

Ownership, liability, patentability, and creativity issues in artificial intelligence

Akanksha Bisoyi

To cite this article: Akanksha Bisoyi (2022) Ownership, liability, patentability, and creativity issues in artificial intelligence, Information Security Journal: A Global Perspective, 31:4, 377-386, DOI: [10.1080/19393555.2022.2060879](https://doi.org/10.1080/19393555.2022.2060879)

To link to this article: <https://doi.org/10.1080/19393555.2022.2060879>



Published online: 12 Apr 2022.



Submit your article to this journal [↗](#)



Article views: 1563




View related articles [↗](#)



View Crossmark data [↗](#)



Ownership, liability, patentability, and creativity issues in artificial intelligence

Akanksha Bisoyi 

Department of Science, Technology and Society, Technical University of Munich, Germany; TUM School of Social Sciences and Technology, Germany

ABSTRACT

While Artificial Intelligence technologies find increasing use in different industries such as transportation, healthcare and other services, it gives rise to legal complexities in respect of ownership and liability of AI, patentability of AI inventions, and creativity & ownership of AI-generated works attributable to various components of AI. The autonomous decision-making ability of AI challenges the existing IP framework. Since AI machines can “think” and “act” without any human effort, if any damage or harm occurs to the properties, does the current model of tort liability (product liability, negligence, strict liability) adequately address the legal concerns? Robust regulatory bodies and institutional mechanisms are required to develop rigorous safety standards and establish safety certification processes for AI. Even though AI inventions can be patented, many jurisdictions recognize only a “human” as an inventor and not the AI. With the increasing capability of AI to generate works without human intervention, there seems to be a strong case for granting copyright protection to AI-generated works. Exploring a separate legal framework for AI to reduce ambiguity and increase accountability would be in order.

KEYWORDS

Artificial intelligence; law; ownership; patentability; liability; copyright; creativity

1. Introduction

In this era of the digital revolution, every day, an enormous amount of data is being added, which are likely to increase by many folds, as use of Artificial Intelligence (AI) increases. While this necessitates structuring the rules and laws to regulate the digital world, it also compels to take note of the role of AI, which has moved from the theoretical realm to the global commercial market. Its growth is fueled by a profusion of digitized data and rapidly advancing computational processing power, with potentially revolutionary effect. Detecting patterns among billions of seemingly unrelated data points, AI can improve weather forecasting, boost crop yields, enhance detection of cancer, predict an epidemic and improve industrial productivity (WIPO, 2019nd). AI technologies find use across different industries, typically in transportation (self-driving machines, transportation planning), healthcare (clinical setting, healthcare analytics, healthcare robotics, mobile health, elderly care) and service robotics (Stone et al., 2016), as shown by a large number of patents in multiple industries (WIPO, 2019nd).

Nevertheless, Artificial Intelligence gives rise to legal complexities in respect of ownership and liability of AI, patentability of AI inventions, and creativity & ownership of AI-generated works attributable to various components of AI. The difficulty in enforcing patents on modern interactive technologies in case of joint infringement also compounds the problem (Robinson, 2016). Its inherent automated decision making processes challenges the existing legal doctrines of disparate treatment and disparate impact (Kroll et al., 2017nd). At the same time, the legal architecture of the intellectual property and its intersection with AI and AI-generated works on patentability, and creativity has profound implications on fostering innovation (Castets-Renard, 2020).

The objective of this paper is to contribute to discussions on AI and IP by exploring, reviewing and analyzing the patentability, ownership and liabilities issues to address legal concerns involving AI, and new forms of creations generated by AI or using AI.

2. Artificial intelligence

The concept of “intelligence” has evolved from being a general ability which remains constant throughout for any individual (Spearman, 1927) and pervaded all intellectual tasks (Sternberg, 2012), to the idea that there is no ‘general intelligence’ but are “multiple intelligences” (Davis et al., 2011). Such multiple intelligences are linguistic, mathematical, spatial, musical, bodily-kinesthetic, naturalist, interpersonal intelligence (Sternberg, 2012). It is “one’s ability to learn from experience and to adapt to shape, and select environments” (Sternberg, 2012). As per “triarchic theory,” human intelligence comprises of three sets of skills: creative, analytical, and practical (Sternberg, 2012). In biological terms, intelligence is correlated with complex patterns of the electrical activity of brain prompted by the external stimuli and speed of conduction of neural impulses (Sternberg, 2012). Expectedly, the goal of AI has been to design systems which can think and act like humans as well as think and act rationally (Russell et al., 2010). Philosopher John Haugeland says that AI is “the exciting new effort to make computers think . . . machines with minds, in the full and literal sense” (Bringsjord & Govindarajulu, 2020nd).

