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**NAVIGATING THE INTERSECTION: A CRITICAL STUDY ON
INTELLECTUAL PROPERTY IMPLICATIONS IN THE REALM OF
ARTIFICIAL INTELLIGENCE**

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INTRODUCTION

Artificial intelligence implies to intelligence prevailing in other things apart from humans. A science focusing on creating machines that behave and perform human like activities. It is a concept that makes and programs intelligent machines. Even before digital computer, scientists believed that computers can perform extremely well and be exhibit human behavior. As soon as computers came to existence there were plans to program them in way that one day they can surpass humans and perform all the possible and impossible tasks known to mankind. Computers started solving numerical, understanding English, playing games and taking commands.

The idea of Artificial Intelligence can be traced back from the time of the Greeks. Hephaestus was a great craftsman and in Book 18, there are two distinct passages where he is described as the creator of robot-like machines.² In the first paragraph, the idea of automatic waiters can be traced, *“Three legged tables he was constructing, twenty in all, to stand round the wall of his well-built hall. To these he had fitted wheels wrought of gold, so that they could run by themselves to the banquet of the gods, at his wish, and back home, leaving everyone staggered.”*

In the second he introduces a girl assistant made of gold, *“Handmaidens, fashioned of gold, gave ready support to their master. Looking like genuine girls they proved their understanding by their intelligent speech, their proficient and skillful performance.”*

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² Karl R. Popper and John C. Eccles, “The Self and its Brain” 29 (3) *British Journal for the Philosophy of Science* 265-273 (1986).

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Talos was also one of the bronze men of Hephaestus who guarded and defended Crete, and Daedalus and Arthenian architect making artificial wings to escape, was said to have created artificial people. *Antikythera mechanism* was the most surprising revelation from the Greeks that represented ancient clock computers. The arab astrologers were attributed with a thinking machine called Zairja. Is homunculus remembered? He was a little man invented by Paracelsus. He also wrote, “*we shall be gods. We shall duplicate Gods greatest miracle—the creation of man*”.³

Rabbi Juddah Ben Loew’s invention brought a warning to the growing greed of the golem builders because he builds a living clay man, Joseph Golem, which with time grew aggressive and had to be dismantled. The mortal’s human should not be dabbed in the special province of God; the creation of intelligent beings and thus bringing a temporary and brief halt to the attempts of making thinking beings and thinking machines. Much before the time of Homes, such ideas can be well traced in the history of the Hindus as well. Several machines have been given reference to in the Samarangana- Sutradhara of Bhoja. In the same text⁴ there is a mention about the wooden robots and the heavenly bodies in motion.

Harvey discovered the circulation of the sap in heavenly bodies in the 17th century but much before that the discussion has been found in the Vaisesika- Sutras of Kanada. The Mahabharatta discussed about the intelligence in plants. Dr. J. C. Bose conducted a well-known⁵ experiment on these lines. The Panachtantra⁶ gives evidence about the intelligent speeches given by birds and animals.

The Chinese too had similar achievements, one being the astronomical clock made by SuSu in 1088 A.D.⁷these mentions clearly give a view that artificial intelligence is anything outside human intelligence and the concept is not new.

Ever since the first computers came to existence, the scientists have been trying to make them think. Today computers can forecast weather conditions and even keep an eye on the movements of planets and stars in the galaxies. Extracting results for these gigantic events

³Pamela McCordock, *Machines who Think* (Freeman, New York, 1979).

⁴P. Ray and S.N. Sen (eds.), *The Cultural heritage Of India*, 6, 59 (The Rakrishna Mission Institute of Culture, Calcutta, 1986).

⁵Peter Tompkins and Christopher Bari, *The Secret Life of Plants* 81-96 (Penguin, USA, 1974).

⁶Aurthur W. Ryder & PanchTantra, *In the Wake of Theory* (Jaico publishing House, Bombay, 1992).

⁷Richard L. Gregory, *Odd Perceptions* 67 (Routledge Kegan & Paul, 1981).

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involve volume computational work, which puts tremendous pressure on human mind. A human mind has certain limits and cannot be pushed beyond that and hence as we know necessity is the mother of invention so came the artificial intelligence to cope up with this issue. Systems were developed that possessed certain kind of intelligence similar to that of human brain. It deals with the basic understanding of artificial intelligence and some of its most important aspects, such as expert System Natural language possessing, Neural networks and Robotics.

Now-a-days manufacturers and service providers are more focused towards automation in every field to meet consumer satisfaction. Consumers on the other hand are enjoying automation in each work. From being involved in a car manufacturing industry to serving guests in a hotel.

