hidden structure underlying the data.[20] The quality and size of the training dataset are crucial in the success of both learning processes.[21]

8 One example of unsupervised learning is 'generative modelling'. Generative modelling has become more prominent recently, as two deep learning (DL)[22] techniques called 'variational autoencoders'

the Nanshan District Court of Guangzhou Province. In this case, the Court granted copyright protection to an article that was said to be written by Dreamwriter, as it considered that Dreamwriter was used rather as a writing tool.

11 See Automated Insights: <https://automatedinsights.com/>.

12 See Editor: <https://nytlabs.com/projects/editor.html>.

13 See Artbreeder: <https://www.artbreeder.com/>.

14 Satoshi Sato, A challenge to the third Hoshi Shinichi award, Proceedings of the INLG 2016 Workshop on Computational Creativity in Natural Language Generation (2016) 31,35.

15 WIPO, ´What is Artificial Intelligence? <https://www.wipo.int/about-ip/en/artificial_intelligence/faq.html>.

16 See Stuart J Russell and Peter Norvig, *Artificial Intelligence: A Modern Approach* (Prentice Hall., 2009) 1,5; or David L. Poole and Alan M. Mackworth, *Artificial Intelligence, Foundations of Computational Agents* (Cambridge University Press, 2010) 3, defining AI as *"the field that studies the synthesis and analysis of computational agents that act intelligently"*.

17 Cormen, Thomas H., Charles E. Leiserson, Ronald L. Rivest, and Clifford Stein, *Introduction to Algorithms* (MIT Press, 2009) 5; Marta Duque Lizarralde and Héctor Axel Contreras, ´The real role of AI in patent law debates´ (2022) <https://academic.oup.com/ijlit/advance-article-abstract/doi/10.1093/ijlit/eaac008/6555494>.

18 Mehryar Mohri, Rostamizadeh Afshin and Ameet Talwalkar, *Foundations of Machine Learning* (The MIT Press, 2018) 1,2; Matt Taddy, ´The Technological Elements of Artificial Intelligence´ (2019) NBER Working Paper 24301 <https://www.nber.org/system/files/working_papers/w24301/w24301.pdf>.

19 Josef Drexl, Reto M. Hilty et al., (n.14); Anthony Man-Cho So, ´Technical Elements of Machine Learning for Intellectual Property Law´, in J.-A. Lee, K.-C. Liu, R. M. Hilty (eds.), *Artificial Intelligence & Intellectual Property* (Oxford University Press, 2020).

20 *Ibid.*

21 Mohri et al (n. 18) 1.

22 Matt Taddy (n.18): Deep learning relates to some machine learning techniques in which several layers of simple pro-

and 'generative adversarial networks', enabled major breakthroughs in terms of creative content creation.[23] It must be recalled, however, that there is nothing magical in the functioning of creative AI systems. These systems simply perform mathematical operations, previously programmed, to learn a latent space from the data they are trained on. The latent space can be defined as "an abstract multi-dimensional space that encodes a meaningful internal representation of externally observed events."[24] In this space, similar data entries are placed close to each other and, by sampling it, these systems produce new works with similar characteristics.[25]

9 For example, a Variational Autoencoder (VAE) is a combination of an encoder and a decoder network that learns a general encoding from an unlabelled dataset. The encoder maps the input data to a latent space and the decoder tries to map the representation in the latent space back to the input data. The VAE learns a continuous latent space from the input data, which is achieved by creating two encodings by the encoder based on their mean and the standard deviation. This leads to different encodings for the same input data. Through this, the decoder learns for a specific input sample to refer to an area in the space instead of a single point. Further, the training process minimizes the differences between the areas of different training samples in the latent space in order to allow arithmetic on them to generate new features, e.g., adding an accessory to a person in an image, or combining faces of celebrities.[26]

10 Generative adversarial networks, in turn, are a set of algorithms that aim to make two neural networks compete to learn and evolve. Both networks are trained with the same dataset, but the first generating network must create variations of the data and produce a creative result that looks genuine. This output will be analysed by a second discriminative network to determine if it is part of the original training dataset or a fake output. Depending on its quality, the discriminative network will give it a score on a scale of 0 to 1. If the score is low, the generative network corrects the result and forwards it to the discriminative network. The generative networks then repeat the cycle until they create high-scoring results. In this way, images and sounds with a high degree of realism[27], or even level for video games, are produced.[28]

11 Lastly, in reinforcement learning, the system must achieve a certain goal and receives penalties or rewards for its performance, the goal being to maximise the total reward.[29] It has been an area of great success in training AI systems for playing games, as illustrated by the example of AlphaGo defeating a professional human Go player.[30]

3. Natural Language Processing

12 Another subset of AI worth mentioning is Natural Language Processing (NLP), which is used, among other things, for machine translation, text summarisation and the creation of texts, which can be short, as in the case of answers in chatbots; but also longer, as in the case of passages in articles and reports on events.[31] NLP is an area that, as its name suggests, deals with processing natural languages. This processing entails the translation of natural language into numerical data that a computer can

cessing units are connected in a network, so that the input to the system passes through each of them successively.