Though the precise definition of AI is not yet established (Stone et al., 2016), it can still be defined as a branch of computer science that studies the properties of intelligence by synthesizing intelligence. “It is that activity devoted to making machines intelligent, and intelligence is that quality that enables an entity to function appropriately and with foresight in its environment” (Nilsson, 2009). European Commission’s High Level Expert Group on Artificial Intelligence (AI HLEG) 2018, has defined AI systems as “software (and possibly also hardware) systems designed by humans that, given a complex goal, act in the physical or digital dimension by perceiving their environment through data acquisition, interpreting the collected structured or unstructured data, reasoning on the knowledge, or processing the information, derived from this data and deciding the best action(s) to take to achieve the given goal. AI systems can either use symbolic rules or learn a numeric model, and they can also adapt their behavior by analyzing how the environment is

affected by their previous actions.”¹ Of course, lack of clear definition has helped AI to progress, and witness rapid growth (Stone et al., 2016).

Artificial Intelligence can be divided into three broad categories namely, Artificial Narrow Intelligence (ANI), Artificial General Intelligence (AGI) and Artificial Superintelligence (ASI) (Carriço, 2018). While ANI mimics human intelligence and performs narrowly defined activities using machine learning and deep learning tools (Ayres, 2006), AGI is programmed for human-level innovative thinking, logical reasoning and adaptive capability to solve any problem rather than any specific problem (Pennachin & Goertzel, 2007). ASI signifies that the intelligence of machines is more than that of humans in every field including scientific creativity, general wisdom and social skills (Yampolskiy & Duettmann, 2020). In case of ANI, the programmer is in control of the output of the AI system, and therefore, naturally, it cannot be assigned with any IP rights since it fails to satisfy the test criteria, i.e. “creativity” and “original work of authorship.” However, in case of AGI and ASI are inspired by the working of neural networks of the brain, it can adapt to stimuli independent of a programmer; in a way, it learns through experience, acquires skills, interacts and develops on its own. Thus, AGI and ASI complicate the situation as to who should have IP rights, if any.

AI systems can receive video, audio, and sensory signals and other information from other devices and other computer networks as well (Aristodemou & Tietze, 2018). Further, such systems can reach their conclusions based on the available information. Unlike random outputs which depend upon the programmer or the author of the code, in these cases, the output will not be known to the programmers as the computer or robot will receive and process the inputs or stimuli from different sources independent of the author. Moreover, such computers or robots can interact with each other, which influences the output to the extent that it goes beyond the original programmers’ prediction and control. In a way, these computers have acquired some characteristics of the human brain.

3. Ownership and liability of AI

As long as AI systems perform assistive roles, the issue of ownership and liability is not complicated, but with autonomous AI machines, the challenge is to determine the burden of risk and liability of AI and who should own up given the fact that law in respect of AI as the inventor is not yet crystallized under patent laws. The obvious question is who should be the owner of AI inventions – should it be the AI systems itself or the inventor of AI systems or anybody else under private arrangements. Patentability issues in respect of AI inventions would indicate that ownership is implicitly granted to the successful patent applicant(s) unless AI has a legal personality (which it does not have so far).

Since ownership is all about reaping benefits of AI inventions, invariably liabilities would come along with the same. Should the developers (designers) of AI or the owners be held liable for any damages caused due to autonomous conduct of AI machines? Since AI machines can “think” autonomously, they can develop solutions without any human effort. But such decision-making by AI systems is fraught with the possibility to cause injuries or damages to the properties (Barfield, 2018). Does the current model of tort liability (product liability, negligence, strict liability) meet the expectations of a scenario where AI is in operation?

3.1. Product liability

Products liability law applies to products that have observable utility to attract consumers and hidden risks which can lead to injuries (Hylton, 2013). Such liability claims can be based on a theory of negligence, strict liability, or breach of warranty of fitness depending on the jurisdiction within which the claim is based. According to tort law, one is liable for one's own act. Further, tort law requires that action which may cause liability must be foreseeable beforehand. Product liability also inherently means that somewhere in the chain of manufacture or distribution, a human element is responsible for the design or manufacturing defect and failed to forewarn, leading to damages by an AI system. However, an autonomous AI system which has no design defects or manufacturing flaws could still make a mistake based on the structure of the

computing architecture, or the learning experience in deep neural networks causing damages (Hylton, 2013). In case of AI machines which function independent of human intervention and which learns from experience and thereby whose action cannot be predicted by the developer, both the requirements of tort law are not met. Moreover, after all, AI in any physical shape may be considered as an asset or property under established laws, it could not have any rights of its own even if it displays enough “intelligence” (Hylton, 2013). As such, product liability doctrine also does not fit with AI machines since by design, their behavior is not foreseeable.

3.2. Negligence

Negligence, characterized in the form of nonfeasance, misfeasance, and malfeasance, is the cornerstone of tort liability and is a very attractive liability principle in personal injury and property damage cases. One of the fundamental concepts of “negligence” is “reasonable person” whose behavior is benchmarked to judge a person's conduct. As such, negligence refers to a behavior that creates an unreasonable risk of harm to people and property (Abraham, 2017). There are five primary conditions which must be satisfied to be a “negligence” – duty of care towards the plaintiff, breach of duty to take care, cause in fact, proximate cause, and consequential harm to the plaintiff (Owen, 2007). Since negligence is doing something which a reasonable or prudent man would not do,² a person is said to act negligently when his behavior departs from conduct ordinarily expected of a reasonably prudent person under the circumstances.

