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Big Data, AI System and Enforcement of Intellectual Property Right

Big Data, systemy sztucznej inteligencji oraz egzekwowanie praw własności intelektualnej

Abstract: The purpose of this paper is to analyze the challenges that the development of Artificial Intelligence system implies for the IP rights (particularly patent, *sui generis* database right, copyrights – GenAI) in relation to Big Data, which is increasingly available in all areas of manufacturing and operations and hence presents an opportunity for better decision-making and discovery of the next generation of innovative technologies. However, regarding them are serious doctrinal and normative challenges that we will try to discuss in this study, as well as address the recent jurisprudence that circumscribes the subject currently under discussion.

Key words: Artificial Intelligence System, Big Data, patents, copyright law, database rights

Abstrakt: Celem niniejszego artykułu jest analiza wyzwań, jakie rozwój systemu sztucznej inteligencji niesie ze sobą dla praw własności intelektualnej (w szczególności patentów, praw *sui generis* do baz danych, praw autorskich – GenAI) w odniesieniu do Big Data, które jest coraz szerzej dostępne we wszystkich obszarach produkcji i innej działalności, tym samym stanowiąc okazję do lepszego podejmowania decyzji oraz odkrywania nowej generacji innowacyjnych technologii. Niemniej jednak zagadnienie to wiąże się z poważnymi wyzwaniami doktrynalnymi i legislacyjnymi, które zostaną poddane analizie w niniejszym opracowaniu. Ponadto omówione zostanie najnowsze orzecznictwo dotyczące przedstawionej problematyki.

Słowa kluczowe: system sztucznej inteligencji, Big Data, patenty, prawo autorskie, prawa do baz danych

* pilar.i@ua.es. This contribution is part of the Research Project for groups recognized as research groups of excellence, titled "Protection of Innovation in Agriculture in the Digital Age" (Generalitat Valenciana. Prometeo Excellence Research Group Projects: CIPROM/2021/57).

Introduction

Fuelled by a profusion of digitized data and rapidly advancing computational processing power,¹ AI techniques and functional applications² give rise to unprecedented opportunities of innovation and creativity, and also bring about important challenges to intellectual property protection.³ Big Data and its use by Artificial Intelligence (AI)⁴ is changing the way Intellectual

1 WIPO, WIPO Technology Trends 2019: Artificial Intelligence (Geneva: WIPO, 2019), at 13.

2 AI techniques include machine learning, deep learning, fuzzy logic, logic programming, neural networks, latent representation and unsupervised learning. AI functional applications include computer vision (including image recognition and biometrics), natural language processing (including semantics and sentiment analysis), speech processing (speech-to-speech and speaker recognition), robotics, control methods. See WIPO, note 2, at 31.

3 Filippo Mezzanotti, and Timothy S. Simcoe, *Innovation and Appropriability: Revisiting the Role of Intellectual Property* (NBER, 2023), Working Paper, no. 31428.

4 The new AI Act is the first-ever legal framework on AI, which addresses the risks of AI and positions Europe to play a leading role globally. The AI Act aims to provide AI developers and deployers with clear requirements and obligations regarding specific uses of AI. At the same time, the regulation seeks to reduce administrative and financial burdens for business, in particular small and medium-sized enterprises (SMEs). The AI Act is part of a wider package of policy measures to support the development of trustworthy AI, which also includes the AI Innovation Package and the Coordinated Plan on AI. Together, these measures will guarantee the safety and fundamental rights of people and businesses when it comes to AI. They will also strengthen uptake, investment and innovation in AI across the EU. The AI Act is the first-ever comprehensive legal framework on AI worldwide. The aim of the new rules is to foster trustworthy AI in Europe and beyond, by ensuring that AI systems respect fundamental rights, safety, and ethical principles and by addressing risks of very powerful and impactful AI models. So, the European AI Office strives to position Europe as a leader in the ethical and sustainable development of AI technologies, European Parliament and of the Council on laying down harmonized rules on Artificial Intelligence (Artificial Intelligence Act) and amending certain Union Legislative Acts (COM (2021) 20210206-C9-0146/20212021/0106 (COD)). On May 2024, the Council approved a ground-breaking law aiming to harmonize rules on AI, the so-called artificial intelligence act. The flagship legislation follows a 'risk-based' approach, which means the higher the risk to cause harm to society, the stricter the rules. It is the first of its kind in the world and can set a global standard for AI regulation. The new Artificial intelligence (AI) law aims to foster the development and uptake of safe and trustworthy AI systems across the EU's single market by both private and public actors. At the same time, it aims to ensure respect of fundamental rights of EU citizens and stimulate investment and innovation on artificial intelligence in Europe. The AI act applies only to areas within the EU law and provides exemptions such as for systems used exclusively for military and defence as well as for research purposes. The new AI Act was published in the EU's Official Journal on 12 July 2024. It entered into force in August 2024. It categorizes different types of artificial intelligence according to risk, general purpose AI models, a new governance architecture, penalties transparency and protection of fundamental rights, measures in support of innovation. It is interesting that the regulation of the European Parliament and of the Council laying down harmonized

Property⁵ is developed and granted. For decades, machines have been autonomously generating works which have traditionally been non-eligible for copyright and patent protection. Innovations derived from AI represent a new paradigm of knowledge production in the economy and society, which decisively influences the ability of firms to compete in the market and redefines the limits of knowledge concentration.⁶ Given the breadth of the chosen topic,⁷ in this article we will look into the particular applications in Big Data environment of patents, copyrights,⁸ and databases legislation.

The Concept of Artificial Intelligence System

From a general perspective, the digital economy is perhaps the main driver of innovation. Data⁹ is the fuel that drives it, including in the field of AI,¹⁰

rules on artificial intelligence and amending Regulations (EC) No 300/2008, (EU) No 167/2013, (EU) No 168/2013, (EU) 2018/858, (EU) 2018/1139 and (EU) 2019/2144 and Directives 2014/90/EU, (EU) 2016/797 and (EU) 2020/1828 (Artificial Intelligence Act).

5 Intellectual Property is defined as “intangible property, the result of creativity.” *Oxford English Dictionary*, <http://enoxforddictionaries.com>. As is very interesting, the political agreement reached between the European Parliament and the Council on the Artificial Intelligence Act was approved 13 March 2024, <https://www.europarl.europa.eu/news/en/press-room/20240308IPR19015/artificial-intelligence-act-meps-adopt-landmark-law>.

6 From an ethical perspective, the AI inherits the same foundational approach seen in the GDPR: it is based on protecting human dignity and fundamental rights. This is a very positive feature, even if the current proposal of the AI seems to be somewhat more top-down, less flexible, and less focused on the protection of citizens and their rights than the GDPR. Unfortunately, the AI uses an anachronistic terminology to define this approach as “human-centric,” that is, as an approach that places humanity at the center of technological development. Yet this is both trivially true and dangerously ambiguous. Remember European Parliament Resolution of 20 October 2020 with recommendations to the Commission on a framework of ethical aspects of Artificial intelligence, robotics and related technologies. https://www.europarl.europa.eu/doceo/document/TA-9-2020-0275_EN.html.

7 In relation with design and trademark, see WIPO. Revised Issues Paper on Intellectual Property Policy and Artificial Intelligence, second session, 21 May 2020, Issue 12 and 13, https://www.wipo.int/edocs/mdocs/mdocs/en/wipo_ip_ai_2_ge_20/wipo_ip_ai_2_ge_20_1_rev.pdf.