23 Nina I. Brown, ´Artificial Authors: a Case for Copyright in Computer-Generated Works´ (2018), *XX The Columbia Science and Technology Law Review,* 8; François Chollet, *Deep Learning with Python* (Manning, 2018) 296, 313: Although a large number of academic articles point to the great revolution that generative adversarial networks are bringing about, François Chollet points out that "*the most successful practical applications I have seen with images rely on variational autoencoders.*"

24 Panagiotis Antoniadis, ´Latent Space in Deep Learning´ (March 4, 2022, Baeldung) <https://www.baeldung.com/cs/dl-latent-space>

25 François Chollet (n.23) 270. For an in-depth comprehension of how ML is applied to generate text and images see chapter 8 of this book.

26 Xianxu Hou, Linlin Shen et al., Deep feature consistent variational autoencoder, 2017 IEEE Winter Conference on Applications of Computer Vision (WACV) (2017) 1133,1141.

27 Joseph Roca, ´Understanding Generative Adversarial Networks (GANs), Building, step by step, the reasoning that leads to GANs´ (towards data science, 2019) <https://towardsdatascience.com/understanding-generative-adversarial-networks-gans-cd6e4651a29>; Marta Duque Lizarralde, 'Las obras creadas por Inteligencia Artificial, un nuevo reto para la propiedad intelectual '(2020), *64 Revista pe.i* 13,67.

28 Ruben Rodriguez Torrado, Ahmed Khalifa, et al., Bootstrapping conditional gans for video game level generation, 2020 IEEE Conference on Games (CoG) (2020) 41,48.

29 Anthony Man-Cho So (n.18).

30 See DeepMind website: https://deepmind.com/research/case-studies/alphago-the-story-so-far

31 Hannes Hapke, Cole Howard, Hobson Lane, *Natural Language Processing in Action: Understanding, analyzing, and generating text with Python* (Manning, 2019) Ch.1.

use to learn.[32] NLP relies on unstructured data, which can be more challenging to interpret.[33] But structured data like semantic lexicons, or linguistic rules can be applied to induce domain knowledge into a model, e.g., word relations.[34] Processing the text consists of several stages. First, the text is converted into a format that computers can process. To do this, several steps must be taken. In the first place, the text is analysed and divided into several pieces, which is called tokenisation. Subsequently, the text is normalised, which means converted to be easier to process, for example by removing punctuation marks or contractions. The next step would be to remove affixes and suffixes, known as stemming, and to reduce a word to its base form to group the different existing forms of the same word, that is, to lemmatise. The system must then understand the overall meaning of the text. For this, there are different techniques, and DL is frequently employed. As a result of the process, the system must be able to discover hidden structures in sets of texts or documents.[35]

13 The development of AI "creative" systems requires significant investment. With the aim of protecting and recovering this investment, it has been proposed to protect the results generated with AI through exclusive rights. The first question in this regard is whether these creative outputs would be eligible for copyright protection.

C. Copyright

I. Protectable subject-matter

14 The object of copyright protection is the work, which is the formal expression of an idea or feeling communicated to the public. The work is an immaterial good, so the object of protection is the form, the expression, but not its tangible medium or the ideas it comprises.[36]

15 For a work to be eligible for copyright protection, it must be original.[37] There is no rule at international or EU level defining what is meant by originality. At the EU level, however, the Court of Justice of the European Union (CJEU) has specified that a work is original if it is "the author's own intellectual creation", which "is manifested by the author's free and creative choices."[38] This requires the existence of a field of choice, which means the requirement of originality is not met when the result is dictated by technical considerations, rules, or other subject-matter constraints which leave no room for creative freedom.[39] In addition to this, although not explicitly stated, it follows from the case law of the CJEU, the provisions of the Berne Convention[40], and some of the EU copyright directives,[41] that the author must be a natural person.