Thus, the issue is how to apply the standard of “reasonable person” in AI systems. Further, if negligence theory is to be applied to AI systems, then it has to be shown that AI systems manufacturer had a duty to exercise reasonable care, the manufacturer failed to exercise the same, and the defendant's conduct proximately caused plaintiff's damages. With technological advances, as AI systems learn from experience, and behaves and takes decisions in an autonomous manner which are not foreseen by manufacturers. Since foreseeability is a crucial ingredient for liability in negligence, nobody could

be liable for negligence in case of autonomous AI systems. As such, general negligence doctrine also fails to cover the AI phenomenon adequately.

3.3. Strict liability

Strict liability doctrine establishes liability without fault, which means liability is imposed on defendants (such as manufacturers of AI systems) who are neither negligent nor guilty of intentional wrongdoing. This doctrine is applied to regulate the existence of an unreasonably dangerous product whose foreseeable use has caused an injury. Manufacturers are strictly liable for any injuries for these unreasonably dangerous products in the market irrespective of the amount of care exercised in preparing the product and the contractual relationship with the user (Hylton, 2013). Will this argument be valid for AI systems which has critical roles in so many applications ranging from manufacturing to healthcare? Moreover, strict liability does not apply to “changes” made to the product after delivery to the consumer unless those changes were foreseeable. Because autonomous AI systems learn with experience and change from their original behavior, their actions are not foreseeable, which makes the AI a poor candidate for strict liability. Overall, common liability related doctrines are not enough to meet the entire spectrum of challenges of AI.

3.4. European perspective

European Parliament’s Committee on Legal Affairs has examined if robots should have some legal rights and be given legal status as an “e-person,” and whether a robot can be held liable for accidents. It observed that a robot’s behavior has civil law implications, both in terms of contractual and of non-contractual liability. The report acknowledges that current legal framework on data protection and ownership is insufficient due to enormous flow of data arising from the use of robotics and AI, and hence, calls for a balanced approach to IP rights that protects as well as fosters innovation (Delvaux, 2017). European Parliament adopted a resolution to “create a specific legal status for robots in the long run, so that at least the most sophisticated autonomous robots could be

established as having the status of electronic persons responsible for making good any damage they may cause, and possibly applying electronic personality to cases where robots make autonomous decisions or otherwise interact with third parties independently” (Para 59 (f), EU, 2017). This idea itself has run into controversies as ethical, legal, economic and societal issues have been raised by experts (*Open Letter to the European Commission: Artificial Intelligence And Robotics*, 2018). The main criticism of “legal personhood” concept is that by seeking legal personhood for robots, an attempt is being made by manufacturers to absolve themselves of responsibility for the actions of their machines. If legal personhood is bestowed upon AI systems and robots, that itself would not be able to cover liability. Adequate funds are to be allocated to this legal personality so that liabilities due to damage and failures caused by AI could be met. Instead, an actionable framework for innovative and reliable AI and Robotics may be created to spur more significant benefits.

3.5. Liability challenges due to “intelligence” of AI

Applying the concepts of strict liability and negligence can be challenging in case of autonomous AI systems which have been designed to think, learn and behave intelligently. Since algorithmic reasoning processes of AI systems control the performance of AI systems, it is tough to ascertain the exact cause, which led to significant alterations from the expected behavior. If such intelligent machines are involved in damages, it is difficult to assign any liability to any human being. On that pretext, of course, the humans can not absolve off the liabilities caused due to AI systems designed or manufactured or owned by them. There could be a compulsory insurance scheme or no-fault liability scheme to ensure that damages are paid when AI systems are involved in an accident, and no human role could be attributed to the accident (Barfield, 2018). It is based on a mandatory duty to purchase first-party insurance and a restriction on the right to sue the injurer (Cummins et al., 2001). No-fault insurance schemes have various economic advantages such as reducing administrative costs and producing more equitable outcomes, as victims are compensated regardless of their ability to

prove negligence or fault(Liao, 2002). Another option is to determine the Principal-Agent relationship between the owner and the AI system. The principal who has the right to control the manner and means of the agent's performance of work has to pay damages caused by its agent. Of course, robust regulatory bodies and institutional mechanisms would be required to develop rigorous safety standards and establish safety certification processes for algorithms(Hubbard, 2014nd).

4. Patentability of AI inventions

As per European Patent Convention (EPC), any invention (in all fields of technology) which involves a new inventive step and is susceptible of industrial application is eligible for European patents subject to certain conditions and exclusions (Office, 1973, p. 52, 1973ndb, p. 53). While there is no confusion regarding the patentability of AI systems designed and developed by human effort with or without the assistance of AI robots, the interpretation is not straightforward in case of inventions by an AI. There is no specific provision for AI-generated works, so such AI works continue to be considered in accordance with the general requirements for patentability, just like any other inventions. A patent application may be filed by any natural or legal person, or anybody equivalent to a legal person(Office, 1973, p. 58) and the right to a European patent shall belong to the inventor or his successor in title(Office, 1973ndd, p. 60). Therefore, logically, an AI system should also be able to file for a patent successfully(Davies, 2011). However, European Patent Office held that for the mandatory designation of an inventor for a European patent application the inventor must have a legal personality³ and as such an AI invention does not meet the requirements laid down in Article 81 and Rule 19 of EPC.

