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ASPECTS OF ARTIFICIAL INTELLIGENCE IN THE PROTECTION OF INTELLECTUAL PROPERTY OBJECTS

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Abstract: The article addresses aspects regarding the benefits and risks of using Artificial Intelligence (AI) in the field of Intellectual Property (IP), highlighting both the opportunities and the challenges it generates. It highlights the importance of protecting intellectual creations in the digital age, in which innovation and economic competitiveness are conditioned by the existence of effective legal mechanisms. In this context, the main concepts are defined: types of artificial intelligence (narrow, general, generative), the main areas of intellectual property (patents, trademarks, copyrights, industrial designs) and categories of objects influenced by intelligent technologies (software, automatically generated works, AI-assisted inventions).
The application of AI in the protection of IP objects is reflected in high-performance tools for detecting plagiarism and counterfeiting, algorithms for monitoring online markets, data analysis on work registration certificates, patents, trademarks, as well as digital document management platforms. On the one hand, artificial intelligence brings significant benefits, such as increased efficiency, reduced costs, increased accuracy and rapid access to information; on the other hand, it also involves immense risks, including the lack of a uniform legislative framework, ethical dilemmas related to artificial creativity, the proliferation of deepfakes and vulnerabilities regarding data security. This tool offers major opportunities for technological and economic progress, but also involves complex challenges, which require legal, ethical and security solutions adapted to new realities, solvable through international cooperation and by training specialists capable of managing the impact of the convergence between AI and Intellectual Property.
Keywords: intellectual property, intellectual property objects, artificial intelligence, copyright protection, legislative framework.
JEL Classification: K24; O34; O38

1 Introduction

The exponential development of artificial intelligence technologies has generated profound transformations across multiple fields, including that of intellectual property. Machine learning algorithms, neural networks, and data-driven systems are no longer merely support tools but active participants in the processes of creation and innovation. These technologies not only redefine the boundaries of human knowledge but also the ways in which such creations can be protected under the law. In this context, the importance of intellectual property goes beyond the legal world, becoming an ethical and strategic issue that is also important for the economy. This idea is supported by Maskus and Reichman (2004) in their analysis of protecting intellectual property in the globalised world (Maskus & Reichman, 2004).

This article looks at how artificial intelligence and intellectual property overlap, and highlights laws, rules and practices that protect new creations. It does this by checking official and academic sources. The article's aim is to encourage scientists to talk to each other and help

institutions decide how to protect copyright, offering a balanced view of the role of intellectual property in modern research.

Specialized literature and practical examples clearly show that the legal framework needs to be adapted to the new realities brought about by Artificial Intelligence. The current rules on intellectual property often don't work well. This is because intelligent technologies are changing so quickly. This creates complicated issues around ownership and use. These issues lead to legal disputes and intense debates in our countries, in Europe, and around the world. This raises important questions about how advances in artificial intelligence affect scientific research and the challenges and opportunities that come with protecting new ideas created using AI.

Intellectual property management is a key part of scientific activity. It helps to encourage creativity and new ideas, and it supports the continued growth of society. At present, innovation originating from the academic environment plays a major role in the evolution of human knowledge, while copyright protection remains indispensable for ensuring continuous progress in research (Popovici, 2024). Artificial intelligence, due to its ambiguous role, has attracted significant attention among international communities dealing with IP-related matters. On one hand, artificial intelligence opens new horizons for innovation and creativity, offering powerful tools for the development of next-generation products and services; on the other hand, it significantly alters the structure of the creative sector, affecting the economic incentives of humans to create original works.

The World Intellectual Property Organization (WIPO) draws similar conclusions in its recent study on the economic perspectives of the interaction between artificial intelligence and intellectual property, clearly indicating the dual effect of artificial intelligence mentioned above (Cuntz, Fink, Stamm, 2024). However, at the core of discussions among WIPO experts and jurists lies the fundamental question: *Who owns the output generated by AI?*

According to current European and national legislation on copyright and related rights, protection is granted only to works created by humans. Thus, scientific creations, music, paintings, and other texts generated by artificial intelligence remain in a legal gray area. Consequently, further questions arise, such as: if no human author is involved, can such works be protected by copyright? Or, if a person provides input data to the AI, does that person become the author of the output? These questions are not merely theoretical - they have real implications for IP right holders, developers, and users of AI systems (*Legal Aspects*, August 18, 2025).