II. Demystifying the role of Artificial Intelligence in the creative process

16 Following the academic debate, a distinction must be made here between AI-assisted works and AI-generated works. According to WIPO, 'AI-assisted works' are those "that are generated with material

32 *Ibid.*

33 Tom Taulli, *Artificial Intelligence Basics, A Non-Technical Introduction* (Apress, 2019) Ch.6; Adam Geitgey, ´Natural Language Processing is Fun! How computers understand Human Language´ (Medium, 18 July 2018) <https://medium.com/@ageitgey/natural-language-processing-is-fun-9a0bff37854e>

34 Manaal Faruqui, Jesse Dodge et al., ´Retrofitting Word Vectors to Semantic Lexicons in Proceedings of NAACL´ (2015) <https://arxiv.org/abs/1411.4166>

35 Tom Taulli (n.33) Ch.6; Adam Geitgey, ´Natural Language Processing is Fun! How computers understand Human Language´ (Medium, 18 July 2018) <https://medium.com/@ageitgey/natural-language-processing-is-fun-9a0bff37854e>

36 Claude Masouyé, ´*Guide to the Berne Convention for the Protection of Literary and Artistic Works* (WIPO 1978) 33.

37 Art. 2 of the Berne Convention for the Protection of Literary and Artistic Works of September 9, 1886;

38 Among others, C-145/10, Painer v. Standard Verlags GmBH and others (2011) ECLI:EU:C:2011:798, para 119,120; C-604/10, Football Dataco Ltd v. Yahoo! UK Ltd y and others (2012) ECLI:EU:C:2012:115, para 37,39; C-403/08 and C-429/08, Football Association Premier League v. QC Leisure and Karen Murphy v. Media Protection Services (2011) ECLI:EU:C:2011:631, para 97.

39 C-683/17, Cofemel (2019) ECLI:EU:C:2019:721, para 31; C-833/18, Brompton Bicycle (2020) ECLI:EU:C:2020:461, para 23,24.

40 See Arts. 3 and 7 Berne Convention.

41 See Art. 3 Directive 96/9/EC of the European Parliament and of the Council of 11 March 1996 on the legal protection of databases; Recital 16 and Art. 6 Directive 2006/116/EC of the European Parliament and of the Council of 12 December 2006 on the term of protection of copyright and certain related rights; and Art.1 Directive 2009/24/EC of the European Parliament and of the Council of 23 April 2009 on the legal protection of computer programs.

human intervention and/or direction"[42], while 'AI-generated works' "refers to the generation of an output by AI without human intervention. In this scenario, AI can change its behaviour during operation to respond to unanticipated information or events."[43] Nonetheless, these definitions do not reflect the state of the current debate, since AI systems are still not capable of producing results autonomously, i.e., without any sort of human intervention.

17 In ML development, human involvement is needed in distinct phases and has a significant impact on the results. First, the training data is chosen and pre-processed by practitioners. This may include actions that require domain knowledge, for example, to exclude specific information or samples from the data that could impair the training. In the case of supervised learning approaches, the labelling of the data must also be performed by professionals with expertise in the field, although this task can be supported by an ML algorithm in a human-in-the-loop process.[44] Before training the ML model, programmers set the hyperparameters, which are those parameters that do not change during training. The first step in this regard is to design the architecture of the model, i.e., its structure. Each model is suitable for different sets of tasks, so establishing the architecture also requires expertise.[45] Subsequently, practitioners also decide on the learning rate and the algorithms used for the optimisation and regularisation of the trainable parameters of the model. Trainable parameters, unlike hyperparameters, are adjusted to better fit the data as the training dataset is analysed. To assess whether training the model is successful, a loss/cost function must be established beforehand as well. After training, decisions such as output and model selection further influence the final results.[46] It is important to keep in mind that at each step of the human intervention a bias is induced in the model in addition to the bias already present in the original data. It is also relevant to clarify that all these steps are not performed by the same person, but rather multiple actors are involved. Moreover, once the model has been trained, it can be applied by users completely unrelated to the training process.

18 In NLP, a subfield of particular relevance to our analysis is Natural Language Generation (NLG), which deals with the processing of unstructured data into human-readable text. The process of automated text generation entails various stages. First of all, as data often comprises more information than needed, the content to be produced must be delimited (content determination); then the data structures are arranged to create the narrative structure and the documentation plan (document/discoursing planning). Next, data are analysed and contextualised, often using ML (data interpretation). This involves the selection of phrases and words to express the domain-specific concepts and relationships in the texts (referring expression generation and lexicalisation). Subsequently, it must be ensured that the entire text adheres to the correct grammatical form, spelling, and punctuation (grammaticalization/linguistic realisation). And finally, the data is entered into the appropriate templates to check that the output is correctly formatted (language implementation). Human involvement in this process remains significant, although a number of tools exist that are useful for automating individual steps.[47]

42 WIPO, 'Revised Issues Paper on Intellectual Property Policy and Artificial Intelligence' (21 May 2020) <https://www.wipo.int/edocs/mdocs/mdocs/en/wipo_ip_ai_2_ge_20/wipo_ip_ai_2_ge_20_1_rev.pdf>.

