BEYOND BOUNDARIES: CONVERGENCE OF CODES IN THE FUTURE OF INTELLECTUAL PROPERTY IN AN AI-POWERED REALM

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Chapter 1

Introduction

Overview of Artificial Intelligence and Its Impact on Intellectual Property

Artificial intelligence has brought about revolutionary changes in all sectors, since it changes the nature of innovation and creativity, and thus changes the way innovation and creativity are perceived and protected. The invention of machine learning algorithms, neural networks, and generative AI models such as OpenAI's GPT-4 and DeepMind's AlphaFold has raised the possibility of inventions and creative works previously accredited to human ingenuity. These AI systems are now able to produce highly novel outputs, including art, music, software, and even patents, raising questions on the mode of authorship, ownership, and enforcement under intellectual property frameworks.

In traditional intellectual property law, there is an assumption that these are the inventions and creations of humans. The copyright law remains hinged on human originality, a requirement in the patent system, and trademark law is premised on the ability of a human to represent a brand or product. As artificial intelligence begins to act autonomously or semi-autonomously in such areas, a growing inadequacy of laws previously existing arises in adequately covering the legal issues surrounding such innovation.

Intellectual property jurisdictional disparities further hinder uniform protection and enforcement of rights for AI-generating innovations. For example, South Africa was the first to qualify an AI system as an inventor in a patent application, while other jurisdictions, including the United States, the European Union, and the United Kingdom, have forever

rejected the doctrine of machine inventorship. This is a global inconsistency and, therefore, calls for a clearly defined legal framework that can handle issues of artificial intelligence.

Research Questions

The central questions that this paper research answers are:

1. How can global IP regulations be harmonized to address jurisdictional disparities in patenting AI-driven innovations effectively?

2. What legal reforms are necessary to adapt fair use principles for AI-generated content in the current IP framework?

3. How do AI tools in IP enforcement redefine copyright infringement detection and the monitoring of trademarks across jurisdictions?

4. What are the implications of machine-generated innovations on traditional IP licensing models, and how can licensing adapt to AI advancements?

Research Methodology

This research employs a doctrinal approach to studying primary and secondary sources of law, such as statutes, case law, international treaties, and scholarly commentary. Comparative analysis will be employed to bring out differences in the treatment of artificial intelligence-generated works between jurisdictions like the United States, the European Union, India, and China. The paper further analyses key case studies and gauges emerging trends to proffer harmonized solutions.

Hypothesis

A harmonized global intellectual property framework that includes provisions specific to artificial intelligence can address jurisdictional disparities, facilitate effective enforcement mechanisms, and support the ethical development of artificial intelligence-driven innovations.

Chapter 2

AI and Patenting: Challenges and Jurisdictional Disparities

Recent Developments and Trends of Patenting Innovations on Artificial Intelligence

Recent capabilities of AI systems make innovations without human touch. Actually, there is a striking example wherein an AI system, called DABUS, developed by Dr. Stephen Thaler, came up with a food container with fractal geometry and a flashing beacon for an emergency response. They were actually filed under patents in various jurisdictions, such as the United States, the European Union, and the United Kingdom. Nonetheless, patent applications are usually denied due to the present strict requirement by the patent laws of the inventor being a natural person.

On the other hand, South Africa granted a patent to DABUS and declared that an AI system is indeed an inventor. This generated unprecedented instances of a future in which machines would be considered inventors under intellectual property law; however, the decision is still only an exception and not generally accepted across the globe.

Key Challenges in Inventorship and Patentability

- **Inventorship Requirements:**

  The widespread requirement in any jurisdiction is that an inventor needs to be human. This presents a significant challenge when artificial intelligence autonomously generates inventions. For example, in *Thaler v Comptroller General of Patents, Designs and Trademarks [2021]*[1], the United Kingdom's Court of Appeal upheld the rejection of DABUS's patent application. The court also held that an inventor is a person, citing Section 7 of the UK Patents Act 1977 which defines a "person" to be the inventor. Likewise, in the United States, Title 35 U.S.C. §101 defined the term "inventor" as an "individual," thereby excluding AI systems.