8 Karin Foss-Solbrekk, “Three Routes to Protecting AI Systems and Their Algorithms Under IP Law: The Good, the Bad and the Ugly,” *Journal of Intellectual Property Law and Practice*, vol. 1 (2021): 1–12.

9 Christopher Kuner, Lee A. Bygrave, and Christophe Docksey, *The EU General Data Protection Regulation (GDPR). A Commentary* (Oxford: Oxford University Press, 2020), 1–3.

10 In the same way definition proposed by Tomasz Zalewski in Marcin Świerczyński, and Luca Lai, *Prawo sztucznej inteligencji* (Warsaw, 2020).

which plays in it an increasingly prominent role.¹¹ In this regard, it is enough to note that one of the essential pillars of machine learning, one of the most successful types of AI system in recent years, is precisely data. Thanks to it, when referring to AI system,¹² we allude to a specificity that some algorithms have or may have, this being a sequence of instructions that produce a result to solve a problem. Nevertheless, we have known and used algorithms for a long time, but when they are capable of learning from their own experiences, and make their own decisions (self-learning), we are faced with AI system.¹³ Recognizing this premise, the Communication from the Commission to the European Parliament, the European Council, the European Economic and Social Committee and the Committee of the Regions, Artificial Intelligence for Europe, published on 25 April 2018,¹⁴ defines AI as “that term that is applied to systems that manifest intelligent behavior, as they are capable of analyzing their environment and taking action – with a certain degree of autonomy – in order to achieve it specifically.” Within this organization, there is no universal definition of AI system.¹⁵ Applying these concepts, AI system is generally considered to be a discipline of computer science that is aimed at developing machines and systems

¹¹ *Economic impacts of Artificial Intelligence*, European Parliament Research Services, 2019, [https://www.europarl.europa.eu/thinktank/en/document.html?reference=EPRS_BRI\(2019\)637967](https://www.europarl.europa.eu/thinktank/en/document.html?reference=EPRS_BRI(2019)637967).

¹² The Artificial Intelligence Act responds directly to citizens’ proposals from the Conference on the Future of Europe (COFE), most specifically to proposal 12 (10) on enhancing EU’s competitiveness in strategic sectors, proposal 33 (5) on a safe and trustworthy society, including countering disinformation and ensuring humans are ultimately in control, proposal 35 on promoting digital innovation, (3) while ensuring human oversight and (8) trustworthy and responsible use of AI, setting safeguards and ensuring transparency, and proposal 37 (3) on using AI and digital tools to improve citizens’ access to information, including persons with disabilities. On this aspect, see: Josef Drexl and Reto M. Hilty, *Technical Aspects of Artificial Intelligence: An Understanding from an Intellectual Property Law Perspective* (2019), Version 1.0, <https://ssrn.com/abstract=3465577>.

¹³ Esperanza Gallego Sánchez, “La patentabilidad de la Inteligencia Artificial. La compatibilidad con otros sistemas de protección,” *La Ley Mercantil*, no. 59 (2019): 1–24; Patricia Fernández Carballo-Calero, *La propiedad intelectual de las obras creadas por inteligencia Artificial* (Cizur Menor: Aranzadi, 2021), 19–37; Raquel Xalabarder Plantada, in *Retos jurídicos de la Inteligencia Artificial* (Cizur Menor: Aranzadi, 2020), 205.

¹⁴ See White Paper on Artificial Intelligence. A European Approach to Excellence and Trust of February 19, 2020 (COM 2020), 65 final.

¹⁵ According to the EU AI Act, an “Artificial Intelligence system” is defined as any machine-based system that operates autonomously to generate outputs such as predictions, recommendations, or decisions affecting physical or virtual environments.” Remember that this broad definition, inspired by OECD guidelines, is designed to be future-proof, which means that it covers a wide range of technologies including Generative AI, deep learning, but also more

that can carry out tasks considered to require human intelligence.¹⁶ Machine learning and deep learning are two subsets of the same. In recent years, with the development of new neural networks techniques and hardware, AI is usually perceived as a synonym for “deep supervised machine learning.”¹⁷ Ultimately, at the beginning of 2023, the representatives of the political groups in the European Parliament were able to agree on a uniform definition and, at the same time, define the material scope of the AI Act (art. 3.1 of the AI Act) defines an artificial intelligence system (AI system) as “machine-based system that is designed to operate with varying levels of autonomy and that can, for explicit or implicit objectives, generate outputs such as predictions, recommendations, or decisions that influence physical or virtual environments.” With this objective in mind, the European Union in December 2023 announced that it had reached a provisional agreement regarding the basic content of the Artificial Intelligence Act (AI Act or Act) adopted in March 2024.¹⁸ Recently, the Council approved a ground-breaking law aiming to harmonise rules on artificial intelligence, the so-called Artificial Intelligence act. The flagship legislation follows a ‘risk-based’ approach, which means the higher the risk to cause harm to society, the stricter the rules. It is the first of its kind in the world and can set a global standard for AI regulation.

conventional data analysis techniques. See, in Spanish doctrine, Fernández Carballo-Calero, *La Propiedad Intelectual*, 38–39.

16 See Philipp Hacker, *Comments on the Final Trilogue Version of the AI Act* (2024).

17 Andreas Kaplan and Michael Haenlein, *Siri, Siri, in My Hand, Who’s the Fairest in the Land? On the Interpretations, Illustrations and Implications of Artificial Intelligence* (Business Horizons Review, 2018), 15–25; Pedro Portellano Díez, “Inteligencia Artificial y responsabilidad por productos defectuosos,” *Revista de Derecho Mercantil*, no. 316 (2020): 8–25; Tambiama Madiega, *General-purpose Artificial Intelligence, EPRS, European Parliament* (March 2023), 3–7; Liza Vertinsky and Todd M. Rice, “Thinking about Thinking Machines: Implications for Machine Inventors for Patent Law,” *Boston University Journal of Science & Technology Law*, no. 82 (2002), <http://www.bu.edu/law/journals-archive/scitech/volume82/vertinsky&rice.pdf>.

18 European Parliament legislative resolution of 13 March 2024 on the proposal for a regulation of the European Parliament and of the Council on laying down harmonized rules on Artificial Intelligence (Artificial Intelligence Act) and amending certain Union Legislative Acts (COM(2021)0206-C9-0146/2021 -2021/0106 (COD)).

Special Reference to Patentability of Artificial Intelligence System

Technology is the backbone of the digital economy and much of its value lies in software. Indeed, all economic sectors are becoming reliant on software to leverage growth. This has important implications for IP laws.¹⁹ Until the late 20th century, the functionality of most innovative products, particularly those relying on semiconductors, was primarily embedded in hardware. There was no doubt about their patentability. But today, increasingly sophisticated semiconductor technology and design tools mean that physical objects are no longer the sole basis of innovation. In other words, technical functionality is progressively migrating from hardware to software. And yet in many jurisdictions software-related inventions either do not qualify for patent protection or have a very limited scope of protection.²⁰ In sum, patentability of artificial intelligence has to be assessed in a double context: mathematical methods and computer-implemented inventions.²¹ In this aspect, we should remember that a computer implemented invention is one that involves the uses of a computer, a computer network or other programmable device in which one or more of its functions are carried out totally or partially thanks to a computer program. It should be noted that the European Patent Convention (EPC) (Articles 2 (c) and 3) state that a computer program claimed “as such” is excluded from patentability.²² Accordingly, the technical character is essential for it to be considered an invention in the sense established by art. 4.1 Spanish Patent Law and art. 52 EPC 1973 (and also by art. 52(2) EPC 2000).²³ Additionally, the object for which protection is sought

19 Céline Castets-Renard, “The Intersection Between AI and IP: Conflict or Complementarity?,” *IIC- International Review of Intellectual Property and Competition Law*, no. 51 (2020): 141–143, <https://doi.org/10.1007/s40319-020-00908-z>; Ananya Jain, “Intellectual Property Rights in the Age of Artificial Intelligence,” *International Journal of Law Management & Humanities*, vol. 4, no. 2 (2021): 1501–1506.