43 *Ibid.*

44 Human-in-the-loop processes, like Active Learning and Visual Interactive Labelling, have gained more importance in recent years, as they enable a conversation between an-ML model and the programmers to improve the training process and allow obtaining the desired results with fewer data. See Burr Settles, ´Active learning literature survey´ (2009) <https://research.cs.wisc.edu/techreports/2009/TR1648.pdf>; and Jürgen Bernard, Marco Hutter et al., ´Comparing visual-interactive labeling with active learning: An experimental study in IEEE transactions on visualization and computer graphics´(2017) IEEE *transactions on visualization and computer graphics 298, 308.*

45 Josef Drexl, Reto M. Hilty et al. (n.14); Emmanuel Ameisen, *Building Machine Learning Powered Applications, Going from Idea to Product* (O´Reilly, 2020) 95.

46 François Chollet (n. 23); Wolfgang Ertel, *Introduction to Artificial Intelligence* (Springer, 2011) 175,179; Ethem Alpaydin, *Machine Learning* (The MIT Press, 2016) 166,178; John D. Kelleher, *Deep Learning* (The MIT Press, 2019) 12,13; David Watson, ´The Rhetoric and Reality of Anthropomorphism in Artificial Intelligence´ (2019) *29 Minds and Machines* 417,440.

47 Sciforce, ´A Comprehensive Guide to Natural Language Generation´ (July 4, 2029, Medium) <https://medium.com/p/dd63a4b6e548; https://research.aimultiple.com/nlg/>; Alina Trapova and Péter Mezei, ´Robojournalism – A Copyright Study on the Use of Artificial Intelligence in the European News Industry´ (2022) <https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4032020>.

III. "AI-assisted works" vs. "Authorless AI-assisted" productions

19 From what has been discussed so far, we can conclude that human intervention in the different phases that predetermine the outcome is still relevant. Consequently, the creations that are called 'AI-generated' are in fact 'AI-assisted'. In many works the human contribution to the final result is not only relevant, but also original, and therefore copyrightable.[48] This would be the case, for example, of 'The Next Rembrandt'.[49] However, there are some outputs, such as initial translations performed by DeepL[50], in which the human input may not be of an original nature, although the results are still linked to pre-existing data and parameters provided by the AI developers. Then, they are not copyrightable.[51] Nonetheless, these outputs are not 'AI-generated', and a more accurate term for this type of existing creations that do not deserve copyright protection is that of 'Authorless AI-assisted productions', adopted in the 'Trends and developments in AI final report'.[52] This report explains that there are three stages in the creative process of a work, namely conception, execution, and redaction. It also indicates that even if automated translators, such as DeepL, generate nearly usable results, some human intervention by the user in the redaction phase is still needed to turn the outputs into workable translations. Thus, if a natural person, based on the initial translation, which would not be protectable, makes further modifications, such as rephrasing words and changing the order of parts of the text, the result may be eligible for copyright protection.[53]

20 In the same vein, Trapova and Mezei argue that when NLG is employed in the field of robojournalism, at least in the phases of discourse planning and lexicalisation there is room for expressing the free and creative choices of individuals. Hence, the resulting outcomes may be protected.[54] Nevertheless, as these authors correctly observe, there are reports that, even if written by individuals, would not merit protection because the requirements regarding their presentation leave no margin for "originality".[55] In these cases, it makes no difference whether or not AI has been used to produce the text.

21 In short, to determine whether a result generated with AI is copyrightable, its creation process must be examined. There is no general rule but depending on the steps required to develop a particular project, as well as its domain of application, the type of human involvement in the different stages may or not be of an original nature. Therefore, on a case-by-case basis, there may be one person, several, or none at all who qualifies as the author.

48 Marta Duque Lizarralde (n.27); Robert Yu, ´The Machine Author: What Level of Copyright Protection is appropriate for Fully Independent Computer-Generated Works? (2017), *165 U. Pa. L. Rev. 1245;* Jane C. Ginsburg and Luke Ali. Budiardjo, ´Authors and Machines´ (2019), *34 (2) Berkeley Technology Law Journal* 6; Concepción Saiz García, ´Las obras creadas por sistemas de inteligencia artificial y su protección por el Derecho de autor´(2019) <https://indret.com/las-obras-creadas-por-sistemas-de-inteligencia-artificial-y-su-proteccion-por-el-derecho-de-autor/>; Bernt Hugenholtz and João Pedro Quintais, ´Copyright and Artificial Creation: Does EU Copyright Law Protect AI-Assisted Output?´, *52 IIC – International Review of Intellectual Property and Competition Law volume,* 1200, 1207.