The provision that copyright must belong exclusively to natural persons is reiterated in the *Strategy on Artificial Intelligence* (2023), issued by the Court of Justice of the European Union (CJEU). This document explicitly excludes machine-generated content from copyright protection. Moreover, the EU Intellectual Property Office (EUIPO) recently (2025) published its strategic plan *The Development of Generative Artificial Intelligence from a Copyright Perspective*, which encourages IP right holders to view artificial intelligence as an opportunity (EUIPO, 2025). It proposes the implementation of direct licensing contracts through which IP right holders could control how their works are used, receive fair compensation, and benefit from transparency throughout the entire process. At the same time, developers would enjoy a clear legal framework, reduced litigation risks, improved data quality, and greater scaling potential.

This legal and ethical dimension directly intersects with economic realities, since technological progress and creativity cannot be separated from the fundamental role that innovation plays in the development of society. To understand the complexity of the relationship between Artificial Intelligence and Intellectual Property, we identified the key concepts from informational, technological, legal, and economic perspectives. In this regard, presenting the conceptual framework of advanced technological tools constitutes a necessary premise for elucidating the intersection between artificial intelligence and the system for protecting intellectual creations.

2 Definition of Key Concepts

Intellectual Property (IP) represents the set of exclusive rights granted to creators and innovators over intellectual products resulting from human creative activity. It reflects a balance between the interests of creators/innovators and the public's right to access knowledge and culture. As a fundamental concept, IP is a legal field encompassing all norms that regulate the protection of creations of the human mind, whether they are scientific, artistic, literary, technical, or commercial in nature.

The notion of exclusive right grants the holder the authority to decide how their creation is used (reproduction, distribution, communication, sale, licensing, etc.), while the balance of interests principle ensures that the IP system protects authors and inventors, but also includes certain limitations and exceptions (e.g., citation, educational use, compulsory licenses).

According to the *World Intellectual Property Organization (WIPO, 2022)***,** the main concepts of IP include:

Copyright and related rights **–** protect literary, scientific, and artistic works (books, music, films, software, databases, academic papers).

Industrial property:

Patents **–** protect new and industrially applicable technical solutions.

Trademarks – distinctive signs (logos, names, slogans, sounds) that differentiate products or services.

Industrial designs and models – protect the aesthetic appearance of products.

Geographical indications and designations of origin – link a product to a region (e.g., wines, cheeses).

Trade secrets – confidential information with economic value.

Modern notions:

Software and Artificial Intelligence – fall under copyright or patent law, with ongoing debates regarding AI-generated content.

Intangible assets – know-how, data, algorithms, brands, reputation.

Licensing and technology transfer – mechanisms through which IP becomes an economic resource.

Open access and open source **–** alternative rights management models promoting free access to knowledge and collaborative innovation.

In essence, today IP is no longer limited to the protection of traditional creations - it also serves as a strategic instrument for innovation, economic competitiveness, and cultural development, adapted to new technological realities such as digitalization, AI, blockchain, and big data.

Artificial Intelligence (AI) is an interdisciplinary field of computer science aimed at developing systems capable of performing tasks that require human intelligence, such as learning, reasoning, pattern recognition, or natural language processing. According to Russell and Norvig (2021), Artificial Intelligence can be defined as „the study of intelligent agents capable of perceiving their environment and acting to maximize their chances of success."

In the specialized literature, Artificial Intelligence is classified into several categories:

Artificial Narrow Intelligence (ANI) - systems designed for specific tasks, such as facial recognition, automatic translation, or virtual assistants (Kaplan & Haenlein, 2019).

Artificial General Intelligence (AGI) - a hypothetical form of AI with the ability to learn and perform any intellectual activity that a human can (Bostrom, 2014).

Generative Artificial Intelligence (GenAI) - a modern subset of AI based on advanced neural networks, capable of creating original content (texts, images, music), such as GPT or DALL·E models (Floridi & Chiriatti, 2020).

Thus, Artificial Intelligence is not merely a technological tool but also a catalyst for societal, economic, and legal transformations, including within the field of Intellectual Property. Consequently, the emergence of works and inventions generated partially or entirely by autonomous systems intensifies the debate over ownership rights, the boundaries of legal recognition, and the methods of preventing infringements. Therefore, protecting IP objects in the digital era is essential for maintaining the balance between open access to knowledge and the fair reward of creators and innovators. In a world where AI increasingly influences content creation, it is crucial to remain vigilant and to develop as informed and responsible consumers of information.

Intellectual Property Objects Influenced by Artificial Intelligence

With the rapid development of Artificial Intelligence, new challenges arise for the legal framework of Intellectual Property, as technology generates or assists in the creation of intellectual works. Among these are:

Software - considered both a copyright-protected object and, in some jurisdictions, a patentable invention. AI algorithms and models raise questions regarding ownership rights (Samuelson, 2016).

Automatically generated creative works - texts, music, or visual art produced by generative systems. The central issue lies in identifying the author: is it the programmer, the user, or the system itself? (Gervais, 2019).