20 See https://www.wipo.int/wipo_magazine/en/2017/01/article_0002.html, accessed 25 March 2024.

21 Brian Haney, “AI Patents: A Data Driven Approach,” *Chicago-Kent Journal of Intellectual Property*, vol. 19 (2020): 410–420.

22 See Rules 42 and 43 EPC.

23 In relation to this aspect, see art. 69 EPC. In the United States, patent protection for software-related inventions is limited to those on recordable media, not to computer programs themselves (see *In re Beauregard*, 53 F.3d 1583 (Federal Circuit 1995)). This protection falls short when it comes to the online distribution of software. But the Supreme Court’s decision in *Alice Corp. v. CLS Bank Int’l* (134 S. Ct. 2347, 2014) and some subsequent cases, have failed to provide

must include technical teaching, that is an instruction addressed to a technical expert on how to solve a particular technical problem through the use of particular technical means. In relation with the above, the cited precepts exclude the consideration of invention in both mathematical methods and computer programs, which constitute, as we have seen, the two supports of AI system.²⁴ Of course, the difficulty is knowing what is meant by “technical character.”²⁵ Since there is no legal definition, its scope should be defined according to the groups of cases that exist in practice. Firstly, together with the previous ideas, the technical purpose must be “specific”²⁶ and the model that serves a technical purpose is determined by the direct technical relevance of the results it provides.²⁷ Secondly, this technical characteristic may derive from the fact that the computational model and the algorithms on which it is based are designed and adapted for a *specific technical implementation* or that their design is motivated by technical considerations on the internal functioning of the computer.²⁸ For this reason, the technical character has to redirect in the *additional technical effects* derived from the execution (by hardware) of the instructions given by the computer program. Consequently, additional technical assumptions that confer technical character to computer programs are the control of a technical process or the internal functioning of the computer or its interfaces.²⁹ In this context,

clear boundaries for the patent eligibility of software-related inventions. <https://www.clfip.com/ip/blog/how-to-patent-software/> accessed 23 March 2024.

24 Gallego Sánchez, *La Patentabilidad*, 3-4; Josef Drexler and Reto M. Hilty, *Technical Aspects of Artificial Intelligence: An Understanding from an Intellectual Property Law Perspective, Version 1.0* (2019), <https://ssrn.com/abstract=3465577>; Piotr Kuznieruk and Agnieszka Zemke-Górecka, “Legal Aspects of Artificial Intelligence Under the Law of the European Union. Part 1,” *Europejska Wyższa Szkoła Prawa i Administracji w Warszawie*, no. 4 (2022); Yun Chen, “Intellectual Property Protection for Artificial Intelligence Inventions in China,” *Journal of Intellectual Property Law and Practice*, vol. 15, no. 5 (2020): 374-380.

25 SPTO, www.oepm.es/export/sites/oepm/comun/documentosrelacionados/invenciones/DirExPat_DIRECTRICES_Version_2_o.pdf.

26 EPO, Decision Board of Appeal, T 1358/09 (*Classification/BDGB Software empresarial*, 21.11.2014) (ECLI:EP:BA:2014:T135809.20141121); EPO, Decision Board of Appeal, T1316/09,18.12.2012 (ECLI:EP:BA:2012:T131609.20121218).

27 Gallego Sánchez, *La Patentabilidad*, 11.

28 EPO. Decision G0003/08,12.05.2010 (ECLI:EP:BA:2010:G000308.20100512) and EPO, Decision Board of Appeal T1173/97, 17.7.1998 (ECLI:EP:BA:1998:T117397.19980701). In this Decision, it is possible to grant a patent not only in the case of an invention in which a piece of software manages.

29 EPO, Guidelines for Examination 2024, <https://www.epo.org/en/news-events/news/guidelines-examination-2024-enter-force>.

proportionality – following the abandonment of the so-called “contribution approach,” which required determining an invention’s technical contribution relative to the state of the art to assess its technical character and the presence of an additional effect – was evaluated without reference to the state of the art. From all this, two questions arise: firstly, determining whether or not a computer program is excluded from patentability according to art. 52.2 and 3 EPC is independent of the “state of the art.”³⁰ This aspect can only be considered when examining the concurrence of the patentability requirements specific to novelty and inventive step. Secondly, identifying which aspects can be considered novel if they lack technical character and do not justify by themselves the presence of an additional technical effect. Above all, the jurisprudence is ambiguous.³¹ Only describing “what” the features are or “what” the user experiences on screen are most likely to be deemed as an unpatentable abstract idea.

Defining Big Data

The analysis of the information obtained in the network allows to have a greater knowledge of the essential issues of a business and direct resources in an efficient and profitable forms. Consequentially, databases offer a harmonious and user-friendly synthesis of a main body content (works, data or other materials) with a variety of tools and other means of arranging, presenting and searching their *corpus* of contents.³² In this aspects, the previous tools to analyze and process large amounts of data and the ability to interpret them constitute the basis of the business and the competitive advantage of numerous companies, and especially of a good part of startups that feed on the knowledge acquired by their tools to offer innovative services and solutions with great added value.³³

³⁰ See footnote 28.

³¹ EPO, Decision Board of Appeal, T424/03; 23.02.2006 (ECLI:EP:BA:2006:To42403.20060223); To258/03.12.5.2010 (ECLI:EP:BA:2010:G000308.20100512); T1370/2011;11.03.2016 (ECLI:EP:BA:2016).

³² Tatiana-Eleni Synodinou, “Databases Producer Protection: Between Rights and Liabilities,” in *Research Handbook on Intellectual Property and Digital Technologies*, ed. Tanya Aplin (Cheltenham, UK: Edward Elgar Publishing, 2020), 181–187 .

³³ María Martínez Pérez, “Protección Tecnológica Implicada en el Funcionamiento del Internet de las Cosas,” in *Big data e internet de las cosas. Nuevos retos para el Derecho de la competencia y de los bienes inmateriales*, ed. Ángel García Vidal (Valencia: Tirant lo Blanch, 2020), 400–414.