49 Jane.C. Ginsburg, ´People Not Machines: Authorship and What It Means in the Berne Convention` (2018) *49 IIC – International Review of Intellectual Property and Competition Law* 133,134; Bernt Hugenholtz et al. 'Trends and Developments in Artificial Intelligence, Challenges to the Intellectual Property Rights Framework, Final Report'(2020) <https://ec.europa.eu/newsroom/dae/document.cfm?doc_id=71915>; Andrés Guadamuz, ´Do Androids Dream of Electric Copyright? Comparative Analysis of Originality in Artificial Intelligence Generated Works´ (2017) *2 Intellectual Property Quarterly,* 169,186. Nevertheless, the European Parliament (n..1) 13 argues that "*At a time when artistic creation by AI is becoming more common (one example being 'The Next Rembrandt' painting generated after 346 works by the painter were digitized so that they could be processed using AI), we seem to be moving towards an acknowledgement that an AI-generated creation could be deemed to constitute a work of art on the basis of the creative result rather than the creative process".* See also Reto Hilty, Jörg Hoffmann and Stefan Scheuerer ´Intellectual Property Justification for Artificial Intelligence´ in J.-A. Lee, K.-C. Liu, R. M. Hilty *(eds.), Artificial Intelligence & Intellectual Property, Oxford University Press,* 2020, stating that: *"The outcome of "The Next Rembrandt" project, a computer generated "new painting" in the style of Rembrandt, was simply founded on all available pre-existing Rembrandt paintings. In contrast, combining input from different artists in a targeted way to create a new style mix might qualify as an expression of personality."*

50 Bernt Hugenholtz et al. (n.49); Bernt Hugenholtz and João Pedro Quintais (n.48).

51 *Ibid;* As in the case of translations, if the initial reports and texts are subsequently modified by a natural person, the final result could be copyrightable; See Kan He (n.8).

52 Bernt Hugenholtz et al. (n.49).

53 *Ibid.*

54 Alina Trapova and Péter Mezei (n.47).

55 *Ibid.*

22 This idea is developed by Deltorn and Macrez in their analysis of the role of AI (especially DL) and authorship claims in the music industry.[56] In line with the previous discussion in this section, these authors point out that the functioning of DL systems relies on a series of human decisions made before, during and after the training of the model. The more difficult question then becomes whether there is an author according to the role of the different actors in the generative process, as well as the interactions between humans and the generative model in question.[57] When creating music compositions with AI, there is space to shape the output either by selecting the training dataset; by modifying the model parameters while interacting with it; or by iteratively guiding the selection of the output through the selection of various parameters, as in the case of 'Flowmachines'.[58] But the fact that this space exists does not mean that 'free and creative choices' are always expressed. As this depends on the specific case, the question of whether works created with AI are copyrightable has lawyers frequently answering: "it depends".

IV. Existing legislation on "computer-generated works"

23 Yet, some legal systems (Ireland, the UK, New Zealand, South Africa, India and Hong Kong) have special rules for 'computer-generated works', described as those generated where "there is no human author"[59] or "the author is not an individual."[60] Through a legal fiction, they grant the copyright of these works to "the person by whom the arrangements necessary for the creation of the work are undertaken"[61] or "the person who causes the work to be created."[62] While some advocate that this model is the best available, and should be adopted in more jurisdictions,[63] the issue is not satisfactorily addressed. A regulation that allows copyright to be granted to different persons on a case-by-case basis provides the necessary flexibility in this context. However, the vagueness of the terms "making the necessary arrangements" or "carrying out the creation of the work" is a point of criticism, as they are unclear as to what specific actions would be required to obtain copyright, thus requiring further interpretation.[64] Furthermore, these regulations classify as a 'work' a creation whose creative process is not original, and therefore must not be protected.[65] In fact, protecting "Authorless AI-assisted productions" by copyright is not optimal.[66]

56 Jean-Marc Deltorn and Franck Macrez, ´Authorship in the Age of Machine learning and Artificial Intelligence´ (2018) *Centre for International Intellectual Property Studies (CEIPI) Research Paper No. 2018-10* <https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3261329>.

