The Intersection of Intellectual Property Rights and Artificial Intelligence

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Abstract

This paper explores the intersection of intellectual property rights (IPR) and artificial intelligence (AI), emphasizing the challenges and opportunities presented by AI technologies in relation to existing IPR frameworks. As AI systems increasingly generate original works across various domains, including art, literature, and technology, traditional notions of authorship and ownership are being challenged. The study categorizes IPR into copyrights, patents, trademarks, and trade secrets, discussing how each type interacts with AI innovations. It highlights the complexities surrounding copyright law, particularly regarding AI-generated content and the question of whether machines can be considered authors. Furthermore, the paper examines the implications of machine learning and deep learning technologies, which can create new forms of innovation but also complicate existing legal protections. The analysis underscores the need for updated legal frameworks that address the unique characteristics of AI-generated works while fostering innovation and investment in AI technologies. The findings advocate for a collaborative approach among policymakers, technologists, and legal experts to develop a regulatory environment that supports both the protection of intellectual property and the advancement of AI capabilities.

Keywords

intellectual property rights, artificial intelligence, copyright, patents, machine learning, legal frameworks, innovation, authorship

1. Introduction to Intellectual Property Rights

Intellectual Property Rights (IPRs) have become a critical issue in today's knowledge-based economies that are primarily driven by rapid technological changes. The control of intellectual property (IP) has extended to almost all spheres of life and functions as an important tool to foster innovation and disseminate knowledge. IPRs can be traced back to the dawn of time when people had to be guaranteed compensation for their efforts and to facilitate people's economic gains who take the initiative of creating

inventions to benefit from their input and contribution. The IPR regime has three main justifications that include ensuring that inventors and creators are rewarded for their talent and efforts by restricting others from using their assets to secure the investment and break even, providing a legal system that can ensure some level of protection against copying, and giving individuals and companies the right to use it. In general, the IP system confers a temporary monopoly on the inventor or creator, with the expectation that this will maximize his or her return on investment by giving him or her the sole right to exploit the invention or creation commercially (Pinsky et al.2019). Today, with the global changes in technology, the facility and means of copying and easily duplicating have increased. This necessitates the regular updating of the IPR system to cover the latest areas of economic activity that provide ample opportunities for inventing and innovation. However, there are viable criticisms that the fast pace of technological advancements might be outstripping the pace at which IPR laws are being developed and implemented to protect the interests of inventors and innovators. Moreover, with the introduction of additional possibilities that could be generated by existing applications in the era of artificial intelligence, this adds another significant dimension that puts "AI and IPR" at the center of attention in the upcoming direction.

1.1. Types of Intellectual Property Rights

What are Intellectual Property Rights (IPR)? Intellectual Property Rights (IPR) are legal rights granted by governments that protect the creations, ownership, and use of intellectual properties. Because of the vast subject matter, IPR can be categorized into four different types: 1) Copyrights; 2) Trademarks; 3) Patents; and 4) Trade secrets. What are the uses of these IPR? Each of these IPR protects their interested parties in a slightly different way. Copyrights and trademarks primarily serve to protect the reputations and interests of their creators and consumers, while patents and trade secrets primarily serve to protect the innovators' investments in the ideas being protected.

Copyrights. Copyrights are granted to the creators of original works of authorship, which include a range of human creative activities like writing books, creating a film, chiseling sculptures, creating computer software, etc. Unlike patents, copyrights do not require registration and exist as soon as the work is fixed in a tangible form. They expire under different circumstances, but in general, the rights are in force for a

limited time. Trademarks. Trademarks are made up of words, slogans, symbols, designs, or any combination of these. They are used to identify and distinguish the source of endorsed products. These rights also generally have a duration as long as the mark is used in interstate commerce. Patents. Patents can be granted for any new, useful, and non-obvious process, machine, article of manufacturing, or composition of matter, or any new and useful improvement thereof. These are designed to foster innovation, and as such, have a term of twenty years. Trade secrets. These protect any information in the ownership of companies that provide an economic advantage for them. For example, this can be a company's recipes, formulas, techniques, practices, processes, designs, etc. These rights can be in place for as long as the company takes reasonable measures to keep the information secret. The biggest problem with this IPR type is that there are no penalties or sanctions for those who go against them because companies did not take the necessary measures to ensure their confidentiality.