So, the very importance of these intangible assets makes their protection a crucial element for the success and consolidation of these businesses. We cannot lose sight of the fact that the disclosure of an algorithm or free access to the knowledge stored in the databases generated can put a business that is based on the exploitation of these intangibles at risk. With the development of technologies capable of generating high data volumes at a rapid pace, a global effort has been made to develop solutions for better storage, processing and analysis of Big Data. As our society grows more complex, interconnected, and technologically advanced, data is generated that reflects this societal change, and potentially allows us to better understand this complexity.³⁴ Thus, with technology, every individual's movements, decisions, and purchases are captured and memorialized in the electronic realm. Due to the exponentially increasing efficiency of storage, the data is collected in centralized servers, stored, and analyzed in ways never before possible.³⁵

In general, Big Data and its use by AI system is changing the way IP is developed and granted and it is data that exceeds the processing capacity of conventional database systems. In view of the above, "this process often requires human input to assist the machine in correcting errors or faculty correlations derived from, or decisions based on, the data. Data as such presents value for enabling a competitive data-driven economy, which is at the heart of 'Internet of Things' (IoT)³⁶ and Industry 4.0.³⁷ This processing of corpora of Big Data is done to find correlations and generate predictions or other valuable analytical outcomes. Thus, "these correlations and insights can be used for multiple purposes, including advertising targeting and surveillance, thorough an almost endless array of other applications is possible. Attached to the above, a subset of machine learning know a deep learning (DL) is an AI system function that

34 See <https://www.scientificamerican.com/article/big-data-needs-big-theory/>, accessed 11 February 2021.

35 IBM (2012), Institute for Business Value in collaboration with the Business School Säid, Oxford University, "Analytics: Big Data and Real World," *IBM Global Business Services*.

36 Barrio Andrés, *Internet*, 23; Partha Pratim Ray, "ChatGPT: A Comprehensive Review on Background, Applications, Key Challenges, Bias, Ethics, Limitations and Future Scope," *Internet of Things and CyberPhysical Systems*, vol. 3 2023: 121-154, <https://doi.org/10.1016/j.iotcps.2023.04.003>.

37 Recalled, Industry 5.0. See *Industry 5.0. Towards a Sustainable, Human-Centric and Resilient European Industry European*, Commission Directorate-General for Research and Innovation Directorate F-Prosperity (January 2021).

imitates the workings of the human brain in processing data and creating patterns for use in decision making. Also known as deep neural learning or deep neural network.”³⁸ Big Data is driving a trend towards behavioral optimization and “personalized law,” in which legal decisions and rules are optimized for best outcomes and where law is tailored to individual consumers based on analysis of past data.³⁹ It is supposed “objectivity and predictive power are overstated, at least when applied to highly complex evolutionary systems such as the legal system.”⁴⁰ Alternatively, while law is semantic, Big Data is syntactic. Law is abstract, value-based, and built on compromise. Big Data is empirical, algorithmic, and deterministic. Also, Big Data is inherently contextual and cannot interpret itself, nor can it discern the indeterminate boundaries of legal principles. However, Big Data has serious limitations and poses dangers when applied in the legal context, especially one of ownership in copyright, patents, and database regulation.

Interface Between Intellectual Property Law and Big Data.

The connection between Big Data and law can be thematized in several ways. The development of Big Data invites a reflection on the impact that this and other advanced technologies are having on the field of IP rights.⁴¹ The interfaces between Big Data (as the term is defined below) and IP matters both because of the impact of IP rights in Big Data, and because IP rights might interfere with the generation, analysis and use of data.⁴² In fact, information is the currency of the digital age, and data about customers is becoming a critical asset in these markets. Emerging, fast-growing business models are increasingly counting on the availability of massive amounts of

³⁸ Haney, “AI Patents,” 412.

³⁹ Haney, “AI Patents,” 412

⁴⁰ Haney, “AI Patents,” 413.

⁴¹ In this aspect, Francis Gurry, General Director of the World Intellectual Property Organization (WIPO) notes that “data-driven technology is the dominant force in economic production and distribution in the digital framework.” https://www.wipo.int/wipo_magazine/es/2019/05/article_0001.html, accessed 21 December 2020.

⁴² Kazuhiko Yamamoto and Robert Lloyd, “The Role of Big Data and Digitization in Just-In-Time (JIT) Information Feeding and Marketing,” *American Journal of Management*, vol. 19, no. 2 (2019): 126–133.

data about customers and their behavioural patterns in order to collect and monetize them. A significant portion of this information is personal data relating to identifiable individuals. In this case, the exploitation of those data is subject to privacy laws. In this way, “EU privacy laws allow the collection and use of customers’ data for commercial purposes. However, these activities are highly invasive, and companies must respect a series of strict rules which often imply high costs.”⁴³ For this reason, when processing personal data for commercial purposes, companies create sets of customer data which may differ depending on the level of complexity of the processing activity, from newsletter groups to advanced profiling and behavioral advertising programs. Undoubtedly, this information is an intangible asset having economic value whose creation requires economic investments.⁴⁴ Thus, it may be the subject matter of IPRs (particularly, IPRs that are designed to protect data within the EU IP framework are copyrights, trade secrets and the database right).⁴⁵

Consequently, “Big Data *corpora* are protected by secrecy, a form of protection that relies on trade secret law combined with technological protection from hacking, and contracts.”⁴⁶ Additionally, deciding which IP rights may apply should thus distinguish Big Data *corpora* that are not publicly accessible and those that are.⁴⁷ So, a publicly available *corpus*, in contrast, must rely on *erga omnes* IP protection, if it deserves protection to begin with. Then, copyright

43 See https://ec.europa.eu/info/law/law-topic/data-protection/data-protection-eu_en, accessed 16 March 2024.

44 Prabuddha Ganguli, “AI and Intellectual Property: A Model of Value Creation,” *Journal of Intellectual Property Law and Practice*, vol. 13, no. 11 (2018): 900–910; WIPO, “Artificial Intelligence and Intellectual Property: An Economic Perspective,” *Economic Research Working Paper*, no. 77, 2024.

45 Alan C. Marco, Michael Carley, Steven Jackson, and Amanda F. Myers, “The USPTO Historical Patent Data Files,” *USPTO Economic Working Paper, Office of Chief Economist US Patent and Trademark Office*, working paper no. 2015-1 (2015): 1–57, https://www.uspto.gov/sites/default/files/documents/USPTO_economic_WP_2015-01_v2.pdf.

46 Daniel J. Gervais, *The TRIPS Agreement: Drafting History and Analysis* (UK: Sweet & Maxwell, 2012), 124.

47 José Antonio Gómez Segade, “Protección de los macrodatos (Big Data) mediante secretos empresariales,” in *Big data e Internet de las cosas. Nuevos retos para el Derecho de la competencia y de los bienes inmateriales* (Valencia: Tirant lo Blanch, 2012), 116–150.

protects collections of data,⁴⁸ the *sui generis* database right⁴⁹ (in the EU, is the concept of “substantial investment”)⁵⁰ might apply and data exclusivity rights may be relevant. The outputs of the processing of Big Data *corpora* may contain or consist of subject matter that facially could be protected by copyright or patent law.⁵¹ Big Data technology can be – and in fact is – used to create and invent. Deciding whether machine-created material should be protected by copyright could thus have a profound impact on the market for creative works. If machine-created material is copyright-free, machines will produce free goods that compete with paid ones, that is, those created by humans expecting a financial return. We will have to ask ourselves whether the material produced by machines is protected by copyright and its use potentially subject to payment, which might level the commercial playing field between human and machine, but then who (which natural or legal person) should be paid for the computer’s work? Consequently, there will be border definition issues.⁵² Overall, important legal challenges arise in this matter, especially in relation to IPRs, particularly with respect to the protection of works generated by AI system,⁵³

48 Art. 2 of the Berne Convention only affords protection to “literary and artistic works,” making no mention of computer program. The TRIPS Agreements assimilated the Berne articles to accommodate for technological developments (art. 10 (1)). Thus, Article 4 of WIPO Copyright Treaty reaffirms that computer programs fall within the ambit of the Berne Convention. The EU has accepted TRIPS, and in 2001 adopted Infosoc Directive (Directive 2001/29/EC of the European Parliament and the Council of 22 May 2001).