57 *Ibid.*

58 *Ibid: "The interaction between the neural network and the musician can also consist of a form of dialogue where the user can input a melody and where the system responds by either following up and continuing the priming musical sequence until the human counterpart takes over again, or by providing in return a variation on the initial proposed theme, that the musician can then select, discard, or build upon. This interactive creation is certainly at the core of Sony's Flow Machine creative process: ´In a typical session with Flow Machines, users first select a set of scores (lead sheets) that they want to take inspiration from. These scores determine the style of the scores generated by Flow Machines. Then they select a set of audio recordings that determine the sound textures of the audio stems generated by Flow Machines. Users can go back and forth between the generation of scores and the generation of audio renderings using an interactive interface, until they get a result they are satisfied with´. A particular expression of such a dialogue can take the form of co-improvisation between performers and the responses generated live (and adaptively) by an algorithmic process."*

59 Hong Kong, Ordinance 1997, Section 198 (1).

60 Irish Copyright and Related Rights Act 2000, Section 2.

61 UK CDPA 1998, Section 9.3; Irish Copyright and Related Rights Act 2000, Section 2(1); Hong Kong Copyright Act 2012, Section 11.3; New Zealand Copyright Act 1994, Section 5.2.

62 India Copyright Act 1957, Article 1. d).vi.

63 Annemarie Bridy, ´The Evolution of Authorship: Work Made by Code´ (2016), *39 Columbia Journal of Law & the Arts*, 395,401; Robert Denicola, ´Ex Machina: Copyright Protection for Computer-Generated Works´ (2016), *69 Rutgers University Law Review,* 251, 287; Andrés Guadamuz (n.49).

64 Jane.C. Ginsburg (n.49); Mercedes Morán, ´Creadores en riesgo de extinción´ (2018), *V Certamen de artículos jurídicos sobre Derecho del Entretenimiento, Premios DENAE* 25.

65 Jani Mccutcheon, ´Curing the Authorless Void: Protecting computer generated works, Following IceTV and Phone Directories´ (2013), *36(3) Melbourne University law review* 45,102; A Ramalho ´Will robots rule the (artistic) world? A proposed model for the legal status of creations by artificial intelligence systems´ (2017) *21 Journal of Internet Law* 12-25; Marta Duque Lizarralde (n.27).

66 In the US, it is also not possible to protect 'AI-generated works' under copyright. Section 306 of the Compendium of Practice of the US Copyright Office of 28 January 2021 expressly stipulates that the office register an original work of authorship, "*provided that the work was created by a human being*". Furthermore, section 313.2 specifies that machine-generated works, in which there is no creative input or human intervention, could in no case be copyrighted or

V. Possible ways forward

24 Some have suggested a reinterpretation of the concept of originality to protect such creations as long as they meet a certain degree of creative level and novelty.[67] The European Parliament, in the above-mentioned report, has also proposed an assessment of the advisability "of granting copyright to such a creative work to the natural person who prepares and publishes it lawfully, provided that the designer(s) of the underlying technology has/have not opposed to such use."[68] Nevertheless, this would contradict not only the current prevalent opinion in the academic community[69], but also the contemporary conception of copyright in the EU. The latter statement is particularly relevant considering that the CJEU in the *Levola v. Smilde* case reiterated the above-mentioned subjective criteria for assessing originality and ruled that the concept of a work "must normally be given an autonomous and uniform interpretation throughout the European Union."[70]

25 The European Commission (EC) has also addressed the topic in the Communication "Making the most of the EU's innovative potential. An intellectual property action plan to support the EU's recovery and resilience," published on 25 November 2020.[71] The EC followed the conclusions of the above-mentioned "Trends and developments in AI final report" and acknowledged that "creations autonomously created by AI technologies are still mostly a matter for the future", concluding that "AI systems should not be treated as authors". It also affirms that "the EU IP framework appears broadly suitable to address the challenges raised by AI-assisted creations," but maintains that there are gaps in harmonisation and margin for improvement, so dialogue with stakeholders is needed.[72]

D. D. Related Rights

I. Protection granted by existing related rights

26 Some have argued that authorless creations could be protected by certain related rights, such as the rights of phonogram producers[73], film producers[74], broadcasting organisations[75], publishers of press publications[76], and non-original photographs.[77] The reason is that these rights do not require originality or human authorship.[78] However, others claim that these rights are likewise conceived for human beings, and that legislative reform would be necessary to adapt their ownership.[79] In addition, it is also maintained that in most cases, authorless creations do not meet the requirements for protection set by

registered.