Artificial intelligence is basically a computer science focused towards making machines behaving intelligently. For Artificial Intelligence there is no general and concise acceptable definition available understanding artificial intelligence is difficult task official internet intelligence have to sustain a claim that it is fine generally acceptable destination shall be needed. On one point we can say that the future of humanity is brighter with the advances been done in artificial intelligence whereas on the other point with the advances in artificial intelligence the humanness in the society is Fastly becoming extent. Artificial intelligence has enormous degree of the humanizing effects contrary to the expectations of some early research in this field. By creating such types of machines, the unknown areas of brain can also be unlocked through which various philosophical solutions can be found.

Three distinct approaches were discovered by Masoud Yazdani. First one is that AI is about moving computers into the space above, second stimulating human behaviour and cognitive process on a computer and third the pace of study of nature of the intelligent minds.

The definition of Marvin Minsky is one of the widely accepted definitions, "AI is the science of making machines do things that would require intelligence done by men."⁸ But as per this definition it is difficult for AI to make a grade in science keeping it rather a piece of

⁸Masoud Yazdani (ed.), *Artificial intelligence: Principles and Applications 3* (Chapman and Hall, London, 1986).

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technology. Margaret A Boden said that AI is the study of computer programs.⁹ Though she advocates AI is not the only study of computations¹⁰ but the study of intelligence in thoughts and actions.¹¹ Such tools help to study about the thinking procedure and epistemological structure employed by the intelligent creatures. Some people also define it as an engineering discipline.¹²

AI is basically making computers do something's at which human currently have better holds. AI is yet developing and aims to reach to a level of intelligence exhibited by humans. AI is defined by Barr and Feigenbaum as "the part of computer science concerned with designing the intelligent computer system, that is, system that exhibit the characteristic we associate with intelligence in human behaviour."¹³

Humans can easily outperform computers in activities involving intelligence and thus making computers as intelligent as human beings is the basis of the definition.

Patrick Winston defines intelligence, "defining intelligence takes a semester-long time, and even after that I am not sure, we ever get a definition nailed down."¹⁴ Hence there is no common and generally accepted definition of intelligence, but it has some characteristics associated with it like memory, pattern recognition, goal seeking behaviour, problem solving ability, etc.

Douglas Hofstadter gave some essential abilities for intelligence: -

1. To flexibly respond to stimulus.
2. Interpret contradictory or ambiguous message.
3. Recognizing different elements in a situation.
4. Finding similarities in situations that may otherwise show differences.

⁹M.L. Minsky (ed.), *The Sematic Information and Processing* 5 (MIT Press, 1986).

¹⁰P J Hayes, "Some Comments on Sir James Lighthill's Report on Artificial Intelligence" 14 *AISB Study Group European Newsletter* 40 (July, 1973).

¹¹Richard L. Gregory (ed.), *The Oxford Companion to The Mind* 48(Oxford University Press, 1987).

¹²N.J. Nilson, *Problem Solving Methods in Artificial Intelligence* 7(Mc Graw-Hill, New York, 1971).

¹³Avon Bar & Edward A. Feigenbaum, *The Handbook of artificial intelligence* 3(William Kaufman, Los Altos, CA, 1982).

¹⁴Patrick H. Winston & Karen A. Prendergast (eds.), *The AI Business* 9 (MIT Press, Cambridge, 1984).

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5. Drawing distinctions between situations that may otherwise link them.

Alan Granham said, “AI is an approach to understanding behavior based on the assumption that intelligence can be best analyzed by trying to reproduce it.”¹⁵ AI should neither try to imitate or replace humans. In nutshell we can say that there is no universally accepted definition for AI.

In the present time, AI is an increasingly driven important technology and business. It has an impact on almost every creation and is being employed all across the world in every field now. The fuel to the growth of AI is the advancement in technology and affordable high computing power along with large amount of training data.

In recent times, the development of new neural networks techniques and hardware have perceived the synonym of AI for, “deep supervised machine learning.”

WIPO is continuing and continuing to develop its own management services and tools using AI technologies, creating best-in-class applications of AI for the international IP system. WIPO Translate and WIPO brand image search, uses AI based applications for automated and translation of image recognition, being two examples of AI technologies.

Use of AI technology: -

- Automatic classifications of patents and goods/services for trademark applications
- Search of patent prior art and figurative elements of trademark.
- Examination and formalities check.
- Helpdesk services
- Machine translation.

All around the world several IP offices have deployed various AI applications. The Advanced Technology Applications Centre (ATAC) leads WIPO’s research on enhancing functions and processes at the organization.

¹⁵Alan Garnham, *Artificial Intelligence 73* (Routledge and Kegan Paul, London, 1987).

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CONCEPT OF ARTIFICIAL INTELLIGENCE

An artificial intelligence (AI) is a machine's ability to think, rather than an animal's ability to think. Intelligent agents are defined as any system capable of seeing its surroundings and taking actions that increase its chances of attaining its objectives in the field of artificial intelligence (AI).¹⁶

To define a machine's ability to perform cognitive tasks that was traditionally referred to as "artificial intelligence". It has now been rejected by leading experts in artificial intelligence (AI), who now define AI as a quality that may be expressed in many different ways, including rationality and rational action.