49 See art. 7(2) and Articles 9–15 Directive Databases. Therefore, case of *Directmedia Publishing GmbH v. Albert Ludwigs Univesitat Freiburg*, C-304/07 (ECLI:EU:C:2008:552)

50 The CJEU clarified the concept of “substantial” and “insubstantial” parts of database’s contents. See C-604/10 *Football Dataco and others* (ECLI:EU:C:2002:115). In the UK, Court of Appeal, *Decision in Football Data Co Ltd v. Sportradar GmbH*, EWCA, Civ. 27, 2013, FSR, 30.

51 Yuko Arai and Shingo Kinukawa, “Copyright Infringement as User Innovation,” *Journal of Cultural Economics*, no. 38 , no 2 (2014): 131–144.

52 Pedro Alberto De Miguel, *Derecho privado de Internet* (Madrid: Civitas, 2015), 461–463; Concepción Sáiz García, “Las obras creadas por sistemas de Inteligencia Artificial y su protección por el Derecho de autor,” *InDret*, vol. 1 (2019): 8–19.

53 Chinese Court, Case *Li Yunkai v. Liu Yuanchun*, considered AI as a mere tool for human creativity (the United States Copyright Office). In a high-profile decision, the Office first allowed, then denied, copyright registration to images in a graphic novel titled “Zarya of the Dawn,” which had been generated with the help of the same generative AI tool. This is despite the author’s claims that she had used “hundreds and thousands” of iterative prompts to arrive at the final images. A UK Intellectual Property Office (UKIPO) public consultation in 2021 recognized the argument that the current UK law on computer generated works is unclear and contradictory and asked for views on whether to remove this protection or replace it with a new right with reduced scope and duration. No clear consensus was reached and in 2022 the UKIPO

due to the great autonomy that this technology is acquiring and in which AI models can act and create independently of humans. In this form, we can ask ourselves different questions: can we apply the notion of joint authorship?⁵⁴ Or, should we consider the machine-produced portion (if separable) copyright-free, thus limiting the protection to identifiably human-authored portions? If such major doctrinal challenges – each with embedded layers of normative inquiries – emerge in the field of copyright, Big Data poses existential threats in the case of patents.⁵⁵ Thus, AI tools “can be used to process thousands of published patents and patent applications and used to expand the scope of claims in patent applications. This poses normative challenges that parallel those enunciated above: who is the inventor? Is there a justification to grant an exclusive right to a machine-made invention? To whom?”⁵⁶ Then, there are doctrinal ones as well. For example, is the machine-generated “invention” disclosed in such a way that would warrant the issuance of a patent? It gets more complicated, however. In this way, if AI machines using patent-related Big Data can broaden claim scope or add claims in patent applications, then within a short horizon they could be able to predict the next incremental steps in a given field of activity by analyzing innovation trajectories.⁵⁷ Doctrinally, this raises questions about an inventive step: if a future development is obvious to a machine, is it obvious for purposes of patent law? So, answering this question poses an epistemological as well as a doctrinal challenge for European Patent Office. This use of patent and technological Big Data could lead to a future where machines pre-disclose incremental innovations (and their use) in such a way that they constitute publicly

decided to leave the law as it is, concerned that AI generated works are still in their early stages and changes could have unintended consequences.

54 Raquel Acosta, “Artificial Intelligence and Authorship Rights,” *Harvard Journal of Law and Technology* (17 February 2012), <http://jolt.law.harvard.edu/digest/copyright/artificial-intelligence-and-authorship-rights>.

55 See <https://www.garrigues.com/es>, accessed 20 March 2024.

56 WIPO, Translate and other AI tool in WIPO, 6 December 2019, https://www.wipo.int/meetings/en/doc_details.jsp?doc_id=462691. It is interesting EPO Board of Appeal Issues Decision in Jo8/20 DABUS for an AI-generated invention naming a machine is inventor. The DABUS case, wherein an AI system was named as the inventor of two patents, exemplifies the challenges AI-generated inventions pose. It presses us to reconsider the fundamentals of our IP law system and the definition of an “inventor.” See Daeho Kim, “AI-Generated Inventions: Time to Get the Record Straight?,” *GRUR International*, 69, no. 5 (2020): 443–456.

57 Iain M. Cockburn, Rebecca Henderson, and Scott Stern, “The Impact of Artificial Intelligence on Innovation: An Exploratory Analysis,” *The Economics of Artificial Intelligence: An Agenda* (Chicago: University of Chicago Press, 2019), 115–146.

available prior art and thus make obtaining patents impossible for a significant part of the current patentability universe.⁵⁸ Perhaps even the best AI system using a Big Data *corpus* of all published patents and technical literature will not be able to predict the next pioneer invention, but very few patents are granted on ground-breaking advances. So far, AI systems that can predict most currently patented inventions (which tend to be only incrementally different from the prior art) would wreak havoc with the patent-based incentive system.

Relation with Another System Protection: Copyright⁵⁹ – Particularly in the Context of Generative AI – and Databases⁶⁰

As artificial intelligence system moves beyond performing simple tasks to creating original content, it blurs the lines between humans and machines. In doing so, it challenges a core tenet of many traditional intellectual property (IP) frameworks: only works created by humans are protected by copyright laws.⁶¹ The development and training of AI models also raise another important copyright issue: whether the use of third-party content in that exercise might infringe on the copyright of that content. Creativity is a unique phenomenon that differs in nature from invention. Creative works receive different treatment under IP laws, typically facing fewer originality requirements. Copyright

⁵⁸ Haney, “AI Patents,” 468.

⁵⁹ Generative artificial intelligence (GenAI) challenges EU copyright law, from the AI training to the protectability and liability risks of its output. The EU’s forthcoming AI Act takes first steps towards AI-specific regulation with its provider obligations on training data transparency and copyright policy. In April 2023, China’s Cyber Administration released draft measures, for the administration of generative artificial intelligence services, for public comment. The draft measures try to balance the development of the technology with maintaining control over it to ensure that it does not disrupt social order. One of the key requirements to be implemented is for companies that create generative AI tech to implement safeguards to ensure compliance, not only to prevent content being generated which does not fall foul of government policy, but also with consideration to the IP implications. Doctrinally, Tambiama Madiega, *Generative AI and Watermarking*, EPRS, European Parliament, December 2023.

⁶⁰ The Regulation on harmonized rules on fair access to and use of data – also known as the Data Act – entered into force on 11 January 2024. The Act is a key pillar of the European data strategy and it will make a significant contribution to the Digital Decade’s objective of advancing digital transformation.