2. Artificial Intelligence: Definition and Applications

Artificial intelligence (AI), generally defined as the analysis and partial replication of cognitive functions by entities other than human beings or animals, is seen as having transformative abilities to automate processes, making them faster, cheaper, and more accurate than manual methods and other digital technologies. This, coupled with the potential to make inferences from complex datasets beyond human capability, has already seen growing commercial interest in its deployment. A basic form of automation, dating back to the 1840s, is algorithmic automation, used in modern computing. AI, notably cognitive computing or advanced AI, is more complex, requiring computer learning from a large set of training data; trial-and-error problem-solving with the data; and grouping it all into a neural network like the human brain. Examples of AI and automation include self-driving cars, chatbots, customer relationship management software, and virtual private assistants (Gisselbaek et al.2021).

AI and automation have many applications across a number of sectors. For instance, in healthcare, systems are used for personalized learning and treatment plans; in finance, for the use of chatbot systems, fraud detection, and risk assessment of companies; in transportation, self-driving cars and drones may soon be commercially available; and in entertainment, AI is used in gaming apps, streaming platforms, and

music apps. In short, because of AI's power to detect patterns in vast datasets and make accurate predictions in a fraction of the time it would take a human being to process the same data, its transformative potential is already affecting the labor markets, with forecasts of how it will continue in the future. However, the future of AI is still uncertain with many unknowns. At the basic level, AI is an agent of software or a robot that takes real-world input and produces output that results in influencing or affecting the environment. As an example, machine-learning technology picks out patterns, for instance, in email traffic to identify spam. Given the increasing curiosity in AI's potential, it is important to understand how AI systems impact intellectual property law as its capabilities challenge traditional frameworks.

2.1. Machine Learning and Deep Learning

Artificial intelligence (AI) encompasses a wide spectrum of activities aimed at performing tasks that require human intelligence. This includes tasks such as learning, reasoning, generalization, perception, and problem-solving. Machine learning is a subset of AI that empowers systems to learn from data automatically and improve their performance without being explicitly programmed, using techniques such as classification, regression, clustering, and structure mining. In a machine learning setup, raw data are fed to learning algorithms in order to build models capable of making predictions, recognizing patterns and structures in input data, and learning a sequence of decisions based on trial and error. Moreover, machine learning has led to a series of notable advances in related fields, including computational modeling, pattern recognition, natural language processing, computer vision, and robotics. A more specialized area of machine learning, deep learning, deals with huge amounts of data and is instrumental for handling unstructured data such as audio, text, and images. This is because deep learning techniques use artificial neural networks with a considerable number of layers sandwiched between the input and output layers.

The automation abilities of AI systems built with deep learning and machine learning rely on large data models with the process of decision making. It is due to this blending of technologies that inventions relying on AI techniques have the capability of being works-cum-inventions. Inventions realized in the AI and software domain can range from the development of new algorithms of semi-automation that rely on data inputs for optimization and learning. It is crucial to appreciate that AI is a domain

of computer science and the above disciplines, which are apparently being elaborated by IP policy, notwithstanding the observation of opinions suggesting that modest AI domains are deemed to create a cognitive technology. If the evolution depicted is comprehended, then it assumes a querying standpoint due to various reasons. For instance, these are the scientific jurisdictions implicated in the conundrum of cognizing that AI is the intersection wherein the computer science premise and the health science domain integration intersect. Thus, exploring sophisticated AI tools such as machine learning and data mining can impact the design of curricula irrespective of the pedagogy adopted for IP teaching.

3. Challenges and Opportunities in AI and Intellectual Property Rights

Introduction

This analysis explores the relationship between innovative artificial intelligence technologies and established systems of intellectual property rights. AI systems have become unparalleled tools in a range of fields, generating new and innovative materials in art, literature, computer programming, pharmaceuticals, and other industries. The speed of AI development has outstripped the ability of current intellectual property law to regulate and incentivize AI progress. On the one hand, the process of AI creation and innovation challenges established traditions of legal introspection. An AI system can produce a work that does not comply with the human-centered ideas of creativity and invention.

On the other hand, AI systems present a unique opportunity for the law to craft an IP regime specifically tailored to them. When human programmers develop new creative works, they innovate through inter- or multidisciplinary collaboration with AI agents. Conversely, human inventors who work with AI systems may use the latter as a complementary element of their inventive process, through the cross-checking of research results, the recognition of obscure correlations, or problem-solving. This analysis examines the stakeholders and industries in which AI innovations are applicable. Following this analysis, we discuss the ongoing discourse concerning AI and intellectual property rights among researchers, jurists, policymakers, and technologists. Section II catalogues the challenges that surround AI and intellectual property law. These subsections explain the shake-up of traditional categories such as "authorship" when AI systems produce works. Moreover, we outline the IPR trends

that may benefit from AI. The AI-related opportunities for innovation, investment, and creativity are beginning to inform IPR trends today. The final subsection lists some of the needs that the AI-IP dialogue has cast into relief, as well as the questions across multiple industries that policymakers, researchers, technologists, and artists must consider. In Section V, we offer some reflections on the collaborative discourse that is emerging between policymakers, judges, academics, and practitioners of the law and technology. Our research concludes in Section VI.