Google, YouTube, Amazon, and Netflix are just a few of the companies that employ AI in their products. A phenomenon known as the "AI effect" occurs as actions once deemed to require "intelligence" gradually fall outside the scope of AI as technology improves and capabilities increase. Even though OCR has become a commonplace technique, it is sometimes excluded from the definition of artificial intelligence.

The many sub-fields of artificial intelligence study are focused on specific objectives and the usage of certain methods. The ability to handle objects are some of the more conventional goals of artificial intelligence studies. One of the long-term aims of the area is to develop general intelligence (the capacity to solve any problem). Search and approaches based on statistics, probabilities, and economics have all been adopted and combined by AI researchers to overcome these issues. This includes a wide range of disciplines from computer science to psychology and linguistics to philosophy.

On the basis of this assumption, the field was formed. This sparked philosophical debates about the ethical repercussions of constructing artificial entities with human-like intellect; these concerns have been studied in myth, fiction, and philosophy since the beginning of time. Humanity may face an existential threat from AI if its logical capacities are not properly monitored by science fiction authors and futurologists.

It is believed that artificial intelligence (AI) will become a part of our daily lives in the not-too-distant future. It is thrilling to see how new AI technology will impact the creative arts,

¹⁶ Jelinek F., *Statistical Methods for Speech Recognition* 79 (MIT Press, Cambridge, MA, 1998).

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entertainment industry, and life-enhancing inventions. It's obvious, however, that policy must be adjusted to account for the social, economic, and ethical ramifications. WIPO's public consultation on technological innovation is a good development. 1 With the release of the WIPO Technology Trends report in 2019, the study began to gather evidence-based estimates for the future of AI. A Conversation on IP and AI was then organised by WIPO in September 2019 to formulate the questions policymakers need to ask. WIPO issued its concerns paper in December 2019 and invited feedback from a global audience as large as possible. Technology and intellectual property have always been intertwined and as a result legislation has had to evolve to keep up with the technological and cultural developments taking place. There are a number of problems that AI technology could raise about the IP system, from inventorship to authorship to ownership.¹⁷ Policymakers should pay close attention to the development of artificial intelligence (AI) technologies in order to safeguard the intellectual property regime's effectiveness and to lessen the negative social, economic, and ethical consequences. Issues 1, 3, and 5 deal with patents, whereas issues 6 and 7 deal with copyright and designs, and all are addressed in the WIPO draught issues document below (issue 11). For each field of IP, there are distinct difficulties and ramifications that need to be addressed by policymakers when dealing with AI. 1 'WIPO has begun a public consultation on artificial intelligence.

Across the globe, artificial intelligence (AI) is becoming more and more commonplace. This boom increases the issue of IP management in AI. As of yet, there has been no consensus on the topic matter. The debate over whether artificial intelligence-generated work should be given a higher rank in the creative community continues. Regulation of intellectual property rights (IPR) in the field of artificial intelligence has certain peculiarities. Concerns abound about patent and copyright ownership and infringement, as well as the fines that may be imposed as a result. With the rapid advancement of technology, even international agreements and conventions are no guarantee of legal certainty¹⁸.

In countries like the United States and the United Kingdom, efforts have been made to interpret existing legislation in a way that includes the AI element. Cases such as selfie-taking monkey and Infopaq, which established precedent for intellectual property rights (IPR) ownership in the United States and Europe, examined and reached conclusions on IPR

¹⁷*Id* at 12.

¹⁸*Id* at 14.

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ownership based on existing laws and terminology such as "authorship" and "intellectual creation. However, in light of the rapid use of AI in significant applications, it is essential that appropriate legislation be put in place. This could also refer to a major overhaul of the Trade Agreement on Intellectual Property (TRIPS).¹⁹

AlphaGo and Zero are just two examples of how technology has progressed in recent years. The capabilities of artificial intelligence have enabled these unexpected discoveries (AI). John McCarthy first used the term "artificial intelligence" at a conference in 1956. A computer's ability to make decisions on its own using algorithms and commands was referred to as autonomous decision-making. Early philosophers envisioned a day when machines will be unable to think for themselves.²⁰

These ideas gained traction with the advent of computers, and now there are genuine machines and robots capable of learning from humans. Artificial intelligence (AI) was a sensation when it first appeared, and it has since become one of the most promising aspects of technology. When it comes to machine learning, the process involves analysing data, recognising patterns of user preference, and then applying it to achieve the best possible outcome in the market. As a result of the increasing need to manipulate and organise massive amounts of data, artificial intelligence is becoming increasingly important.

It enhances the use of current applications to their fullest potential. For example, Siri was adapted to the latest generation of Apple products in order to improve its quality and efficiency. Cleaning robots like the Roomba 980, Google's AI-powered predictions in Google Maps, planes with Autopilot, ridesharing apps, and so on are all instances of how AI is used on a daily basis.