[1] UKSC/2021/0201

- **Patentability Criteria:**

  Patents are granted under criteria such as novelty, non-obviousness, and industrial applicability. These are human-creativity-oriented criteria that may not easily accommodate inventions generated by artificial intelligence. For instance, an invention created through iterative machine learning processes may appear obvious to humans even though it is a novel output of artificial intelligence. This issue was highlighted in *Thaler v Commissioner of Patents [2021]*[2]*,* where the Federal Court of Australia considered the patentability of AI-generated inventions but did not address the broader issue of whether AI could be an inventor.

Comparative Analysis of Jurisdictions

- **The United States of America:**

  In the United States, human inventorship is specifically required under Title 35 U.S.C. §101. In *Thaler v Hirshfeld (2021)*[3]*,* the court decided that an AI system cannot be considered an inventor. The statutory language and legislative intent were held to support this conclusion, although the court emphasized the point that, by definition, inventorship is a human undertaking.

- **The European Union:**

  The EPC further requires that the inventor is a natural person for inclusion in the list. Articles 52 to 57 of the EPC cover the technical contribution of an invention, but Rule 19(1) of the Implementing Regulations provides that the inventor must be a human. The Legal Board of Appeal of the EPO had issued in writing its decision in case *J 0008/20 (Designation of inventor/DABUS)*[4], which confirmed that under the European Patent Convention (EPC) an inventor designated in a patent application must be a human being. The decision, announced after hearing the appellant in public oral proceedings on 21 December 2021, concerned the rejection of two European patent applications in which an artificial intelligence system called DABUS was designated as inventor.

[2] [2021] FCA 879
[3] 558 F. Supp. 3d 238 (E.D. Va. 2021)
[4] ECLI:EP:BA:2021:J000820.20211221

- **The People's Republic of China:**

  Chinese patent law, under the Patent Law of the People's Republic of China (2021 Revision), gives preference to the industrial application of inventions. Although the law does not exclude AI-generated inventions per se, it has not directly addressed the question of AI inventorship. In the case, *Patent Re-examination Board v Beijing Winsunny Harmony Science & Technology Co., Ltd. and Daiichi Sankyo Co., Ltd. (2016)*[5], China displays very forward-looking policy with patent law. The SPC in this case admitted that patent law must be adjusted in accordance with changing technologies and recognised the importance of the protection of real technological progress. This was a case about pharmaceutical patents but still showed the openness of China in interpreting patent criteria flexibly for new realities. This is, therefore an indicator that, one day China will change its patent framework to incorporate AI innovation and human inventorship, but so far it demands human inventorship.

- **South Africa:**

  South Africa issued a patent to DABUS in 2021. It was on procedural compliance rather than changes in substantive law since South African patent law does not have an explicit requirement of human inventorship. This decision has been historic, but it has not made other jurisdictions adopt the same course.

The Indian Context: Addressing AI-Driven Challenges in Intellectual Property

India is accepting artificial intelligence technologies presently at a fast pace in industries like healthcare, agriculture, education, finance, and manufacturing. The government's approach, such as the National Strategy for Artificial Intelligence by NITI Aayog, further solidifies India's status as one of the important nations undertaking AI innovation. In fact, the IP law governing the development of these technologies has not been updated with the advancement of the technology.

Indian IP framework, which comprises the Patents Act, of 1970, the Copyright Act, of 1957, and the Trademarks Act, of 1999, is largely human-centered. These laws were drafted by visions concerning human perception of creativity and innovation: an inventor or an author.

[5] Administrative Retrial No. 41, SPC

With artificial intelligence now autonomously generating inventions and creations, this human-centric approach has led to a lot of legal fogginess. India needs to change its IP architecture to meet the fast-emerging trends and comply with international best practices.

Patenting AI-Generated Innovations in India

The Patents Act, of 1970, defines an inventor as a "person," which has been interpreted to mean a natural human being. Thus, inventions generated autonomously by AI systems, such as new pharmaceutical compounds or engineering designs, fall into a legal grey area.