AI-assisted inventions - Artificial Intelligence contributes to the innovation process by identifying molecules in medicine, optimizing materials, or developing technical solutions. The current legal debate concerns whether AI should be recognized as an inventor or whether this status should remain exclusive to natural persons.

Thus, the impact of Artificial Intelligence on Intellectual Property is profound and multidimensional, requiring a reevaluation of traditional concepts such as author, inventor, and rights holder.

3 Applications of Artificial Intelligence in Intellectual Property Protection

Artificial Intelligence is fundamentally transforming the way Intellectual Property (IP) is protected and leveraged, offering advanced tools for preventing infringements and streamlining legal and administrative processes. One of the most prominent applications is the use of AI systems for detecting plagiarism and counterfeiting. Models based on natural language processing, convolutional neural networks, and signal analysis algorithms can identify textual, visual, and audio similarities, even when these are partially disguised through paraphrasing, graphic alterations, or sound distortions. Such solutions support academic institutions, publishers, and rights holders in defending the integrity of creative works.

At the same time, real-time monitoring algorithms for markets and online platforms play a major role in detecting counterfeit products and abusive use of trademarks. Automated analysis of listings, commercial descriptions, and product images enables the rapid identification of irregularities, significantly reducing response time compared to traditional methods.

Another field of application is the analysis of patent and trademark data through machine learning. Automatic classification of patent documents, identification of emerging technologies, and assessment of similarity between trademarks are made possible by state-of-the-art machine learning algorithms and neural networks. These technologies facilitate the work of Intellectual Property offices as well as strategic innovation and technology transfer processes.

Moreover, intelligent platforms for IP document management and archiving integrate OCR (Optical Character Recognition), multimodal recognition, and semantic tools to ensure the rapid and secure retrieval of information, as well as compliance with international standards (WIPO ST.96; ISO 15489). Integrating OCR into IP protection means that intelligent document management and archiving systems (for patents, trademarks, designs, and publications) use OCR for:

Digitizing historical archives (printed patents, technical descriptions, journals);
Semantic search within documents that would otherwise exist only as images;
Recognizing drawings or technical figures (in combination with computer vision);
Workflow automation - extracting metadata, indexing by keywords, identifying claims or brand names.

International examples: WIPO & EPO

WIPO PATENTSCOPE – many historical patents were published only on paper or as scanned images. Through OCR integration, these documents have become fully searchable, allowing users to directly search for technical terms in descriptions and claims.

EPO (European Patent Office) has applied OCR to millions of pages from collections prior to 1978, when patents existed only as facsimile scans. As a result, researchers can perform semantic analysis and text mining on historical patents, tracing technological evolution over time.

National example: AGEPI (Republic of Moldova)

The Official Bulletin of Industrial Property includes patents, trademarks, and industrial designs. In older editions (1990s – early 2000s), documents were published only as images.

OCR integration allows for:
Automatic extraction of data about inventors, patent titles, and technical descriptions;
Indexing of documents within digital catalogs of technical and scientific libraries;
Enabling researchers to search for specific terms directly within patent documents.

Thus, OCR technology emerges as a key element in the process of transforming Intellectual Property collections into a modern, accessible, and interconnected digital heritage. By automating workflows and ensuring a higher level of data security, these systems optimize operational efficiency and guarantee the long-term preservation of documents. In this context, OCR plays a decisive role in converting traditional IP archives into dynamic digital resources that are easily usable for research, innovation, and legal protection. The integration of Artificial Intelligence-based solutions further enhances this transformation by strengthening rights protection mechanisms and reinforcing the infrastructure necessary to foster innovation and economic competitiveness.

4 Benefits of Using Artificial Intelligence in the Protection of Intellectual Property

The integration of Artificial Intelligence (AI) into the field of Intellectual Property (IP) protection offers multiple strategic and operational advantages:

Efficiency and reduction of processing time for Intellectual Property applications represent one of the most evident benefits. Traditional processes - particularly those related to patent examination—involve the analysis of vast volumes of technical and legal documents, requiring significant human resources and extended durations. By integrating machine learning algorithms, Intellectual Property offices can automate patent classification, identification of international classification codes (IPC/CPC), and correlation with relevant scientific literature. This automation does not completely replace the work of examiners but allows them to focus on complex aspects, considerably reducing case resolution time and contributing to greater procedural transparency (WIPO, 2019).