A new set of problems and difficulties have arisen since machine and deep learning have altered technology in such a dramatic way. As stated in a draught, artificial intelligence (AI)

¹⁹Castets Renard C, "The intersection between AI and IP: Conflict or Complementarity?" 51 *IIC-International Review of Intellectual Property and Competition* 141-143 (2020).

²⁰Araujo L., "How evolutionary algorithms are applied to statistical natural language processing" 28(4) *Artificial Intelligence Review* 275-303 (2007).

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will affect every facet of society in the near future. The intersection between AI and Intellectual Property Rights (IPR) presents a number of legal and methodological questions.²¹

APPLICATIONS OF AI

In recent years, artificial intelligence (AI) has found applications in a wide range of industries. As a starting point, here are nine of the best.

- **AI in healthcare:**The most money is being placed on two things: better patient outcomes and lower expenses. Machine learning is being used by businesses to improve and speed up diagnostics over human beings. Data from patients and other sources is mined to build a hypothesis, which is then presented with a confidence grading schema. Making appointment times and understanding their bills are some applications of AI that are worth mentioning here.²²
- **AI in business:**The focus is mostly on improving patient outcomes while also reducing costs. Businesses are turning to machine learning to speed up and improve diagnoses, compared to human beings. Healthcare technology IBM Watson is a well-known brand. As a result, it is able to converse with and understand human beings. A hypothesis is built from data gathered from patients and other sources, which is then presented with a confidence rating system in mind. There are a number of uses for artificial intelligence (AI) that are worth considering in this context. One such example is COVID-19, a pandemic that has been foreseen, combated, and comprehended using a variety of AI technology.
- **AI in education:** As an additional resource, AI tutors can help students stay on track with their academics. Students' learning environments and methods could be altered, and certain teachers could be replaced.
- **AI in finance:**Personal finance apps like Intuit Mint and TurboTax are being disrupted by AI. In addition to providing financial advice, some apps collect personal information from their users. IBM Watson, for example, has been used in the home-buying process. Today, Wall Street's trading is largely handled by artificial intelligence software.

²¹Arbesu D., "Computers may be able to translate language, but will they convey its meaning" *PBS. Org* (March 28, 2016) available at: <https://www.pbs.org/wgbh/nova/next/tech/computers-may-beable-to-translate-language-but-will-they-convey-its-meaning/> (last visited on April 28, 2022).

²²Libunao J., "Artificial brains learns to use human language" *Futurism* (2015) available at: <https://futurism.com/artificial-brain-learns-to-use-humanlanguage-3/> (last visited on May 14, 2022).

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- **AI in law:**Sifting through papers is a laborious and time-consuming part of the legal discovery process. Automating the legal industry's time-consuming processes with the help of artificial intelligence is saving time and enhancing customer service. Machine learning, computer vision, and natural language processing are all being used by law firms to classify and extract data from documents and interpret information requests.
- **AI in manufacturing:**Robots have been widely adopted in the manufacturing industry, which was an early adopter of the technology. For instance, industrial robots that were once trained to execute a specific task and kept apart from human workers. Cobots are becoming increasingly common²³.
- **AI in banking:**Chatbots are being used effectively by financial institutions to educate their consumers about the products and services they provide, as well as to manage transactions that don't need human participation. Compliance with banking laws is being helped along by artificial intelligence virtual assistants, which are also helping to decrease costs associated with the process. Additionally, financial institutions are implementing AI to enhance their decision-making processes for loans, as well as to establish credit limits and locate investment opportunities.²⁴

ARTIFICIAL INTELIGENCE AND INTELLECTUAL PROPERTY

The intangible products of the human brain are under the umbrella of intellectual property (IP), which is a type of property category. There are a wide variety of forms of intellectual property, some of which are recognised in more nations than others. During the 17th and 18th centuries, England was the birthplace of the modern notion of intellectual property. Although the concept of "intellectual property" has been there since the 19th century, it wasn't until the late 20th century that the bulk of the legal systems around the world began to recognise its significance.²⁵

²³Mathur A., "A Reflection upon the Digital Copyright Laws in India" 25 *Journal of Intellectual Property Rights* 5-14 (2020).

²⁴Luger G., *Artificial Intelligence: Structures and Strategies for Complex Problem Solving* 4-6 (6thedn., Pearson, 2002).

²⁵*Id* at 34.

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In order to accomplish this goal, the law confers property rights on individuals and companies for the information and creative goods that they produce, although these rights are typically only valid for a predetermined amount of time. The quantity of protection afforded to innovators is directly related to the amount of progress made in technological advancement.²⁶

When opposed to traditional forms of property, such as land or things, intellectual property offers a number of challenges due to the fact that it is intangible. In contrast to other types of property, intellectual property is referred to as being "indivisible." This is due to the fact that a limitless number of people are able to "consume" an intellectual product without resulting in the good's depletion. In addition, investments in intellectual products are plagued by issues of appropriation. While landowners can secure their property by erecting a sturdy fence around it and employing armed guards, creators of information or works of literature typically have very little power to prevent the original purchaser from copying their work and reselling it at a cheaper price. The fundamental focus of contemporary intellectual property law is on striking a balance between the strength of legal rights, which should be sufficient to inspire the production of intellectual goods but should not be so powerful as to preclude widespread use of those goods.