Challenges in the Indian Patent Framework

- **Inventorship and AI Systems:**

  There is no clear legal provision in the Indian law to specify whether an AI system can be regarded as an inventor. For instance, if the AI platform of DeepMind's AlphaFold, by itself, designed a novel protein structure with medicinal applications, there would be no clear legal provision on the inventorship of a machine to claim patentability.

- **Inventive Step and Human Ingenuity:**

  The inventive step in Section 2(1) (ja) Patents Act refers to an invention that "should not be obvious to a person skilled in the art." It is more a point of human creativity and logical ability. AI works based on the ability to pass data through algorithms that are so complex and significant that they exceed the human capacity for cognition.

Possible Reforms:

- Amend the Patents Act, of 1970, in order to specify that AI-generating inventions could be recognized either as co-inventors or contributors, for human developers designing and training an AI.

- Bring guidelines for testing inventive steps specifically in the AI-generated innovation case so that while promoting technological advances, the balance is maintained while protecting the sanctity of patents.

- Learn from international best practices: For example, China has a lenient approach toward industrial applicability, and South Africa recognized the AI-generated patent as was witnessed in the case of DABUS.

Copyright and Ownership Issues

Copyright Act, of 1957, does not provide specifically for works created by AI. Section 2(d) defines an "author" as the person who created a work except, that is machine-generated outputs. This creates ambiguity in situations where AI creates literary, artistic, or musical works independently with little human contribution.

Ownership Issues in AI-Generated Works

- **Human Involvement:**

  Suppose an AI system like OpenAI's DALL-E generates a series of artworks based on a user's input. Under current Indian law, the user or programmer might claim ownership. However, in cases where human involvement is minimal, determining authorship becomes problematic.

- **Computer-Generated Works:**

  Existing provisions already cover works "computer-generated under human direction." Still, fully autonomous creations, like those generated by generative adversarial networks (GANs), do not fall under this category.

Possible Reforms:

- Amend Section 2(d) to explicitly recognize AI-generated works and define ownership rights. For example, the law may assign ownership to the developer, user, or other stakeholders of the AI, depending on the nature of their contributions.

- Extend copyright protections to cover works created with the help of artificial intelligence through the concept of "computer-assisted authorship" so that the fight over ownership doesn't suppress creativity.

- Establish fair use doctrine with respect to AI-made works, especially when an AI remixes or transforms someone else's work

Trademark Monitoring and Enforcement in India

This growth of Indian e-commerce has therefore demanded the need for more stringent trademark enforcement infrastructures. Counterfeit products and trademark infringements are massive concerns arising out of the internet. Artificial intelligence-based applications to combat the same issues are arising.

AI in Trademark Monitoring

- **Identification of Infringements:**

  AI systems can search through online listings, product images, and descriptions to detect unauthorized use of trademarks. For example, Corsearch is a tool that uses machine learning algorithms to track global markets for trademark infringement.

- **Cross-Jurisdictional and Global Issues:**

  Although AI tools make the process more efficient, there are no specific legal provisions in India for AI-based trademark monitoring. Additionally, coordination at the global level is necessary to effectively combat cross-border trademark infringement.

Possible Reforms:

- Introduce AI-based tools in India's trademark enforcement regime under the Trademarks Act, of 1999.

- Develop guidelines for using AI in the detection and management of counterfeit products

- Promote public-private partnerships for using AI against trademark violations with government agencies and the private sector.

Proposed Reforms for the Indian Context

In order to address the problems created by such AI-driven innovations, the following reforms are suggested for the Indian IP framework:

- **Patents Act be amended:**
  - An AI system be considered a co-inventor or contributor.
  - Criteria of inventive steps for AI-generated inventions, based on global best practices, are formulated.
- **Expanding Copyright Protection:**
  - Provisions be made to describe ownership rights over AI-generated work, preventing ambiguity over rights in disputes.
  - The doctrine of fair use be shaped to encompass transformative AI-generated content.
- **AI Enforcement Mechanisms:**
  - Promote adoption of AI enforcement tools, most specifically in trademarks and copyright, through monitoring or infringement detection
  - Ensure transparency of algorithms used and ensure accountability to avoid biased conclusions.
- **Capacity Building:**
  - Train officers on IP rights, lawyers, and judges on AI technologies; therefore, such disputes involving the works generated from AI can effectively be adjudicated.
  - Raise stakeholders' awareness in regard to the effects of AI on the IP rights laws.