3.1. Copyright and AI-generated Content

Copyright law is supposed to protect authors of original works. This fundamental principle seems clear enough. In some countries, copyright is even automatically applied to original works, without the need for registration (Bhargava et al.2020). The approach raises multiple new complexities in the context of artificial intelligence (AI) that can generate increasingly complex works, from visual art to music, based on vast datasets. The works are not protected by copyright law if they are created by a machine, but by which author, if any? When AI cannot be readily defined as an author, can such works be protected at all, and if so, how? How do AI systems impact the authors on whose works they are based? There is no straight or clear answer in law. The term AI refers to a broad variety of systems and their potentially evolving functions, from mere tools that assist a human to completely autonomous systems that operate without human intervention.

In response to the discussion, several respondents reported a situation in the United Kingdom in which copyright offices are ready to grant copyright registrations to titled AI-generated works, despite the lack of a human author, and without prejudice to copyright. The U.S. Copyright Office takes the stand that works generated by a machine cannot be registered, as they have not been authored by a human. The ongoing jurisprudential and normative debate continues to explore the question of whether or not machines can be authors, creators of original works protected by copyright. In the meantime, several jurisdictions and commentators are working on proposals of how best to adjust copyright law to deal with the issues posed by AI-generated works. The mechanisms that are being elaborated or envisaged in some jurisdictions to regulate how copyright might be invoked offer some interesting legal options for considering this matter. The copyright protection may be detached from

the authorship requirement and predicates the protection of an original work on its investment, in line with the protection that is afforded to neighboring rights holders. Other viewpoints are that AI technologies should be covered by a sui generis IP law. For example, it has been suggested that the EU should consider an IP right to protect some AI training data and AI algorithms, for a limited time and with a view to encouraging other companies to invest in improving the most powerful algorithms to a certain extent, in asmuch as they should be considered to have been created in the first place.

4. Legal Frameworks for Protecting AI Innovations

It is by and large accepted that AI can be seen as tools or machines that are created, designed, and crafted by humans. These processes of creation, design, and development are qualified as the inventive and creative dimension from the point of view of the intellectual property system. This traditional landscape of intellectual property rights, however, is not directly concerned with the specificities of AI systems as creations or innovators. In general, patents, copyright, or trade secrets take into consideration the human and legal net that encompasses a specific innovation. Anyway, an AI system can shape a distinct innovation, made by a distinct methodology and strategy. Consequently, the existing legal framework of the aforementioned intellectual property rights may be considered inadequate to enforce appropriate protection for this new typology of innovation. This result may entail a lack of complete protection in some of these cases if the legislator does not intervene to adopt dedicated regulation (Matos et al. 2022).

Despite the traditional scarcity of a lateral approach to cases or international cooperation on policies or regulations in this field, the issues that the AI intersection is addressing will, most probably, persuade the international community of the necessity to develop common provisions to extend the repertoire of law in this respect. It is unpredictable to draw the evolution of this industry worldwide. The question can be potentially interesting to raise – if the change will consist of the recasting of traditional legal instruments or if the development of regulations will be used to defend the actual system of intellectual property rights and the economic model that is behind them. However, the various legal instruments at the national and regional levels are not organized for these new software creations: as a consequence, the legal

defense of AI development is uncertain. Moreover, the wide availability of AI technologies can make it easier for copying to happen, for example, when a similar AI technology is developed separately in different places in the world. The only way to overcome such an issue is to invest in product development, for example, by building a system where the software results of AI can run in a robust way, but this needs capital.

4.1. Patents for AI Technology

Conducting innovation research is one of the proposed selections on how we could probably address meaning. Researchers have shown a substantial preference for the patenting of AI technologies (Daneshvar et al., 2021) This is unsurprising given that the results probably reflect the more general willingness of individuals to apply for the perceived importance of R&D investment and the possibility of demonstrating its novelty, non-obviousness, utility, and compliance with requirements. Until 2021, these criteria were generally thought to apply to audiologists. However, in the AI innovation sector, several restrictions are challenged. One of the main difficulties that has been pointed out is the likelihood of unique function and inventorship, and indeed, AI only drives existing knowledge to its logical conclusion.