Further, the patentability of AI-driven business methods is also not without challenges. Even though AI inventions are patentable as a subgroup of Computer Implemented Inventions,⁴ EPC does not recognize patent of business methods(Office, 1973, p. 2), whereas the US patent law does. Since Artificial Intelligence involves complex computational models, algorithms, neural networks and

analysis, it is per se an abstract mathematical model and hence on a standalone basis, considered un-patentable(Office, 2020). As a business method would include embedded algorithms, processing of data, interpretations of messages, and optimization, by not patenting a business a method, an inventor is deprived of its commercial exploitation.

Likewise, as per Federal Act on Patents for Inventions of Switzerland, the patent for inventions are granted for new inventions applicable in industry(Article 1, Federal Act oon Patents for Inventions 1954) and the inventor, his successor in title, or a third party owning the invention under any other title has the right to the grant of the patent (Article 3, Federal Act on Patents for Inventions 1954). However, as per Article 5, of the said Patents Act, the name of the inventor must be informed by the applicant, and only the inventor can waive off this right. Such a provision implies that only a "person" can be an inventor and AI would not qualify as an "inventor." The non-binding Civil Law Rules on Robotics adopted by European Parliament calls on to create "legal status" for robots so that sophisticated autonomous robots could be conferred with the status of electronic persons(Para 59 (f), EU, 2017).

US Patents Act(USPTO,2020) also does not prohibit patenting of any invention by AI since it does not require any threshold of human control or input in the invention process for granting patent rights. However, while §101 of the Patent Act, which governs patentable subject matter, focuses on "whoever shall invent," §102 prohibits the patenting of subject matter that "a person" did not invent. The patent application process also requires an oath or a declaration from the inventor (which obviously has to be an individual). It, therefore, appears that inventions by AI are patentable in the US, but many barriers to patentability are still to be overcome(WEF, 2018). Even if patents are granted to new methods and protocols, it may still be complicated to act against multiple infringements(Hojnik, 2019). While there are examples of granting patent protection to computer programs, there is a need to acknowledge that the rights belong to the creator and in this case, the AI system(Davies, 2011).

5. Creativity and ownership of works created by AI

The concept of creativity is associated with humans in the sense that it is “the interaction among aptitude, process and environment by which an individual or group produces a perceptible product that is both novel and useful as defined within a social context(Plucker et al., 2004),” and a fundamental feature of human intelligence. It involves not only a cognitive dimension but also motivation and emotion, and is closely linked to cultural context and personality factors(Boden, 1994). Therefore intellectual property laws associated with creative activities such as copyrights and patents are designed to protect the work of humans(Clifford, 1997).

The present generation of AI systems are not just capable of performing various jobs in different industries, but can also generate “works” which have historically been protected as “creative,” even though they focus primarily on cognitive dimension(Boden, 1998). There is no dispute that the work created through any software applications or systems belongs to the person who uses such applications, software, or systems lawfully, since the creativity aspect in such cases is predominantly a human effort and use of human intelligence, and that software or system is only a tool in the creative process.

With the advances in machine learning capabilities, development of parallel computing, and improvement of computational efficiency, computers are now able to allocate resources automatically to achieve results which can be much more than just crunching numbers. In case of AI, the work creation process utilizes own independent source of intelligence as AI systems are much more than just tools, which do not require any involvement of human intelligence. In such a scenario, the creator of the work is no more “the developer of AI,” but AI itself, even though the artistic merit of such works are debatable(Guadamuz, 2017). The lack of a human directly being assigned ownership of the work created by AI raises significant legal issues – determination of the author of such work, and the allocation of the rights surrounding it, since the general rule in most jurisdictions is that the rights associated with the work belong exclusively to the

author(Gürkaynak, 2017nd). Nevertheless, there is a need to examine whether the creative works generated by AI machines meet the requirements for copyright protection, and if so, who has the ownership rights from a legal perspective.

Since computers and software are merely tools in creating works, the ownership of the copyright in case of computer-generated works has been assigned to a human author. UK Copyright, Designs and Patents Act (CDPA), defines a computer-generated work as one that “is generated by computer in circumstances such that there is no human author of the work”(UK Government, 1988c) and the author shall be taken to be the person by whom the arrangements necessary for the creation of the work are undertaken(UK Government, 1988b). This is a recognition of the work that goes into creating the program (Artificial Intelligence) capable of generating original works (Ihalainen, 2018). As per CDPA, the author of a work is “the person who created it”(UK Government, 1988a) and chances of deviating from this principle to allocate any rights towards machines are unlikely(Guadamuz, 2017). According to Federal Act on Copyright and Related Rights of Switzerland, a natural person who has created the work can only be the author(Article 6, Federal Act on Copyright and Related Rights, p. 6, 1992). German Copyright law says that “author is the creator of the work”(Section 7, Act on Copyright and Related Rights (Urheberrechtsgesetz – UrhG), , p. 7, 1965), and while it does not specify that this is to be a person, copyright provision “protects the author in his intellectual and personal relationships to the work”(Section 11, Act on Copyright and Related Rights (Urheberrechtsgesetz – UrhG), , p. 11, 1965).