UNDERSTANDING INTELLECTUAL PROPERTY

Because of the substantial value that intellectual property has in today's increasingly knowledge-based economy, businesses work very hard to locate and safeguard their holdings of it. In addition, the production of intellectual property of value demands significant inputs of both mental capacity and the time of skilled labour. This translates into substantial expenditures made by companies and individuals, which should not be accessible by others with no rights whatsoever.

Any corporation has a significant obligation to maximise the value that can be derived from its intellectual property while simultaneously prohibiting others from doing the same. There are a variety of manifestations that intellectual property can take. Intellectual property is

²⁶Jyh-An Lee, Reto Hilty, et.al., *Artificial Intelligence and Intellectual Property* (OUP Oxford, 2021).

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considered the businesses that hold the property use extreme caution in guarding and defending it from unauthorised use.²⁷

➤ Patents

Property rights are granted to original inventions by the U.S. Patent and Trademark Office, which covers everything from methods to machines. Inventions are protected by patent law, which grants one or more inventors exclusive rights to their creations. Patents, such as the one for the first computer, the three patent kinds are:²⁸

- **Design patents:** The preservation of a device's or invention's visual appeal. For example, Coca-bottle Cola's form, emojis, or any other distinctive visual characteristics can be protected by ornamental design patents.
- **Plant patents:** Plant variety protection measures. Plant patents have been used to develop pest-free varieties of fruit trees. It is also possible that innovators might like a design patent for a tree that has unique visual characteristics.
- **Utility patents:** For a useful and functional product that needs protection. An IP example is a software application or a pharmaceutical product. This was the earliest field of patent law and it is still the most important.

➤ Trademarks

Protecting trademarks is an important part of a company's strategy for distinguishing its products and services from the competition. The Twitter logo, McDonald's golden arches, and Dunkin's font are trademark examples. Trademarks, on the other hand, can protect a wide range of products. A law known as the Trademark Act of 1946, known as the Lanham Act, is responsible for trademark law.

Authors are immediately entitled to copyrights when they create original works of authorship (OWA). A head start in the legal system can be gained by registering with the United States's Copyright Office.

²⁷J.P. Mishra, *An Introduction to Intellectual Property Rights* (Central Law Publications, 2012).

²⁸VK Ahuja, *Law Relating to Intellectual Property Rights* (3rdedn., Lexis Nexis, 2017).

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To qualify as a trade secret, a company must aggressively protect its own private knowledge. Once the information is made public, it is no longer protected by trade secret laws. Assets can be tangible and intangible, and trade secrets include knowledge that's both tangible and intangible, according to Section 1839(3) of the US Code.

- Business \s
- Financial \s
- Technical \s
- Economic \s
- Scientific \s

INTELLECTUAL PROPERTY INFRINGEMENT

Those who do not have permission to exploit intellectual property's associated rights, referred to as Intellectual Property Rights (IPR), are prohibited from violating those rights. Using intellectual property rights (IPRs), creators are able to prevent others from copying or exploiting their work.²⁹

It is illegal for someone else to use a legally-protected patent without permission. Before June 8, 1995, patents were valid for 17 years, however after this date, they were valid for 20 years. The specifics of the patent are made public after the patent's expiration date.

When a work of art, music, or a literature is recreated in its entirety or in part by an unlicensed third party, a copyright violation has occurred. In order to be considered an infringement, the copied content does not have to be an exact copy of the original.³⁰

When an unlicensed party uses the trademark of a licensed trademark, or a similar trademark, without the permission of the trademark owner, trademark infringement occurs. Some competitors may utilize the same trademark as their opponent in an attempt to undermine their business and capture their clientele. Businesses in unrelated fields may also use

²⁹Dr. Paresh Kumar C. Dave, *Intellectual Property Rights Enforcement: State of Affairs Globally* (Notion Press, 2019).

³⁰P. Mohan Chandran, *Artificial Intelligence and Intellectual Property Rights Role, Impact, Contribution, Challenges, and Legal Implications of AI on IPR* (Gurucool Publishing, 2021).

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trademarks that are identical or similar in an attempt to profit from the strong brand images of other enterprises.