67 Susana Navas Navarro, ´Obras generadas por algoritmos, en torno a su posible protección jurídica´ (2018), *5(2) Revista de Derecho Civil*, 273,291; In a similar vein, Shlomit Yanisky-Ravid and Luis Antonio Velez- Hernandez, ´Copyrightability of Artworks Produced by Creative Robots and Originality: The formality-Objective Model´ (2018), *19(1) Minnesota Journal of Law, Science and Technology,* 51, 53. The authors argue that as the conclusion as to whether or not creative robots should have copyright in the works they generate depends on whether one views originality from a subjective or objective perspective, and conclude that adopting the objective perspective is more efficient, and that the requirement of originality should not hinder the recognition of copyright in works generated by creative and autonomous robots.

68 European Parliament (EP) Report (n.1) 13.

69 WIPO, ´ Summary of Second and Third Sessions, WIPO Conversation on Intellectual Property (IP) And Artificial Intelligence (AI)´ (4 November 2020) <https://www.wipo.int/edocs/mdocs/mdocs/en/wipo_ip_ai_3_ge_20/wipo_ip_ai_3_ge_20_inf_5.pdf >.

70 C-310/17, Levola Hengelo (2018) ECLI: EU: C: 2018:899, para33; Marta Duque Lizarralde (n.27).

71 COM(2020)760 EU - Communication Making the most of the EU's innovative potential An intellectual property action plan to support the EU's recovery and resilience <https://ec.europa.eu/docsroom/documents/43845/attachments/2/translations/en/renditions/native>.

72 *Ibid.*

73 Chapter II: Rights Related to Copyright, Directive 2006/115/EC of the European Parliament and of the Council of 12 December 2006 on Rental Right and Lending Right and on Certain Rights Related to Copyright in the field of Intellectual Property.

74 *Ibid.*

75 *Ibid.*

76 Art. 15 Directive (EU) 2019/790 of the European Parliament and of The Council of 17 April 2019 on copyright and related rights in the Digital Single Market and amending Directives 96/9/EC and 2001/29/EC.

77 Art. 6 Directive 2006/116/EC of the European Parliament and of The Council of 12 December 2006 on the term of protection of copyright and certain related rights.

78 Bernt Hugenholtz et al. (n.49).

79 Concepción Saiz García (n.48).

the related rights under which they are purported to be protected.[80]

27 More controversial is the question of whether authorless AI-assisted databases are protectable by the *sui generis* database right. For a database to be protected by this right, there must be substantial investment, quantitative or qualitative, either in obtaining, verifying, or presenting the content of the database.[81] Conversely, investment in the creation of data does not lead to protection.[82] In some cases it may be very cumbersome to determine whether the cost incurred by a legal database producer in developing and applying AI technology amounts to a substantial investment in data creation or collection. Even assuming that in this case the substantial investment is made in the collection of existing data, it might not be desirable for AI-generated data to be protected by the *sui generis* right. It has rightly been pointed out that in such a rapidly changing context, where new databases are constantly being produced, the risk is that protection may become perpetual, which could lead to anti-competitive effects.[83] Nevertheless, when AI is used to verify or present existing data, the result may be protected by the *sui generis* database right.[84]

28 Further research on this topic is indeed needed. What seems certain, however, is that those authorless creations that do not come within the scope of the existing related rights are unprotected and would fall into the public domain.[85] That said, the idea of authorless creation falling into the public domain is rejected by part of the academic community, and the introduction of a new related right is instead suggested.[86]

II. Creation of a new related right

29 Yet, the creation of a new related right may not be the best approach. Up to date there is neither economic nor theoretical justification (e.g., deontological or naturalistic), supporting that this related right would incentivise the creation of authorless AI-assisted productions, instead of producing saturation in the market.[87] What's more, it seems that while most jurisdictions do not have copyright or other exclusive rights to protect these productions, the development of AI, including creative AI, is in full swing.[88] Moreover, regardless of the protection of the results created by AI, those who use it as a tool to create content can benefit from first mover advantages.[89] Finally, sufficient tools are already available to those who employ creative AI systems to protect their results, such as trade secrets, factual

80 *Ibid;* Josef Drexl, Reto M. Hilty, Luc Desaunettes-Barbero, Jure Globocnik, Begoña Gonzalez Otero, Jörg Hoffmann, Daria Kim, Shraddha Kulhari, Heiko Richter, Stefan Scheuerer, Peter R. Slowinski and Klaus Wiedemann, ´Artificial Intelligence and Intellectual Property Law Position Statement of the Max Planck Institute for Innovation and Competition of 9 April 2021 on the Current Debate´ (2021) <https://www.ip.mpg.de/fileadmin/ipmpg/content/stellungnahmen/MPI_PositionPaper__SSRN_21-10.pdf>: "*While in some situations AI-generated output can fall de lege lata under such protection, the desirability of such protection can be questioned from a welfare perspective*".