However, the idea of rewarding skill, labour and effort of human beings through copyright is seriously challenged by the increasing capability of AI to create original works without or with minimal human intervention. The distinction between human-created works and AI-generated works is reducing and, in many cases, AI performs better, making a strong case for granting copyright protection to such AI-generated works so that the developer of AI is justly rewarded. Although copyright of AI-generated works is not explicitly prohibited, most national legislations protect only human-generated works. In the US, a work must have been created by an “author”(\$102, United States,

1976) and initial ownership rights vests in the author or authors of the work (§201, United States, 1976). As per the US Copyright Office's Compendium, a non-human is excluded from authorship (§306, United States, 1976). This would undoubtedly extend to works created by AI, although it is arguable that if there is significant human input in the AI's work, the human could have authorship.

Only, CDPA recognizes the work that goes into creating the program (Artificial Intelligence) capable of generating original works, But, such an approach does not recognize the contribution of the user (who makes all arrangements for the creation of works by AI) and has its own set of problems (Ihalainen, 2018). In other EU jurisdictions such as Germany, Switzerland and Spain, the ownership of copyright is strongly linked to personhood (Guadamuz, 2017). Courts have also determined that copyright work should demonstrate the "own intellectual creation of its author," where author expresses his or her creative ability in an original manner by making free and creative choices (Strömholm, 2009).⁵ This follows that AI would neither be classified as an author nor have copyright protection (Ihalainen, 2018).

If the human efforts put into creating the algorithms which produce "original works" of its own are analyzed in detail, it would reveal that extensive, data, and procedures have been fed into the AI systems. Thus, it may be possible to link the creations of AI with the creator of algorithms (AI systems), and the fundamental requirement of the human element of copyright will be satisfied.

6. Way ahead

The intellectual property is specifically directed towards the protection of the fruits of the human mind, and the works of innovation are given a set of limited ownership rights allocated to persons, both natural and legal (Hettinger, 1989). AI inventions are patentable as a subgroup of Computer Implemented Inventions (Office, 2020), subject to the condition that the inventor must have a legal personality.⁶ The challenge is to determine ownership and liabilities due to damages caused by its capability to adapt and rewrite itself using its "intelligence" to include discoveries which it learns from

experience. More so, how AI will react to a stimulus cannot be predicted. However, as the creator of AI, humans must own up the responsibility of paying the damages caused by AI. Apart from the mandatory insurance scheme or no-fault liability scheme, the principal-agent relationship between the owner and AI machine needs to be explored along with developing rigorous safety standards and protocols.

Since copyright is linked to the creative aspect of human intelligence, it is applicable to authors own intellectual creation, making AI ineligible to be an "author" for any copyright protection. While all AI-generated works may be placed in public domain, but it will work against innovation. Such an approach is bereft of any incentive for humans to develop, finance and contribute to the development of AI technologies. Such lack of incentive would slow down progress and development in this area. As a result, less and less copyrightable work would be created leading to decrease of the work falling into the public domain as the copyrighted work eventually falls into the public domain at the expiration of its protection period (Hristov, 2017).

Another approach could be to redefine the term "author" within the scope of intellectual property law to encompass non-humans (Abbott, 2016). While defenders of this approach argue that the rights arising from the authorship should be given to its owner, most countries would require changes in the fundamental definition of the legal entity. Therefore, a more convenient and a favorable approach would be to determine authorship in works created by AI by way of reinterpretation of the "made for hire" doctrine (Bridy, 2016).

Without intellectual property protection, the value of the innovation which rightfully belongs to the original innovator could be appropriated by competitors before the investments in research and development are recovered by the original innovator (Menell, 1994nd). But AI's capability to think, invent and create works is challenging the established norms of ownership, liability, patentability and creativity. Lawmakers need to recognize and adapt to the characteristics of automatic algorithmic decision making which offer both opportunities and challenges for the development of legal regimes to reduce ambiguity, and increase accountability (Castets-Renard, 2020; Kroll et al., 2017nd). A separate legal framework for AI may be explored

proactively anticipating potential problems to ensure that relevant laws provide certainty to parties in litigations.