Non-disclosure agreements are frequently used to safeguard trade secrets (NDA). As soon as a trade secret is disclosed to an uninterested person, the agreement is broken, and the trade secret is infringed upon. Even if an NDA is present, it is possible to be found guilty of trade secret infringement.³¹

LIABILITY FOR INFRINGEMENT

In cases where an AI system violates a third party's intellectual property rights, one of the most contentious issues is determining who bears responsibility. Whether the programmer, the machine, or someone else will be held accountable.³² There is still a degree of uncertainty in this area. As long as the programmer had advance information that the machine would infringe on someone else's IP, he or she will be held responsible for any infringements that resulted from the machine's creation. However, if the programmer has no knowledge or purpose of infringing on intellectual property rights, and yet the AI machine or programme does so, it will be difficult to determine who bears responsibility. For this reason, there is still a void that must be addressed in order to establish the AI program's legal responsibility for its actions. If the infringement results in criminal accountability how can the AI are held liable for its own actions in such a case? Liability is a major worry, and it needs to be handled if we don't want to see a lot of arguments and uncertainty.³³

IMPACT OF ARTIFICIAL INTELLIGENCE ON IP POLICY

AI, which was once a sci-fi fantasy, is now a reality and has accelerated over the past several years, resulting in a slew of new discoveries in nearly every industry. Artificial intelligence will permeate every industry, and Intellectual Property Rights are no exception. There are two ways in which Artificial Intelligence will have an impact on intellectual property rights: on the one hand, it will help in the areas of patent and patent search tools, timely research on inventions, and providing a mechanism to sort inventions and ideas and provide the inventor

³¹*Ibid.*

³² Justice A K Sikri, *Artificial Intelligence and Law* (Law and Justice Publishing Company, 2022).

³³Lavika Goel, *Artificial Intelligence: Concepts and applications* (Wiley, 2021).

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with a mechanism on the patents already existing similar to his idea. On the other hand, it will also have an impact on the patents that are already out there and provide the inventor with a mechanism on those patents that are similar to his idea. AI's impact on intellectual property rights, the advantages and downsides of AI on creativity and innovation, and the future of AI in intellectual property rights are all covered in this study paper.³⁴

Artificial intelligence (referred to as AI in this paper) has grown rapidly in the last several years and is something that can perform simple jobs like conducting calculations to extremely complicated ones. Artificial Intelligence (AI) will be able to achieve anything a human can, and more, in the near future. In spite of this, there is still much confusion surrounding AI, which is why it has become one of the most hotly disputed topics in recent years. Although there is no single accepted definition of AI, the most basic notion is that it is about developing computers and software that can perform tasks that normally need human intelligence. Without a shadow of a doubt, artificial intelligence (AI) has had and will continue to have an impact on intellectual property (IP). However, on the other hand, it has the potential to constitute a danger to intellectual property. The influence of AI on intellectual property, including copyright, patents, and traditional knowledge, will be explored in depth in this article, as will the legal ramifications of infringement of an intellectual property claim.

It is believed that artificial intelligence (AI) will become a part of our daily lives in the not-too-distant future. The creative arts, entertainment sectors, and life-enhancing products can all benefit from new AI technologies. It's obvious, however, that policy must be adjusted to account for the social, economic, and ethical ramifications. WIPO's public consultation on technological innovation is a good development. 1 With the release of the WIPO Technology Trends report in 2019, the study began to gather evidence-based estimates for the future of AI. A Conversation on IP and AI was then organised by WIPO in September 2019 to bring and formulate the questions policymakers need to ask. WIPO issued its concerns paper in December 2019 and invited feedback from a global audience as large as possible. Technology and intellectual property have always been intertwined and as a result legislation has had to evolve to keep up with the technological and cultural developments taking place. There are a number of problems that AI technology could raise about the IP system, from inventorship to

³⁴*Id* at 43.

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authorship to ownership. Policymakers should pay close attention to the development of artificial intelligence (AI) technologies in order to safeguard the intellectual property regime's effectiveness and to lessen the negative social, economic, and ethical consequences. Issues 1, 3, and 5 deal with patents, whereas issues 6 and 7 deal with copyright and designs, and all are addressed in the WIPO draught issues document below (issue 11). For each field of IP, there are distinct difficulties and ramifications that need to be addressed by policymakers when dealing with AI.

The process of creating has undergone significant modifications as a result of the rapid advancement of AI technologies and the growth in their processing capability. With the advancement of artificial intelligence (AI) in sifting data, discovering progressed to the point where it can produce results with minimal input from a person. Patent protection would be available for human-created versions of these outputs. An important topic is whether an AI system may be defined as an inventor under present patent law. In our opinion, this question is unanswered. All aspects of the patent system are built on the concept of "the human inventor," including the rationale and fundamental ideas that underpin the system's patentability standards. The basic goal of patent law, then, is to reward and incentivize inventors' inventive endeavours, which is a utilitarian rationale. Inventing is an act of intellectual creation that is unique to the inventor - a mental act that takes place in his or her head. It is also important to note that a dividing line between patentable and non-patentable inventions is established on the basis of "human capabilities," which is why inventors are required to take an additional step of human inventiveness in order to obtain a patent. Because the focus is on 'human innovators,' there is limited room for 'non-human inventors,' who are not included in these discussions. A human inventor is the focal point in the study of issues pertaining to inventorship. Inventors' conceptions of their inventions are often used by courts to determine when an invention was created and by whom³⁵. A patent in the UK, for example, is principally. According to the court in *Yeda*, just adding to the claims does not suffice because the claims may contain non-patentable components drawn from the prior art. It is only when one can show that they have contributed to the "inventive thought" that they are regarded the inventor. When a person makes a significant contribution to solving a specific issue, the courts normally regard that individual to be an innovator or co-inventor. A

³⁵*Id* at 41.