Harmonization Needs

The differences in jurisdictions require an international approach to addressing the unique issues of artificial intelligence. The basis for such a platform can be drawn from the World

Intellectual Property Organization and the Agreement on Trade-Related Aspects of Intellectual Property Rights. Some of the proposals for reform could be as follows:

AI should be recognized as co-inventors with humans, thereby ensuring human accountability.

New standards should be set for novelty and non-obviousness of inventions originating from AI.

Promote adoption of sui generis regimes over AI-specific problems.

All these would serve the purpose of ensuring clear legal certainty, which spurs innovation but also answers ethical and practical concerns about the AI inventor.

Chapter 3

Licensing and Ownership in the AI Era

Evolving Ownership Dynamics

It has become a controversy over ownership, as AI creates works that have blurred the boundaries between the creator, tool, and user. Traditionally, intellectual property rights have been granted based on the concept of human authorship and creativity. Now, with the ability of an AI system to create content independent of human input, the issue of ownership has also become more complicated.

For those like OpenAI who create and maintain the underlying technology, developers of an AI system often lay claim to outputs generated by their models. For the user who gives specific input or prompts, however, their value lies in actually shaping the final output. It results in a web of conflicting claims that existing legal frameworks find difficult to resolve.

For instance, when OpenAI's Codex generates software code, several questions emerge: Should the developer of Codex, the user who prompted the model, or the AI system itself be recognized as the owner? Current intellectual property frameworks in most jurisdictions fail to provide definitive answers to such questions. The absence of clarity raises concerns about ownership disputes, especially as AI-generated content becomes a significant driver of innovation.

Case Studies

The issue of authorship and ownership in the case of non-human creators is not new. However, with the advent of AI-generated content, the question has once again resurfaced. Some legal precedents set in related contexts can throw light on how courts might decide such issues:

- *Naruto v Slater [2018]*[6]*:* The United States Court of Appeals for the Ninth Circuit ruled that a monkey could not have copyright ownership in a photograph taken by it with a human's camera. Copyright law requires human authorship, the court explained. This has been extended to AI-generated works in jurisdictions that require human creativity to obtain copyright protection.

- *Thaler v Comptroller-General of Patents, Designs and Trade Marks [2021]:* The case came from the UK where an application was made regarding a patent, which sought to be filed by an AI system named DABUS for being declared the inventor. The court rejected the application, which reiterated that, under the present patent laws, only natural persons were deemed inventors. This case deals with patents but brings in the bigger picture about what is involved with the present role of AI and how it will influence the intellectual property system.

- *United States Copyright Office Rulings:*

- *Re Kashtanova (Théâtre d'Esprit LLC v US Copyright Office) [2023]:* In this case, Kristina Kashtanova attempted to register a copyright for the graphic novel Zarya of the Dawn, which featured images generated using the AI model MidJourney. The Copyright Office granted copyright protection only for the text and the specific arrangement of the work authored by Kashtanova, explicitly excluding the AI-generated images. The ruling reinforced the requirement of human creativity and authorship under the US Copyright Act (17 USC §102).

- *Thaler v Perlmutter [2023]*[7]*:* Dr. Stephen Thaler, a vocal proponent of AI intellectual property rights, filed an application to register a copyright for an artwork titled "A Recent Entrance to Paradise," created entirely by his AI system, Creativity Machine.

[6] No. 16-15469 (9th Cir. 2018)
[7] 687 F. Supp. 3d 140 (D.D.C. 2023)

The Copyright Office rejected the application, citing that copyright law requires human authorship. Thaler subsequently challenged the decision in federal court, but the court upheld the denial, emphasizing that the Copyright Act provides protection only for works created by human beings.

These cases, in aggregate, show that courts and administrative bodies are not willing to extend intellectual property rights to non-human entities or their creations, leaving developers and users to deal with unclear ownership frameworks.