Notes

1. European Commission appointed a 52 member High Level Expert Group on Artificial Intelligence (AI HLEG) in 2018 to implement European Strategy on Artificial Intelligence. (High Level Expert Group on Artificial Intelligence (AI HLEG), 2018)
2. Baron Alderson, in *Blyth v. Birmingham Waterworks Co.*, (1856) 11 Ex. 781, defined negligence as “the omission to do something which a reasonable man, guided upon those considerations, which ordinarily regulate the conduct of human affairs, would do or doing something which a prudent and reasonable man would not do. The defendants might have been liable for negligence, if, unintentionally, they omitted to do that which a reasonable person would have done, or did that which a person taking reasonable precautions would not have done.”
3. Earlier this year, the EPO published reasoned decisions on the refusal of two patent applications (EP18275163; EP18275174) designating AI as an inventor.
4. A computer-implemented invention (CII) is one which involves the use of a computer, computer network or other programmable apparatus, where one or more features are realised wholly or partly using a computer program.
5. In *Infopaq International v Danske Dagblades Forening*, Case-C-5/08 16 July 2009, it was held that “an act occurring during a data capture process, which consists of storing an extract of a protected work comprising 11 words and printing out that extract, is such as to come within the concept of reproduction in part within the meaning of Article 2 of Directive 2001/29/EC of the European Parliament and of the Council of 22 May 2001 on the harmonisation of certain aspects of copyright and related rights in the information society...the act of printing out an extract of 11 words, during a data capture process such as that at issue in the main proceedings, does not fulfil the condition of being transient in nature as required by Article 5(1) of Directive 2001/29 and, therefore, that process cannot be carried out without the consent of the relevant right holders.
6. *Supra* note 4.

Disclosure statement

No potential conflict of interest was reported by the author(s).

ORCID

Akanksha Bisoyi  <http://orcid.org/0000-0003-1707-1748>

References

- Abbott, R. (2016). I think, therefore i invent: Creative computers and the future of patent law. *Boston College Law Review* 57(4), 1079-1126/2. <https://lawdigitalcommons.bc.edu/bclr/vol57/iss4/2>.
- Abraham, K. (2017). *The forms and functions of tort law*. West Academic.
- Aristodemou, L., & Tietze, F. (2018). The state-of-the-art on intellectual property analytics (IPA): A literature review on artificial intelligence, machine learning and deep learning methods for analysing intellectual property (IP) data. *World Patent Information*, 55, 37–51, 0172-2190. <https://doi.org/10.1016/j.wpi.2018.07.002>
- Ayres, R. (2006). Book Review -The Singularity is Near: When Humans Transcend Biology, Ray Kurzweil, Viking Penguin, New York (2005), 602 pages plus index. *Technological forecasting and social change*. Vol. 73(2), 95–127, 0040-1625. <https://doi.org/10.1016/j.techfore.2005.12.002>
- Barfield, W. (2018). Liability for autonomous and artificially intelligent robots. *Paladyn, Journal of Behavioral Robotics*, 9 (1), 193–203. <https://doi.org/10.1515/pjbr-2018-0018>
- Boden, M. A. (1994). Chapter 4: What is Creativity? Boden, M. A. *Dimensions of Creativity* A Bradford book (Cambridge, Mass. u.a.: MIT Press) 242, 0262023687. .
- Boden, M. A. (1998). Creativity and artificial intelligence. *Artificial Intelligence 40 Years Later*, 103(1–2), 347–356. [https://doi.org/10.1016/S0004-3702\(98\)00055-1](https://doi.org/10.1016/S0004-3702(98)00055-1)
- Bridy, A. (2016). *Coding creativity: Copyright and the artificially intelligent author* Preprint. SocArXiv. <https://doi.org/10.31235/osf.io/5ru6m>
- Bringsjord, S., & Govindarajulu, N. S. (2020). Artificial Intelligence Zalta, Edward N.) *The Stanford Encyclopedia of Philosophy* Summer 2020 (Metaphysics Research Lab, Stanford University). Retrieved August 8, 2020, <https://plato.stanford.edu/archives/sum2020/entries/artificial-intelligence/>
- Carriço, G. (2018). The EU and artificial intelligence: A human-centred perspective. *European View*, 17(1), 29–36. <https://doi.org/10.1177/1781685818764821>
- Castets-Renard, C. (2020). The intersection between AI and IP: Conflict or complementarity? *IIC - International Review of Intellectual Property and Competition Law*, 51(2), 141–143. <https://doi.org/10.1007/s40319-020-00908-z>
- Clifford, R. D. (1997). Intellectual property in the era of the creative computer program: Will the true creator please stand up. *Tulane Law Review* 71. 1675. https://scholarship.law.umassd.edu/cgi/viewcontent.cgi?article=1077&context=fac_pubs.