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person who just provided a "unnecessary detail" to the invention must therefore be creative or clever in order to be considered an inventor. As a result, no one can claim credit for AI's invention in this case³⁶. When it comes to invention patentability and the success of an invention in solving a technical problem, 'AI activity may be instrumental or decisive. When it comes to invention, these technologies should be considered as an essential part of the process. We argue that the current patent law regime can accommodate AI-generated ideas by attributing inventorship to a person who cognitively dominated the innovative process, given that modern technology necessitates human engagement in the creation process of AI systems. No modifications to patent law are needed at this point in time if we consider that an AI system should be regarded as the inventor. As noted above, changes in the legal framework are likely to alter the reasoning and fundamental principles of the current patent system. It would be necessary to reevaluate the systems of output protection if technology progresses to the point where no human intervention is required (the so-called "strong AI").

FUTURE OF ARTIFICIAL INTELLIGENCE

The research and development on AI is still going on, and the functions that AI will be able to perform in the near future are beyond anyone's ability to imagine. At the moment, AI has been able to perform the tasks that involve human intelligence and the research and development on AI is still going on. However, when we are considering the advantages, we must not lose sight of the fact that, in the end, it is a machine and for a computer. There have been cases in which the machine has escaped the control of the programmer and begun carrying out duties of its own will. Now, these activities can either be productive or harmful; however, it becomes difficult to govern the AI machine or programme if it begins doing actions on its own and moves beyond the control of the programmer. Even though a lot of work has been done in the field of artificial intelligence, there are still a lot of questions that need to be answered. There is some reason to hope that these questions will be answered in the not too distant future, at which point we will have a clear roadmap indicating the extent to which AI can function in human lives and in inventions as well.

³⁶*Id* at 40.

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INVENTIONS BASED ON ARTIFICIAL INTELLIGENCE AND INTELLECTUAL PROPERTY RIGHTS

ARTIFICIAL INTELLIGENCE WORLD In computer science, artificial intelligence is a subfield (AAAI, 2003). Based on artificial neural networks, it's a computational model of the brain (Neural Network, Encyclopaedia Britannica). These mathematical procedures and a set of parameters produce an output that resembles human intellect. When it comes to artificial intelligence, "Deeply supervised machine learning" is the best way to define it. There is a good chance that (Allen, 2020) When it comes to machine learning, the computer doesn't need to be told exactly what to do in order to produce an answer. The system "learns" to spot patterns in data on its own, without any human intervention. The hardware or software, just like a human, makes judgments based on patterns. Remember the word "cognition" when you read this? (Jelinek, 1998). It is possible to process, process and analyse vast amounts of unstructured data by allowing the machine to learn cognitively in this manner. Books, journals, metadata, analogue data, and text in emails, audio files, video files, webpages, health records, and biomedical documents are examples of unstructured data. (Pearl, 2000 & Sowa, 2000). The linguistic, aural, and visual aspects of human communication are all included in this unstructured data. Unstructured data is labelled using these formats via machine learning. AI-based tutors in education can provide pupils with individualised instruction and support. Students benefit from a setting that is specifically tailored to meet their needs. There are endless uses for AI in healthcare. For example, it is employed.³⁷

in the management of hospitals, the diagnosis of disease (Arbesu, 2016), the monitoring of patients, the outcomes of patients, the optimization of health care processes and clinical decision-making, the augmentation of clinical workflows, and the optimization of hospitals (Luger, 2002). With AI, researchers can discover patterns they never realised existed. New compounds to treat disease can be developed by them. Any task that can be completed by a computer without the involvement of a human being can be referred to as "artificial intelligence." It is also possible to use the word "machine" instead of "computer." Speak recognition, sentiment analysis, facial detection and risk assessment are all examples of cognitive computing (Libunao, 2015), as are natural language interaction and enhanced

³⁷ Randi L. Karpinia, "Intellectual Property rights of Artificial Intelligence Inventors" *AIPLA* available at: aipla.org (last visited on June 02, 2022).