Emerging Licensing Models

As the legal landscape of AI-generated content evolves, new licensing models have emerged that address ownership and usage rights. These frameworks seek to balance the interests of AI developers, users, and other stakeholders.

- **AI-Specific Creative Commons Licenses:**

  - Another possible direction might be the development of AI-specific licenses, adapted from Creative Commons licenses. Such licenses will indicate who "owns" the content and precisely within what conditions the rights may be used. These could include an assignment of rights of ownership to the developer and to the user or, for instance, full free use, but requiring payment of royalties for commercial exploitation.

  - This approach also provides much-needed clarity and can be used with flexibility for AI-generated content use without even the threat of a lawsuit.

- **Revenue-Sharing Models:**

  - Revenue-sharing contracts are becoming a common viable answer to the problem of ownership. Here, the revenue from AI-generated content will be distributed from those AI-created content according to the percentages from each contributor.

  - Some examples: Developers would get a standard percentage for providing the core technology.

  - The share for users who give prompts or training data may depend on the degree of

input or customization.

- Such models fall into the category of precedents like the *Google v Oracle America Inc. [2021]*[8]case in which the court admitted the fair use as a transformative activity of software development and appears to imply that new business models might have an important role in solving complicated issues in the domain of IP.

- **Hybrid Licensing Arrangements:**

- Hybrid agreements combine traditional IP licensing with collaborative arrangements specifically designed for the context of AI.

- For instance: Licensing terms may assign ownership of the core technology to the developers while offering derivative works to the users.

- Arbitration clauses may be included in agreements to resolve disputes outside of drawn-out litigation.

- **Public Domain Assignments:**

- Another potential model is the one that assigns works produced by AI machines to the public domain in scenarios where authorship cannot easily be attributed. Since this encourages innovation and access, it may discourage commercial investment in AI systems to the extent that there are no copyrights to own.

Chapter 4

AI in IP Enforcement: Revolutionizing and Redefining Creativity

Artificial Intelligence Tools in IP Enforcement

Artificial intelligence is transforming the intellectual property enforcement process, bringing in the benefits of automation, efficiency, and accuracy to a process that has traditionally been manual and error-prone. Through AI tools, mechanisms become dynamic and scalable for the increasing exponential digital content and global markets. AI-driven enforcement, however,

[8] 141 S. Ct. 1163 (2021)

involves legal, ethical, and procedural issues that demand significant adaptations to the current IP frameworks.

Copyright Enforcement

Some of the greatest strides in AI for copyright enforcement are seen in tools usage, such as Content ID, used by YouTube, which scans everything uploaded for copyright infringement. Content ID makes use of a mega database of copyrighted audio and video materials, and matches uploads with that to automatically claim, monetize, or remove infringing materials. This proactive approach has reduced unauthorized use, but it raised issues with overreach, false positives, and limited opportunities for users to contest decisions.

Thus, for example, in *Capitol Records, LLC v Vimeo, LLC [2013]*[9], the court held that a video-sharing platform should also act reasonably to prevent copyright infringement. This case demonstrated how advanced technologies like AI can be used to identify and manage violations effectively. However, the lack of human oversight in automated systems is still controversial, especially when transformative uses or parody works are flagged wrongly, which could stifle creativity.

Trademark Monitoring

Corsearch and TrademarkNow are AI-based platforms that have revolutionized trademark enforcement through computer-based algorithms to monitor trademark use in global markets. These tools analyse data on logos, product names, slogans, and domain names across various jurisdictions to give IP owners real-time insights.

Large retail chains, such as Nike and Apple, use AI technologies to combat counterfeiters on e-commerce websites. *United States v. Trawick [2023]*[10] is the increasing relevance of monitoring tools wherein the court approved the imposition of penalties on the sale of branded products through counterfeit activities. AI tools hasten the detection and removal of counterfeit merchandise, thereby making enforcement action more prompt.

[9] 826 F.3d 78 (2d Cir. 2016)
[10] No. 22-2703 (8th Cir. Oct. 6, 2023)

Despite these successes, however, AI systems often fail to distinguish between legitimate uses, such as comparative advertising or artistic expression, and genuine infringements, thereby raising concerns of overreach and misuse.