- Cummins, J. D., Phillips, R. D., & Weiss, M. A. (2001). The incentive effects of no-fault automobile insurance. *The Journal of Law & Economics*, 44 (2), 427–464. JSTOR. <https://www.journals.uchicago.edu/doi/epdf/10.1086/322818>
- Davies, C. R. (2011). An evolutionary step in intellectual property rights – Artificial intelligence and intellectual property. *Computer Law & Security Review*, 27(6), 601–619. <https://doi.org/10.1016/j.clsr.2011.09.006>
- Davis, K., Christodoulou, J., Seider, S., & Gardner, H. (2011). Chapter 24: The Theory of Multiple Intelligences Sternberg, R.J., Kaufman, S.B., In *Cambridge Handbook of Intelligence*. (Cambridge University Press). (pp. 485–503). https://www.researchgate.net/publication/317388610_The_Theory_of_Multiple_Intelligences
- Delvaux, M. (2017). *Report with recommendations to the commission on civil law rules on robotics (2015/2103 (INL))* (P8_TA(2017)0051). European Parliament. http://www.europarl.europa.eu/doceo/document/TA-8-2017-0051_EN.pdf
- EU. (2017). *European Parliament resolution of 16 February 2017 with recommendations to the Commission on Civil Law Rules on Robotics (2015/2103 (INL))*. 19. <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52017IP0051&from=EN>
- Federal Ministry of Justice, *Act on Copyright and Related Rights (Urheberrechtsgesetz – UrhG)* (Federal Ministry of Justice). (1965). Retrieved August 9, 2020, from https://www.gesetze-im-internet.de/englisch_urhg/englisch_urhg.html
- Guadamuz, A. (2017). Do Androids Dream of Electric Copyright? Comparative analysis of originality in artificial intelligence generated works). *Intellectual Property Quarterly*, 2, 169–186 1364-906X . 20. Retrieved August 8, 2020. <http://sro.sussex.ac.uk/id/eprint/66693/3/Do%20Androids%20Dream%20of%20Electric%20Copyright.pdf>
- Gürkaynak, G. et al (2017). Questions of Intellectual Property in the Artificial Intelligence Realm, *Robotics Law Journal*. 3. <https://roboticslawjournal.com>. Retrieved August 8, 2020, from <https://www.gurkaynak.av.tr/docs/8b791-rlj-september-october-2017-.pdf>
- Hettingerin, E. C. (1989). Justifying intellectual property. *Philosophy & Public Affairs*, 18(1), 32–52. <http://hettingern.people.cofc.edu/Hettinger%20-%20Justifying%20Intellectual%20Property.pdf>
- High Level Expert Group on Artificial Intelligence (AI HLEG). (2018). *Ethics guidelines for trustworthy AI*. European Commission. <https://ec.europa.eu/futurium/en/ai-alliance-consultation/guidelines>
- Hojnik, J. et al (2019). Social and juristic challenges of artificial intelligence. *Palgrave Communications* 5, 61. <https://doi.org/10.1057/s41599-019-0278-x>
- Hristov, K. (2017). Artificial intelligence and the copyright dilemma. *IDEA - The Journal of the Franklin Pierce Center of Intellectual Property : The IP Law Review*, 57 (3), 431–454. <https://ssrn.com/abstract=2976428>
- Hubbard, F. P. (2014). “Sophisticated robots”: Balancing liability, regulation, and innovation. *Florida Law Review* Retrieved August 8, 2020, Retrieved. 66(5), 1803. https://scholarcommons.sc.edu/cgi/viewcontent.cgi?article=2027&context=law_facpub
- Hylton, K. (2013). The law and economics of products liability. *Notre Dame Law Review*, 88(5), 2457. <https://scholarship.law.nd.edu/ndlr/vol88/iss5/14>
- Ihalainen, J. (2018). Computer creativity: Artificial intelligence and copyright. *Journal of Intellectual Property Law & Practice*, 13(9), 724–728. <https://doi.org/10.1093/jiplp/jpy031>
- Kroll, J. A., Huey, J., Barocas, S., Felten, E. W., Reidenberg, J. R., Robinson, D. G., & Yu, H. (2017). Accountable Algorithms. *University of Pennsylvania Law Review*. Retrieved May 16, 2020, Retrieved. 165(3), 633. https://scholarship.law.upenn.edu/penn_law_review/vol165/iss3/3/
- Liao, Y.-P. (2002). No-fault for motor vehicles: An economic analysis. *American Law and Economics Association*, 4(2), 258–294. <https://doi.org/10.1093/aler/4.2.258>
- Menell, P. S. (1994). The challenges of reforming intellectual property protection for computer software. *Columbia Law Review*, 94(8), 2644–2654. <https://ssrn.com/abstract=1944599>
- Nilsson, N. J. (2009). *The quest for artificial intelligence: A history of ideas and achievements*. Cambridge University Press. <https://doi.org/10.1017/CBO9780511819346>
- Office, E. P. 1973. Article 52(2)(c), *Patentable inventions—The European Patent Convention* (European Patent Office). Retrieved August 9, 2020, from <https://www.epo.org/law-practice/legal-texts/html/epc/2016/e/ar52.html>
- Office, E. P. (1973). Article 53, *Exceptions to Patentability—The European Patent Convention* (European Patent Office). Retrieved August 9, 2020, from <https://www.epo.org/law-practice/legal-texts/html/epc/2016/e/ar53.html>
- Office, E. P. (1973). Article 58, *Entitlement to file an European Patent application—The European Patent Convention* (European Patent Office). Retrieved August 9, 2020, from <https://www.epo.org/law-practice/legal-texts/html/epc/2016/e/ar58.html>
- Office, E. P. (1973). Article 60, *Right to a European Patent—The European Patent Convention* (European Patent Office). Retrieved August 9, 2020, from <https://www.epo.org/law-practice/legal-texts/html/epc/2016/e/ar60.html>
- Office, E. P. (2020). *EPO Guidelines for Examination* (European Patent Office). Retrieved August 8, 2020, from <https://www.epo.org/law-practice/legal-texts/html/guidelines/e/j.htm>