⁶¹ United States Copyright Office: Copyright Registration Guidance: Works Containing Material Generated by Artificial Intelligence, 2023.

protection, in particular, applies to any newly created work. Emerging use cases around generative AI are disrupting traditional views of creativity, authorship and ownership and pushing the boundaries of copyright law. As the world catches up with innovation, the resulting legal ambiguity impacts all sides of the AI equation – developers, content creators and copyright owners. In principle, copyright law does not confer any control of data: by application of the idea-expression dichotomy, copyright only applies to an original form of expression, not to the ideas or simple information embedded in a creative work.⁶² Following this approach, copyright protects the form or expression of information but not the underlying information itself. It applies to software, certain databases,⁶³ literary works, music, films, videos and broadcasts. It arises automatically by operation of law in the EU (so does not require to be registered). It ensures protection of various types of works, awarding protection to individual data as long as they are original⁶⁴ and can be expressed in a material, concrete form. The broad understanding of these protection requirements facilitates extending, in principle, protection to different types of works, including to data. It is, however, worth examining some of the most important characteristics of the EU copyright system in order to determine whether it may apply to (big) data. So, “Big Data *corpora* is considered a literary work eligible for copyright protection, subject to possible exclusions and limitations.”⁶⁵ In the context of Big Data projects, it is crucial to understand to what extent the data used can be copyright protected.⁶⁶ In all likelihood, most of the data collected and processed in a Big Data analytics (that provide the big picture for understanding patented technologies in a company or industry and help executives of a company make business decisions on how to build their patent portfolio and licensing programs)⁶⁷ context will not be considered original and will

62 Yamamoto and Lloyd, “The Role of Big Data and Digitization,” 136.

63 See art. 2 (5) Berne Convention.

64 Case Cofemel-Sociedade de Vestuário, S.A. v. G-Star Raw CV, C-683/17JEU in its recent judgment of 12 September 2019 (see, in this sense, the judgments of 1 December 2011), Painer v. Standard Verlags GmbH and others, C-145/10 (ECLI:EU:C:2011:798), paragraphs 88, 89 and 94, and of 7 August 2018, Renckhoff, C-161/17 (ECLI:EU:C:2018:634).

65 Yamamoto and Lloyd, “The Role of Big Data and Digitization,” 137.

66 In US Law, Copyright Office. Compendium of US Copyrights Offices Practices, paragraph 306 (Third edition, 2014).

67 See for example, <https://www.ipytics.com/general/big-data-ip-analytics>, accessed 18 March 2024.

therefore not benefit from copyright protection. Likewise, in the context of data, traditional literary copyright will subsist in documentation. Having said that, it cannot be excluded that the individual data can gain originality once they are connected with other information or presented in an original way (by means of different possible forms of expression). The protection of computer programs through copyright constitutes the traditional and ordinary form of protection. It is based on the claim that the software is a mere intellectual creation, not the kind of technical inventions, which, insofar as it is written in code, is similar to a literary work. Thus, Article 1 of Directive 24/EC of the European Parliament and of the Council, of 23 April 2009, on the legal protection of computer programs is expressly stated when it states that: “Member States shall protect the computer programs as literary works as defined in the Berne Convention for the protection of literary and artistic works.”⁶⁸

A Committee of Experts meeting under the auspices of the WIPO, which administers the Berne Convention,⁶⁹ concluded that, although this is not specified expressly in the text of the Convention, the only mandatory requirement for a literary or artistic work to be protected by the Convention is that it must be “original.” To arrive at this conclusion, the Committee considered both the Convention’s drafting history and the use of the expression “intellectual creation” in the Convention as a functional synonym of the term “work.” This also means that no mandatory formality may be required to obtain copyright protection. The same statement, namely that the only applicable criterion is originality, can be made about the EU law. As will be commented on later, when “electronic” databases started to emerge in the 1990s, data generally had to be indexed and re-indexed regularly to be useable. In this line, using language meant to parallel art. 2(5) of the Berne Convention,⁷⁰ the data in typical (relational or “SQL”) databases in existence in the 1990s generally was “structured” in some way, for example, *via* an index, and this structure might qualify the database for (thin) copyright protection in the database’s organizational layer. Older databases also contained more limited datasets (“small data”). Indeed, Big Data is sometimes defined in direct contrast to the notion of SQL database and

68 Geiger, Frosio, and Bulayenko, “Text and Data Mining,” 28–63.

69 Committee of Experts on a Possible Protocol to the Berne Convention, https://www.wipo.int/meetings/en/details.jsp?meeting_id=2251, accessed 9 April 2024.

70 Ricketson and Ginsburg, *International Copyright and Neighbouring Rights*, 47.

reflected in the TRIPs Agreement⁷¹ (and the EU database Directive discussed in the next section).⁷² Big Data software is unlikely to “select or arrange” the data in a way that would meet the originality criterion and trigger copyright protection. In this context, “fixation,” in a data context, would mean that the specific information needs to be saved in a tangible form.⁷³ Thus

The form of saving the data can differ from handwritten notes (files), through photographic documentation (image) or recorded testimonies (sound) to digitalized archives (digital files), as long as it remains concrete, can be easily identified and described. Results that have not yet been produced (future data), or results that cannot yet be described (e.g. because there are no means yet to express them) cannot benefit from copyright protection for as long as they have not materialized.⁷⁴

This can present some difficulties in a Big Data context, given that Big Data tends to involve dynamic datasets and notably relies on cloud computing services. And the legal framework for copyright does not provide for a registration system. Accordingly, the eligibility for protection (and its scope) can only be confirmed *a posteriori* by a Court of Justice, leading to a lack of legal certainty in the meantime.

In the light of the foregoing, the copyright holder is granted several exclusive economic rights that allow controlling the protected work’s use and facilitate enforcement in case a third party uses the work without authorization. More-

71 TRIPs established global standards for Copyrights and Patent protection. The UK and all EU member states are required to adhere to the mandatory requirements in TRIPs. These requirements were modelled after the IP laws in developed nations such as the United Kingdom, the United States and Japan, so TRIPs required relatively few changes to the UK IP laws when it came into effect on 1 January 1996 (94/800/EC Council Decision on 22 December 1994). See further, Richetson and Gissnburg, *International Copyright and Neighbouring Rights*, 47–48.

72 Directive 2009/24/EC of the European Parliament and the Council of 23 April 2009 on the legal protection of computer programs, OJL111, 5 February 2009; 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 OJL372, 27 December 2006; Directive 96/9/EC of the European Parliament and the Council of 11 March 1996 on the legal protection of database, OJ L77, 27 March 1996.

73 Foss-Solbrekk, *Three Routes to Protecting AI Systems*, 4–6.

74 Sam Richetson and Jane C. Gissnburg, *International Copyright and Neighbouring Rights: The Berne Convention and Beyond*, vol. 2 (Oxford, New York: OUP, 2006), 47.

over, “the rights of reproduction, communication to the public and distribution are indeed a useful toolkit which, balanced by the copyright exceptions, allows for an optimal protection of right holder’s interests.”⁷⁵ That is, copyright law therefore provides for a wide scope of measures securing the rights of the author in case of dissemination of his work and the use of these works by third parties. The rules governing copyright protection aim at enabling further use of the works, securing at the same time the legitimate interests of the author. In this aspect, in a data environment, the most important hindrance resulting from copyright protection is the necessity to obtain authorization from the copyright holder of each individual data.⁷⁶ In the context of Big Data projects, to the extent copyright applies, it would require identifying authors of hundreds (if not hundreds of thousands) of works. In many cases, it might be difficult to identify or find the right holder and/or understand whether he has given his authorization for use of the work.⁷⁷ In practice, this means that time-consuming analyses need to be performed before the data gathered can be used. Furthermore, as regards the possibility to acquire copyright in data, the exclusivity of this type of right constitutes a hindrance, since it does not allow acquiring copyright in the same data “in parallel.”⁷⁸ Thus, the latter may however often be the case in a Big Data context, in particular where parties will be independently collecting the same or similar data, leading to the creation of convergent datasets. Consequently, a wide range of factors can be taken into account when determining the exclusive economic rights, when authors are also granted so-called “moral rights,”⁷⁹ which are related to the idea that a work is not a mere staple commercial object, but also the expression of their personality.⁸⁰ In relation with the above, the Generative

⁷⁵ Foss-Solbrekk, *Three Routes to Protecting AI Systems*, 7.