Challenges in Applying AI for IP Enforcement

While AI-based enforcement is pretty promising, it carries challenges that would need to be overcome:

- **False Positives and Fair Use:**

  Automated systems are unable to accommodate subtle exceptions like fair use, parody, or transformative works. For example, in *Campbell v Acuff-Rose Music, Inc. [1994]*[11], the US Supreme Court resolved that transformative uses could arguably qualify as fair use even if commercially exploited. AI tools, however might flag such uses as infringement without context.

- **Transparency and Accountability:**

  Most of the AI algorithms employed for IP enforcement are proprietary and, hence, not transparent. This is why the CJEU recognized accountability in the automated decision making process as the central principle of its ruling in *Google Spain SL v Agencia Española de Protección de Datos (AEPD) [2014]*[12], and IP enforcement must necessarily apply to that. Algorithmic lack of transparency means that the creators lack due process by which they can dispute such enforcement decisions.

- **Cross-cultural or International Differences:**

  In principle, numerous countries have taken on different policies to AI enforcement involving technologies. Infrastructure and frameworks are lacking to actually implement systems built on AI amongst less developing states. On lack of any internationally agreed measure cross-border infringements also failed.

[11] 510 U.S. 569 (1994)
[12] C-131/12

Impact on Creativity Originality, or Fair Use

AI challenges traditional notions of creativity and originality by enabling machines to generate works without human input. For example, AI-generated art, such as the 2018 Portrait of Edmond de Belamy, auctioned at Christie's, raised questions about authorship and copyright ownership.

Fair use doctrines, a cornerstone of copyright law, require re-evaluation in light of AI's transformative capabilities. In *Authors Guild v Google, Inc. [2015]*[13], the court found that scanning books for a searchable database was a fair use because it added new value and meaning to the work. Courts will have to decide whether AI-generated works that remix or critique existing content qualify under the principles of fair use and perhaps an extension of those doctrines.

Proposed Legal Reforms to Address Enforcement Challenges

- **Algorithmic Transparency:**

  Transparency in AI enforcement algorithms is important to ensure fairness and accountability. Courts and regulatory bodies should demand disclosure of the criteria and decision-making processes used by AI systems, allowing creators to contest enforcement actions effectively. For instance, principles of the General Data Protection Regulation (GDPR) on automated decision-making can be a model for IP enforcement reforms.

- **Global Standards for Enforcement:**

  International standards for AI-based IP enforcement must be developed to fill the jurisdictional gap. Organizations like WIPO should take the lead in developing harmonized standards that will ensure fair and consistent enforcement across borders.

- **Expansion of Fair Use:**

  Fair use doctrines must evolve to accommodate AI-generated content. This includes

[13] No. 13-4829-cv (2d Cir. Oct. 16, 2015)

revising legal frameworks to address transformative uses by AI systems, ensuring that legitimate remixes and critiques are not inadvertently penalized. The principles established in *Sony Corp of America v Universal City Studios, Inc. [1984]*[14], which recognized the balance between innovation and copyright protection, remain relevant in guiding such reforms.

Chapter 5

Conclusion and the Way Forward

Key Findings

The study underlines the significant impact of AI on IP laws, enforcement mechanisms, and licensing models. The findings underscore the pressing need for legal frameworks to adapt to the changes in AI technology to address the challenges and opportunities presented by these innovations.

- **Global Disparities:**

  Jurisdictional variations in recognizing and protecting AI-created works are substantial hurdles for inventors and creatives. Most countries have created some level of protection for works created by artificial intelligence, though others deny its existence, further fragmenting this legal framework. The inconsistency leaves cross-border innovation in limbo, deters investment in the AI-driven sector, and breeds uncertainty among creatives relying on global protection for their intellectual properties.

- **Obstacles to Conventional Notions:**

  AI is changing the traditional understanding of fundamental IP principles such as creativity, originality, and fair use. Traditional IP law assumes that creativity originates from human effort and intellect. The AI systems, however, capable of generating complex works—be it artistic, literary, or functional—seem to blur the line between human and machine creativity. This question arises: whether AI-generated works can

[14] 464 U.S. 417 (1984)

be "original" and how courts are to assess the applicability of fair use in such contexts.