Increased accuracy in detecting Intellectual Property infringements is also a major benefit. Algorithms based on natural language processing (NLP) and image recognition enable the identification of plagiarism, counterfeiting, or similarities between trademarks and products - even when these are disguised through paraphrasing, graphical alterations, or distortions. Audio-video analysis systems, including deepfake detection technologies, provide additional support in ensuring the authenticity of digital creations (EUIPO, 2022). Thus, Artificial Intelligence significantly enhances institutions' ability to respond promptly and precisely to potential abuses, reducing the risk of financial or reputational loss for rights holders.

Cost optimization in monitoring and litigation represents another significant advantage. Traditionally, identifying and documenting IP infringement cases required laborious investigations and substantial financial resources. Through the automated monitoring of online platforms, marketplaces, and databases, Artificial Intelligence reduces manual effort and enables rapid selection of cases with a high likelihood of infringement. This leads to lower investigation-related costs, fewer unnecessary lawsuits, and increased legal efficiency (OECD & EUIPO, 2021).

Rapid and integrated access to international databases. IP offices and users can simultaneously query sources such as WIPO PATENTSCOPE, EPO Espacenet, USPTO, or commercial databases using semantic searches, machine translation, and metadata extraction algorithms. Consequently, the process of identifying technological prior art or trademark conflicts becomes much faster and more reliable (EPO, 2022). This cross-border interconnectivity plays a decisive role in the context of market globalization and the growing volume of digital creations.

The use of Artificial Intelligence in the protection of Intellectual Property thus provides a wide range of benefits - from administrative efficiency and increased precision in detecting infringements to cost optimization and easier access to international resources. These advantages strengthen not only legal protection systems but also the infrastructure necessary to foster innovation, competitiveness, and international cooperation.

5 Challenges and Risks of Using Artificial Intelligence in the Protection of Intellectual Property

The development of Artificial Intelligence (AI) technologies brings undeniable benefits to the protection of Intellectual Property (IP) objects. However, the integration of these technologies also entails a series of challenges and risks that affect the legislative, ethical, technological, and social environments alike.

A first major difficulty lies in the *lack of a uniform legislative framework* regarding Artificial Intelligence and Intellectual Property. Currently, international regulations differ significantly in terms of recognizing AI-generated creations, determining ownership rights, or assigning legal responsibility for infringements committed through autonomous systems. This lack of harmonization creates legal uncertainty and complicates the enforcement of IP rights, especially in cross-border cases (WIPO, 2020).

Another challenge concerns the *ethical issues* surrounding the relationship between human and artificial creativity. The emergence of works generated partially or entirely by Artificial Intelligence raises fundamental questions: Can AI be considered an "author" or "inventor"? What role does human contribution play in an automated creative process? In the absence of clear answers, there is a risk of undermining the value of human creativity, which may lead to cultural and economic imbalances (Floridi, L., Cowls, J., 2021).

A particularly pressing technological risk is the *proliferation of deepfakes and advanced forgeries.* Generative algorithms, such as Generative Adversarial Networks (GANs), enable the creation of highly realistic visual or audio content that is difficult to distinguish from authentic material. In this context, copyrights, trademarks, and even personal identity can be manipulated or misappropriated, complicating the work of protection institutions and law enforcement agencies (Chesney, R., Citron, D., 2019).

Equally important are the *risks associated with data security and confidentiality* in AI systems. IP protection infrastructures rely on large datasets, including legal documents, patents, and sensitive commercial information. Cyber vulnerabilities can allow unauthorized access to such data, with serious consequences for economic competitiveness and national security. At the same time, data collection and processing raise concerns about compliance with privacy regulations, such as the European *General Data Protection Regulation (GDPR)* (Veale, M., Borgesius, F. Z., 2021).

Although AI opens significant opportunities in the IP field, the associated risks - lack of uniform regulation, ethical dilemmas, proliferation of digital forgeries, and data security vulnerabilities - require a *cautious and balanced approach.* We can only deal with these challenges and turn them into opportunities for improving how we protect intellectual property if we work together internationally and develop the right rules and technology.

6 Conclusions

When we look at the problems and risks of using artificial intelligence in the area of Intellectual Property, we see a complicated situation where new technology, laws and ethics all meet. Although artificial intelligence has the potential to greatly benefit the processes of creating, detecting and protecting innovations, it also raises many questions regarding authenticity, property rights and information security.

There is a lack of coordinated legislation at an international level. This makes things more uncertain when it comes to copyright and the establishment of legal liability. The idea of *artificial creativity* means that the traditional notion of human originality needs to be rethought. In today's digital world, protecting intellectual property is crucial to maintaining its value and integrity.

Innovation is very important for economic and social progress. Protecting ideas and creations legally is also important. This encourages investment, helps technology to be shared, and makes countries and organisations stronger.

It is very important to update and adapt the laws about intellectual property to the new realities created by the development of artificial intelligence. This is so that we can make the most of this technology in a sustainable way.

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