In Europe and the USA, we have seen a percentage of patents for AI associations. In China, a listing has been established by the National Office of Intellectual Property. Because patent applications do not need to be made public until 18 months after the submission date, some patent applications were filed before this review was released. There were 5,577 AI-related patent applications. According to the study, 61.32% of the total AI patent request documents (approximately 3,423 out of 5,577 files) were applications for the U.S. Patent and Trademark Office during the review period. The U.S. Patent and Trademark Office also filed 58.94% of the U.S. patent applications. The classification of patents and decisions are a key asset that offers anyone within a tech investment ecosystem a sense of what is and where it is excluded. But when it comes to AI, federal patent offices struggle to determine who or what can be patented simply because they have policies and rules in force that are increasingly infeasible. Diverging viewpoints have been expressed with AI being identified by active decisions in which some technology investments have been filed but not supported. These ongoing inquiries mainly involve the collection of individual information and

demand that legal and technical practitioners embrace existing national law and practice to debate these issues and their role.

5. Future Trends and Ethical Considerations

AI will continue to develop in the future, affecting service-oriented, talent-driven, and product-oriented companies, therefore creating new economic landscapes. Like the internet, AI will influence business models. It will mean that patents will no longer matter that much, as the product might not have been invented in any understanding of the word. Further, some forms of intellectual property, such as trade secrets and copyrights, might be volatile due to the nature of the relationships and agreements. As a result, this discussion increased calls for transparent and accountable AI systems that follow some form of standardization. It is noted that ethical guidelines for trustworthiness are different from the approach to making sure the AI provides a fair outcome despite its variables. Tremendous peer pressure led companies to abandon black-box AI processes with no idea of the results. Indeed, there is something to be said for "AI for the Good," especially as it influences healthcare, climate, and outer space, but it needs standards. Another trend is the possibility of AI in human interest, including AI-generated thought-provoking and saleable creativity. As a result, the plagiarism claims would not pertain only to the piece of work but can extend to the creator and creators. Overall standards and suppression of speculative investment in AI are impeached, including new inhibitors. An example of transparency being an advantage is the requirement for legally mandatory ethics assessments before subgroups of AI applications can be put on the market as part of civil protection. It is increasingly recognized that AI cannot be ethically neutral and cannot exist in a vacuum. Regulatory science will enter a new sphere when AI achieves scientific expression in its creative capabilities. AI's peculiar relationship to time and the court is being recounted most recently in concerns about the deployment of algorithms dedicated to asylum applications. Consumer rights have spawned AI privacy laws and licenses. The impact on society cannot be overestimated now that it is possible to express interest in one's own "personal data" through intelligent autonomous agents and robots. Inevitably, the concept of creativity — spontaneous, innovative, and unpredictable — and the essence of intellectual property ownership are under attack. One regulation has been passed, introducing someone who is deemed to be a producer

of a product subject to liability for damage caused to a person by a defect that is established according to normal conversational analysis (Ferreira, 2020). Thus defined, a defect exists when the product does not provide the safety which a person is entitled to expect. This stems from the principle that members of society must stand by one form or another for activities afterwards. Providing an ethical mode for AI automata, while important, is critical. AI gives rise to concern in at least three quarters of society. AI's capabilities have reached those cultural normative values that countries and supranational organizations protect as essential core elements in statute, custom, and any modern conception of their national constitutional framework.

5.1. Bias and Discrimination in AI

The commercial success of AI-based applications depends on the existence of highly accurate and reliable systems, a challenge influenced by multiple factors. Like human decisions, AI systems should not be influenced by bias. AI bias in the context of this paper is defined as an unjust spillover from human private prior beliefs to data, a priori to AI algorithms or trained models, and without a legitimate rational basis. Bias can manifest itself through three general pathways: data bias (a result of biased or incomplete training data), algorithm bias (when modeling processes impose unwanted group-based predictions), and outcome bias. Outcome bias may be the result of human decision-making, criteria applied, and the context and is not explicitly introduced through the dataset or algorithm, but rather introduced post-factum by the user of the artificial intelligence system. Ultimately, the only pathway an intellectual property right grants for the filtering of deep learning systems training algorithm is the training dataset. However, ultimately the true output of an AI will have to account for the outcome bias that is introduced post-model development and training (Edelson et al.2021).

There are several examples of bias in AI systems whose use can lead to the detriment of certain segments of society. For example, a search associative algorithm was found to be offensive to those who belonged to marginalized communities and that those with the highest levels of education were most likely to endorse burdened stereotypes. A platform serves unhealthy dietary guidance to young users based on their playing preferences in what was suspected to be a violation of privacy protection laws. A proprietary AI product marketed by a large healthcare provider as a healthcare

decision-support tool had a 44% error rate in caring for critically ill Black patients and a 17.3% rate for critical populations overall. However, AI-produced output, if biased, could also impact trade secret law and practice. A request for more diverse tools that have been used to train valid AI systems generally to obtain broad-based strong patent protection for innovative research and development systems is clearly on the side of prosperity (Stivi et al.2022).

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