- **Licensing and Ownership:**

  Current licensing structures are challenged by the specific question of AI-made works regarding disputes on ownership and revenue sharing. For instance, there is no general principle as to who owns the rights to an AI-made work, whether it is the developer of the AI, the user who inputs the work, or both. If not modernized, the disputes will soar, likely hampering the innovation and commercial exploitation of AI-driven creativity.

- **AI in Enforcement:**

  AI tools are proving very valuable in the enforcement of IPs, such as copyright or trademark infringement detection, automatic takedown notices, and counterfeit product identification. However, there are also inherent risks to such tools: algorithmic biases and overreach that may limit the legitimate uses of content without proper intent. Transparency in AI enforcement tool deployment and regulatory oversight will be essential for fairness and accountability.

Recommendations

To overcome these challenges and fully exploit the opportunities offered by AI, the following actions are proposed:

- **Harmonization of IP Laws around the World:**

  The international frameworks of TRIPS Agreement and WIPO treaties must be revisited and modified so that it would specifically account for AI-generated work. The invention and ownership definitions would be homogenized throughout regions. It will thus alleviate the confusion arising from varying regional legal structures, thus motivating innovations. A prototype could be adopted by other regions using the EU AI Act as an example.

- **Evolving Norms on Fair Use:**

  National legislatures and courts should reconsider the fair use doctrine to adapt to the

transformative capacity of AI-generated works. For example, AI-generated works can be deemed transformative if they add value or provide new meanings, even if the input was taken from existing materials. Courts should be flexible and adapt to the changing nature of creativity in the AI age.

- **AI-Specific Licensing Models Development:**

  Such disputes over ownership and revenue-sharing should be resolved with innovative licensing frameworks tailored to AI-generated works. Some models that could be used include:

  - Revenue-sharing agreements between AI developers, users, and stakeholders to share benefits equitably.
  - AI-specific Creative Commons licenses that promote open innovation while respecting the rights of contributors.
  - Mechanisms to ensure transparency in licensing terms, especially when human creators collaborate with AI systems.

- **International Collaboration on Enforcement Standards:**

  Cooperation by governments, international organizations, and private stakeholders would be needed for standardizing mechanisms that would ensure IP rights in an AI world. It should be developed on the base of AI tools but still needs to be transparent, include a due process mechanism, and allow for human oversight. For instance, a centralized database of international works generated through AI would ensure enforceability with decreased conflict between jurisdictions.

Future Prospects

The combination of AI with IP law has opened avenues for reinventing and redesigning the conventional legal framework. Though such obstacles as jurisdiction fragmentation and ethical issues are quite powerful, risks in the adoption of AI-driven innovation are very minor in comparison with the advantages. Technological, legal, and ethical integration will drive the future ahead.

- **Promotion of Innovation:**

  The adaptive IP frameworks will encourage responsible development and deployment of AI technologies. This is because the law can make an environment that is friendly to experimentation and innovation by providing clarity and certainty to creators and stakeholders.

- **Protecting Human Creators:**

  Notwithstanding the increasing role of AI in the creative process, it is important to protect the contribution by human creators. Policies must ensure human ingenuity remains at the core of the creative economy while appropriately recognizing the supportive role of AI as an instrument of innovation.

- **Fair Just Treatment of Stakeholders:**

  It is, therefore, important that AI reshapes industries in a way that is fair to all the stakeholders, be it the developer, user, or consumer. This calls for not only a fair distribution of rights and revenues but also the mechanisms that will prevent the monopolization of AI-driven creativity by a few select entities.

- **Equilibrium between Technology and Ethics:**

  The future of IP law is thus bound between promoting technological advances and maintaining considerations for ethics, which may relate to the avoidance of algorithmic bias, fostering inclusivity, and facilitating cooperation among the globe to find shared solutions for issues AI may impose.

The future of intellectual property will determine its harmonization and conciliation in a world in which legal principles would be met by the realism of AI-generated creativity. Through the collaborative forward-looking approach of harmony, such innovation ecosystems become sustainable and balanced among all stake holders.

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