⁷⁶ Christophe Geiger, “From Berne to National Law, via the Copyright Directive: The Dangerous Mutations of the Three-Step Test,” *European Intellectual Property Review*, vol. 29, no. 12 (2007): 486–491.

⁷⁷ Yamamoto and Lloyd, *The Role of Big Data and Digitization*, 133.

⁷⁸ Jérôme Debussche and Céline Jasmien, *Big Data & Issues & Opportunities: Intellectual Property Rights*, Bird & Bird, March 4, 2019, <https://www.twobirds.com/en/insights/2019/global/big-data-and-issues-and-opportunities-ip-rights>.

⁷⁹ Debussche and Jasmien, *Big Data*.

⁸⁰ CJEU, Case C-161/17, *Renckhoff* (ECLI:EU:C:2018:634). In relation with creative choices, Case C-145/10, *Painer* (ECLI:EU:C: 2011:788). Analyzing sequences and combinations wherein authors originally express themselves, CJEU Case C-5/08, *Infopaq International A/S v. Danske Dagblades Forening* (ECLI:EU:C:2009:465).

Artificial Intelligence (GenAI) challenges the EU copyright law,⁸¹ from the AI training to the protection ability and liability risks of its output.⁸² The EU's AI Act takes first steps towards AI-specific regulation with its provider obligations on training data transparency and copyright policy. First of all, the text and Data Mining (TDM)⁸³ is an exception for AI training: GenAI applications have been trained with millions of pieces of copyrighted content scraped from the internet without explicit consent from the rightsholders. In the EU, reproductions made in the course of such training are permitted by the TDM exception of the 2019 EU Copyright Directive, unless rightsholders express machine-readable opt-outs. Not yet harmonized standards for such technical opt-outs and the issue that AI models currently cannot retroactively "forget" individual training content are practical challenges for which crucial developments should be monitored in 2024. Secondly, in relation with training data transparency, the EU AI Act will include a training data transparency obligation for providers of general-purpose AI (GPAI) models. The transparency obligation will no longer be limited to copyrighted training data, as initially proposed by the EU Parliament. It now requires providing general information on the datasets and databases used with further guidance to be provided by the future EU AI Office. In relation with the above, AI output needs to be assessed under general copyright law: because the EU AI Act will require GPAI model providers to put in place a policy to respect existing EU copyright law, which

81 In the new regulation of AI generative is seen as a disruptive technology that will likely mean amending EU laws and regulation. EU lawmakers are considering whether to legislate in other areas, such as on AI at the workplace, competition in generative AI (with much uncertainty regarding openness in generative AI), AI energy sustainability and, of course, intellectual property rights, with the possible revision of the Copyright Directive.

82 The EU AI Act introduces a risk-based classification for AI applications, categorizing them from minimal risk to banned applications based on their impact on individuals and society. The Act lays out a range of requirements for high-risk AI systems, covering Risk Management System; Data and Data Governance; Technical Documentation; Record Keeping; Transparency and provision of information to user; Human Oversight Accuracy, Robustness and Cybersecurity; Quality Management System and Fundamental Rights Impact Assessment. Limited risk systems are evaluated under the same categories, but face fewer scrutiny levels. Aligning with industry standards like ISO/IEC 42001:2023 can support organizations in meeting these compliance requirements. ISO/IEC 42001 provides a structured approach to managing AI risks, ensuring data quality, and maintaining robust documentation.

83 Ángel García Vidal, "Propiedad Intelectual y minería de textos y datos: estudio de los artículos 3 y 4 de la Directiva (UE) 2019-790," *Anuario de Derecho de la Propiedad Intelectual* 40, 2020: 99-124.

applies to the entire AI cycle from the input level to the output level.⁸⁴ Based on the existing copyright framework, this implies that copyrighted works that have been used for training on the input level must not be recognizable on the output level, unless copyright exemptions apply, or consent of the copyright owner has been given. Finally, the recognizable use on the output level is not covered by the TDM exception. Whether there can be copyright protection of the actual output will not be regulated by the AI Act; it will be left to general copyright principles.

Conclusions

AI technology is reshaping the nature of innovative and creative activity. Artificial Intelligence systems, including Generative AI, continue to play a greater role in innovation and technological processes. Beyond the protection of software used to collect and process Big Data corpora, copyright's traditional role is challenged by the relatively unstructured nature of the non-relational databases typical of them, which implies that such corpora are unlikely to be protected by copyright or by the EU *sui generis* rights in databases. The questions concerning patents are not easy to answer. AI systems can be used to expand patent applications, but they can also be used to assess future incremental innovation and disclose them. Whether that disclosure will be interpreted by patent offices and courts as novelty-defeating is an open question. While there is a clear demarcation between the inventor and the invention, with the advent of AI systems it is essential that legislators address the question of inclusion of AI enabled systems under this category. With the increasing usage of these technologies and the widespread expanse of the solutions generated by them, protection as an issue becomes an integral question. Questions of incentivizing human scientists to create more of such systems alongside the danger

⁸⁴ The EU AI Act mandates that AI system providers based in the EU comply with the regulation. Moreover, both providers and users situated outside the EU are also obligated to abide by these guidelines if the outcomes of their AI systems are used within the EU. Nonetheless, organizations using AI for military purposes and public agencies in countries outside the EU are exempt from this regulation.

of granting complete autonomy to these super intelligent systems are an area wherein the need for proper guidelines is most urgent.

The intersection of AI system, copyright law and the EU AI Act is a complex issue with significant implications for innovation, legal liability, ownership rights, commercial interests, policy and regulation, consumer protection, and the future of the AI industry. Addressing data exclusivity and trade secrets, the latter might protect correlations and insights generated by AI systems, even if those are based on deep learning including the processing of protected personal data. This might generate tension between personal data protection and IP. The policymakers need to follow these developments closely. In considering any policy reform, they face the challenge of not over-reacting and soberly looking at emerging evidence on the impact of AI. Finally, legal enforcement based on data and in-depth analysis of cases will set the guidelines that our courts will have to follow in the near future in the field of AI in relation to Intellectual Property rights, in particular the responsibility arising from its use.

Bibliography

- Acosta, Raquel. "Artificial Intelligence and Authorship Rights." *Harvard Journal of Law and Technology* (2012). <http://jolt.law.harvard.edu/digest/copyright/artificial-intelligence-andauthorship-rights>.
- Arai, Yuko, and Shingo Kinukawa. "Copyright Infringement as User Innovation." *Journal of Cultural Economics*, vol. 38, no. 2 (2014): 131-144.
- Barrio Andrés, Moisés. *Internet de las cosas*. Madrid: Reus, 2018.
- Castets-Renard, Céline. "The Intersection Between AI and IP: Conflict or Complementarity?" *IIC- International Review of Intellectual Property and Competition Law*, no. 51 (2020): 141-143. <https://doi.org/10.1007/s40319-020-00908-z>.
- Chen, Yun. "Intellectual Property Protection for Artificial Intelligence Inventions in China." *Journal of Intellectual Property Law and Practice*, no. 15 (2020): 374-380.
- Cockburn, Iain M., Rebecca Henderson, and Scott Stern. *The Impact of Artificial Intelligence on Innovation: An Exploratory Analysis*. The Economics of Artificial Intelligence: An Agenda. Chicago: University of Chicago Press, 2019, 115-146.
- Debussche, Jérôme, and Céline Jasmien. "Big Data & Issues & Opportunities: Intellectual Property Rights." Bird & Bird, 2019. <https://www.twobirds.com/en/news/articles/2019/global/big-data-and-issues-and-opportunities-ip-rights>.
- Devins, Cary, Felin Teppo, Stuart A. Kauffman, and Roger Koppl. "The Law and Big Data." *Journal of Law and Public Policy*, vol. 27 (2017): 306.
- Drexler, Josef, and Reto M. Hilty. *Technical Aspects of Artificial Intelligence: An Understanding from an Intellectual Property Law Perspective*, Version 1.0, 2019. <https://ssrn.com/abstract=3465577>.