81 Art. 7 Directive 96/9/EC of The European Parliament and of The Council of 11 March 1996 on the legal protection of databases.

82 C-203/02, The British Horseracing Board and Others v William Hill Organization Ltd. EU:C:2004:695, para. 41, 42.

83 Josef Drexl, Reto M. Hilty et al. (n.80).

84 Bernt Hugenholtz et al. (n.49); Concepción Saiz García (n.48): contrarily, it has also been contended that databases created by an AI system may not be the result of the effort of their manufacturer, or may not have required large investment. Thus, the application of this right is not justified.

85 Bernt Hugenholtz et al. (n.49); Concepción Saiz García (n.48).

86 Anthoula Papadopoulou, ´Creativity in crisis: are the creations of artificial intelligence worth protecting?´ (2021), *12 JIPITEC,* 413,414; Ana Ramalho (n.65) argues that *"a disseminator's right, bearing a similar regime to the publisher's right in the publication of previously unpublished works as prescribed by the EU Term of Protection Directive, could be a solution."*. In favour of AI-created works falling into the public domain, see Daniel Gervais, ´The Machine as Author´ (2019) <https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3359524>.

87 Josef Drexl, Reto M. Hilty et al. (n.79); Mark Perry and Thomas Margoni, ´From Music Tracks to Google Maps: Who Owns Computer-generated Works? ´ (2010), *26 (6), Computer Law & Security Review,* 621,629: They claim that the introduction of a related right is likely to be contrary to the economic principle of maximising allocative efficiency, to become inefficient and to lead to market failures.

88 Jyh-An Lee, Reto Hilty and Kung.Chung Liu (eds.), *Artificial Intelligence and Intellectual Property* (Oxford University Press, 2021) 190,195.

89 Robert Yu (n.47) 1264, 1265; Marta Duque Lizarralde (n.27): For example, in the digital marketplace there is a high demand for immediately accessible content that is often hosted on websites that generate revenue from advertising. This implies that competitors compete to be first in the market to attract as many visitors as possible and increase their profits, for which AI can be of great help.

control, and unfair competition.[90] Rather than initially envisaging the creation of new exclusive rights, consideration should be given to the potential of these tools to provide adequate protection, and to whether further harmonisation, for example in the area of unfair competition, would be desirable.

E. Conclusions

30 In recent years, the debate on how to protect AI-generated works has become a hot topic. However, it should also be noted that nowadays AI systems belong to the category of narrow AI, as they can only perform specific tasks, and artificial general intelligence (AGI) is still science fiction. As highlighted by François Chollet, creator of Keras[91], "AI isn´t anywhere close to rivalling human screenwriters, painters, and composers. But replacing humans was always beside the point: AI isn't about replacing our own intelligence with something else, it is about bringing into our lives and work more intelligence, intelligence of a different kind. In many fields, but especially in the creative ones, AI will be used by humans as a tool to augment their own capabilities, more augmented intelligence than artificial intelligence".[92]

31 Many so-called 'AI-generated works' are actually 'AI-assisted works', in which human involvement in various stages of their creation remains relevant and original. Therefore, they do not raise concerns in terms of copyright protection. AI systems cannot generate works autonomously, without any human intervention. Hence, the discussion should focus on how, and whether it is desirable, to protect those AI-assisted productions in which a natural person's contribution to the final result is not original.

32 Definitions of AI-generated works, such as the one adopted by WIPO, do not reflect the current state of AI technology. Hence, a first step to progress in this debate is to strengthen the dialogue between the technical and legal sectors, and thus create a win-win situation for all. On the one hand, AI developers must have a proper IP strategy that allows them to make profits. On the other hand, those in the legal world must understand the technology and the market in order to advise on and regulate it, based on factually correct premises.

33 Copyright is not a suitable means for protecting authorless results. This is because they cannot meet the subjective criterion used by the CJEU in examining originality, nor the requirement that the author must be human, which is presupposed in some provisions of the Berne Convention and in some European directives.

34 Although some argue that authorless creations could be protected by certain related rights, further research is needed on this issue. In any case, introducing a new related right to protect authorless creations is not be the best solution. Those using creative AI systems may already have sufficient tools to protect their results.

90 Bernt Hugenholtz et al. (n..49); Marta Duque Lizarralde (n.27); Jean-Marc Deltorn and Franck Macrez (n.56).

91 Keras is one of the most relevant existing deep-learning frameworks. See Keras´s website: <https://keras.io/>.

92 François Chollet (n.23) 270.