- Office, E. P. (2020). *EPO Guidelines for Examination 3.3.1 - Artificial intelligence and machine learning* (European Patent Office). Retrieved August 9, 2020, from https://www.epo.org/law-practice/legal-texts/html/guidelines2018/e/g_ii_3_3_1.htm
- Open Letter to the European Commission: Artificial Intelligence And Robotics. (2018). Retrieved August 8, 2020, from <https://g8fip1kplyr33r3krz5b97d1-wpengine.netdna-ssl.com/wp-content/uploads/2018/04/RoboticsOpenLetter.pdf>
- Owen, D. G. (2007). The five elements of negligence. *Hofstra Law Review*, 35(4), 1671-1686. <http://scholarlycommons.law.hofstra.edu/hlr/vol35/iss4/1>
- Pennachin, C., & Goertzel, B. (2007). Contemporary approaches to artificial general intelligence. In B. Goertzel & C. Pennachin (Eds.), *Artificial general intelligence* (pp. 1-30). Springer. https://doi.org/10.1007/978-3-540-68677-4_1
- Plucker, J., Beghetto, R., & Dow, G. (2004). Why isn't creativity more important to educational psychologists? Potentials, pitfalls, and future directions in creativity research. *Educational Psychologist*, 39(2), 83-96. https://doi.org/10.1207/s15326985ep3902_1
- Robinson, W. K. (2016). Economic theory, divided infringement, and enforcing interactive patents. *Economic Theory*, 67(6), 1961-2030. <http://scholarship.law.ufl.edu/flr/vol67/iss6/3>
- Russell, S. J., Norvig, P., & Davis, E. (2010). *Artificial intelligence: A modern approach* (3rd ed.). Prentice Hall. <https://people.cs.umass.edu/~pinar/ai-a-modern-approach.pdf>
- Spearman, C. (1927). The abilities of man their nature and measurement. *Nature*, 120(3014), 181-183. <https://doi.org/10.1038/120181a0>
- Sternberg, R. J. (2012). Intelligence. *Dialogues in Clinical Neuroscience*, 14 (1), 19-27. PubMed <https://pubmed.ncbi.nlm.nih.gov/22577301>
- Stone, P., Brooks, R., Brynjolfsson, E., Calo, R., Etzioni, O., & Hager, G. (2016). *Artificial intelligence and life in 2030*. [One Hundred Year Study on Artificial Intelligence: Report of the 2015-2016 Study Panel]. Stanford University. https://ai100.sites.stanford.edu/sites/g/files/sbiybj9861/f/ai100report10032016fnl_singles.pdf
- Strömholm, C. (2009). *Infopaq International v Danske Dagblades Forening*, 28. <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:62008CJ0005&from=EN>
- The Federal Assembly of the Swiss Confederation, *Federal Act of 25 June 1954 on Patents for Inventions (Patents Act, PatA)* (The Federal Assembly of the Swiss Confederation). (1954). AccessedRetrieved August 9, 2020, from https://www.fedlex.admin.ch/eli/cc/1955/871_893_899/en
- The Federal Assembly of the Swiss Confederation, 1992 Federal Act on Copyright and Related Rights (Copyright Act, CopA) (The Federal Assembly of the Swiss Confederation). Accessed 03 April 2022 https://www.fedlex.admin.ch/eli/cc/1993/1798_1798_1798/en
- UK Government. (1988a). *Section 9(1), Copyright, Designs and Patents Act 1988*. 398. https://www.legislation.gov.uk/ukpga/1988/48/pdfs/ukpga_19880048_en.pdf
- UK Government. (1988b). *Section 9(3), Copyright, Designs and Patents Act 1988*. 398. https://www.legislation.gov.uk/ukpga/1988/48/pdfs/ukpga_19880048_en.pdf
- UK Government. (1988c). *Section 178, Copyright, Designs and Patents Act 1988*. 398. https://www.legislation.gov.uk/ukpga/1988/48/pdfs/ukpga_19880048_en.pdf
- United States. (1976). *Copyright Law of the United States and Related Laws Contained in Title 17 of the United States Code*. <https://www.copyright.gov/title17/title17.pdf>
- USPTO, . (2020). *United States Code Title 35—Patents* (United States Patent and Trademark Office). Retrieved August 11, 2020, from https://www.uspto.gov/web/offices/pac/mpep/consolidated_laws.pdf
- WEF. (2018). *Artificial intelligence collides with patent law* [White Paper]. WEF, Center for the Fourth Industrial Revolution. http://www3.weforum.org/docs/WEF_48540_WP_End_of_Innovation_Protecting_Patent_Law.pdf
- WIPO, 2019. WIPO Technology Trends 2019 - Artificial Intelligence. (World Intellectual Property Organization). 154: 9789280530070. <https://doi.org/10.34667/tind.29084> doi:10.34667/tind.29084.
- Yampolskiy, R. V., & Duettmann, A. (2020). *Artificial super-intelligence: Coordination and strategy*. MDPI. <https://www.mdpi.com/books/pdfview/book/2257>