- Fernández Carballo-Calero, Pablo. *La Propiedad Intelectual de las obras creadas por Inteligencia Artificial*. Cizur Menor Aranzadi, 2021.
- Foss-Solbrek, Karin. "Three Routes to Protecting AI Systems and Their Algorithms under IP Law: The Good, the Bad and the Ugly." *Journal of Intellectual Property Law and Practice*. 27 March 2021. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3813797.
- Gallego Sánchez, Esperanza. "La patentabilidad de la Inteligencia Artificial. La compatibilidad con otros sistemas de protección." *La Ley Mercantil*, no. 59 (2019): 1–24.
- Ganguli, Prabuddha. "AI and Intellectual Property: A Model of Value Creation." *Journal of Intellectual Property Law and Practice*, vol. 13, no. 11 (2018): 900–910.
- García Vidal, Ángel. "Propiedad Intelectual y minería de textos y datos: estudio de los artículos 3 y 4 de la Directiva (UE) 2019-790." *Anuario de Derecho de la Propiedad Intelectual* 40 (2020): 99–124.
- Geiger, Christophe. "From Berne to National Law, via the Copyright Directive: The Dangerous Mutations of the Three-Step Test." *European Intellectual Property Review*, vol. 29, no. 12 (2007): 486–491.
- Geiger, Christophe, Giancarlo Frosio, and Oleksandr Bulayenko. *Text and Data Mining in the Proposed Copyrights Reform: Making the EU Ready for Age of Big Data? Legal Analysis and Policy Recommendation*. Munich: Max Planck Institute for Innovation and Competition, 2018.
- Gervais, Daniel J. *The TRIPS Agreement: Drafting History and Analysis*. United Kingdom: Sweet & Maxwell, 2012.
- Gómez, Segade, and José Antonio. "Protección de los macrodatos (Big Data) mediante secretos empresariales." In *Big Data e Internet de las cosas: Nuevos retos para el Derecho de la competencia y de los bienes inmateriales*, 116–150. Valencia: Tirant lo Blanch, 2012.
- Hacker, Philipp. *Comments on the Final Trilogue Version of the AI Act*. 2024.
- Haney, Brian. "AI Patents: A Data Driven Approach." *Chicago Kent Journal of Intellectual Property*, vol. 19 (2020): 410–484.
- Jain, Ananya. "Intellectual Property Rights in the Age of Artificial Intelligence." *International Journal of Law Management & Humanities*, vol. 4, no. 2 (2021): 1501–1506.
- Kaplan, Andreas, and Michael Haenlein. "Siri, Siri in My Hand: Who's the Fairest in the Land? On the Interpretations, Illustrations, and Implications of Artificial Intelligence." *Business Horizons* 62, no. 1 (2019): 15–25.
- Kim, Daeho. "AI-Generated Inventions: Time to Get the Record Straight?" *GRUR International*, vol. 69, no. 5 (2020): 443–456.
- Kuner, Christopher, Lee A. Bygrave, and Christopher Docksey. *The EU General Data Protection Regulation (GDPR). A Commentary*. Oxford, United Kingdom: Oxford University Press, 2020.
- Kusznieruk, Piotr, and Agnieszka Zemke-Górecka. "Legal Aspects of Artificial Intelligence Under the Law of the European Union. Part 1." *Europejska Wyższa Szkoła Prawa i Administracji w Warszawie* no. 4, Warszawa, 2022.
- Madiega, Tambiama. *General-Purpose Artificial Intelligence*. EPRS, European Parliament, March 2023.
- Madiega, Tambiama. *Generative AI and Watermarking*. EPRS, European Parliament, December 2023.
- Marco, Alan C., Michael Carley, Steven Jackson, and Amanda F. Myers. "The USPTO Historical Patent Data Files." USPTO Economic Working Paper No. 2015-1. Office of the Chief Economist, U.S. Patent and Trademark Office, 2015. https://www.uspto.gov/sites/default/files/documents/USPTO_economic_WP_2015-01_v2.pdf

- Martinez Pérez, María. *Protección tecnológica implicada en el funcionamiento del Internet de las cosas en Big data e internet de las cosas. Nuevos retos para el Derecho de la competencia y de los bienes inmateriales*. Valencia: Tirant lo Blanch, 2020.
- Mezzanotti, Filippo, and Timothy S. Simcoe. *Innovation and Appropriability: Revisiting the Role of Intellectual Property*. NBER, 2023, Working Paper, no. 31428.
- de Miguel, Asensio, and Pedro Alberto. *Derecho Privado de Internet*. Madrid: Civitas, 2015.
- Portellano, Pedro. "Inteligencia Artificial y responsabilidad por productos defectuosos." *RDM*, no. 316 (2020): 8–25.
- Ray, Partha Pratim. "ChatGPT: A Comprehensive Review on Background, Applications, Key Challenges, Bias, Ethics, Limitations and Future Scope." *Internet of Things and Cyber-Physical Systems*, vol. 3 (2023): 2.
- Ricketson, Sam, and Jane C. Ginsburg. *International Copyright and Neighbouring Rights: The Berne Convention and Beyond*, vol. 2. Oxford, New York: OUP, 2006.
- Sáinz García, Concepción. "Las obras creadas por sistemas de Inteligencia Artificial y su protección por el Derecho de autor." *InDret*, 1 (2019): 8–19.
- Synodinou, Tatiana-Eleni. "Databases Producer Protection: Between Rights and Liabilities." In *Research Handbook on Intellectual Property and Digital Technologies*, edited by Tanya Aplin, 81–106. Cheltenham, United Kingdom: Edward Elgar Publishing, 2020.
- Vertinsky, Liza, and Todd M. Rice. "Thinking about Thinking Machines: Implications for Machine Inventors for Patent Law." *Boston University Journal of Science & Technology Law*, no. 82 (2002). <http://www.bu.edu/law/journals-archive/scitech/volume82/vertinsky&rice.pdf>.
- World Intellectual Property Organization (WIPO). *Artificial Intelligence and Intellectual Property: An Economic Perspective*. Economic Research Working Paper no. 77/2024 .
- Xalabarder Plantada, Raquel. "Inteligencia Artificial y Propiedad Intelectual." *Retos jurídicos de la Inteligencia Artificial* (2020): 205–223.
- Yamamoto, Kazuhiko, and Robert Lloyd. "The Role of Big Data and Digitization in Just-In-Time (JIT) Information Feeding and Marketing." *American Journal of Management*, vol. 19, no. 2 (2019): 126–133.
- Zalewski, Tomasz. In *Prawo sztucznej inteligencji*, edited by Marcin Świerczyński and Luca Lai. Warsaw: C.H. Beck, 2020.