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intelligence (Araoujo, 2007). Supply chain monitoring and real-time alerts in manufacturing can be provided by AI in industry. Many data sources, both internal and external, can be protected. Customer-specific dashboards can be built using all of this data. AI-driven automated cars can make up for human error (Siegwart, 2004). AI and the internet of things can be used to construct smart cities where air pollution is eliminated, and traffic is better controlled (Li, 2018).³⁸

CHALLENGES FACED BY AI IN THE IP SECTOR

Patent, copyright, and trademark issues raised by AI-related inventions led to a slew of creative solutions to the IP sector's dilemma. It didn't work out because AI couldn't handle large volumes of data and couldn't be verified by the people who were supposed to be trusted. AI poses a lot of difficulties about ownership and contractual issues because of its technical nature. This is something we'll get into more depth about later on.

- **Issues in contracts:** In the past, artificial intelligence (AI) relied on custom hardware systems to mimic the brain's exact capabilities, but because to the advent of software graphic units, CPUs have seen a significant increase in usage. As a result, IP-related concerns arose outside of the realm of software that was used. Commercial agreements are put to the test when there is no provision in the contract addressing current software developments, such as ownership and licence difficulties. New IP development software or indemnity for third-party authorisation must be included in all agreements.
- **Collaborative model:** Third-party organisations often require relevant training data to establish themselves in the market or get relevant rights over a product. This is a problem for many AI developers IP rights ensure that the ownership and licencing of advanced solutions will be of paramount importance, and it will refrain the third party from being involved.³⁹

³⁸ Faruk Yamankaradeniz, "Artificial Intelligence and Intellectual Property Rights" *Mondaq*(2021) available at: [mondaq.com](https://www.mondaq.com) (last visited on May 29, 2022).

³⁹ *Idat* 59.

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- **Customer data:** Data from these training databases can be used with the seller's software so that it can be customised for specific customer business needs. Existence of an incursion into the customer's current software given by the seller's security system raises questions about ownership and copyright. If the clients desire to resell the software to another service provider, a contractual issue will arise. If the software is protected by intellectual property rights, it will not be a problem, but if not, it will be difficult for vendors to safeguard their AI discoveries. As time passes, protecting AI software inventions becomes increasingly challenging. As a result, the number of retailers who have successfully gained and secured rights to their software inventions is rather low.
- **Ownership:** AI can currently generate 3D designs, graphic prints, poetry, and other forms of art. This has led to concerns about the authenticity of artificially generated works of art and the necessity for IP protection for these works as well. It became necessary to defend and secure AI inventions because human inventions had previously been protected by the regime of IP laws. Authentication under IP was difficult due to technical concerns such the software inventions and concepts that were developed during the development of training software. AI patents have been issued for the input stage, so why not for the output stage? Several questions have been raised about this. Should AI inventions be made available to the general public, and if so, what will be the validity and scope of the patent? Probably based on the notion that AI solutions make human lives better by giving solutions in every domain, but it requires a legal status among society to be provided IP protection to AI authors.
- **Liability issues:** Copyright infringement is common in creative works such as analyse a company's business strategies and investment decisions may use patented AI software that the service provider is not aware of because AI patents are recognised as being in the public domain, which could bring up the issue of patent infringement in the AI industry. Who bears the brunt of the blame? As a first step in answering this question, it is necessary to determine where the originality of the patented technology has been imitated from, and second, can the AI's caretakers and in-charge authorities also be held guilty in cases of infringement. In order to deal with infringement cases, it is necessary to establish the authority of the authorities. The

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owner of an invention without a patent can also find themselves in problems because it is necessary to establish the invention in the legal realm.⁴⁰

- **Legislation:** Laws that protect intellectual property (IP) must be constantly updated to keep up with the ever-changing nature of technology and the challenges new inventions and their owners face, as well as the changing outlook of the industry, so that real inventors can patent or copyright their innovations. Continuing to have a gap between AI and IP would lead to a lack of balance between the AI inventions and IP rules. There is a constant demand for the establishment of specialised tribunals to handle issues between AI and IP.

The IP regime's fundamental concern is whether or not AI robots may be considered innovators. Sophia, a Hong Kong-built humanoid manufactured by Hanson Robotics, became Saudi Arabia's first citizen and expressed her desire to pass on her genes to the next generation. Is it possible to patent Sophia's offspring? It is only after extensive study of the "non-technical" and "technical" aspects of an invention that the European Patent Offices will give a patent to the inventor for a "inventive" step. As a result of the many national standards, it may be difficult to get patent protection for this type of invention.⁴¹

IP LAWS AND ARTIFICIAL INTELLIGENCE

People who enforce intellectual property rights are increasingly concerned about the creativity and expertise displayed by AI systems. This has led to a rise in IP-related lawsuits. Because of this, we should investigate the more deliberative goals of copyright and patent rules in relation to artificial intelligence systems. Machines are now capable of producing highly creative works that, if developed by humans, would be qualified for copyright protection. In light of this, copyright standards for AI systems around the world should be re-examined. In the case of *Naruto v Slater*, a San Francisco court recently ruled that animals, not being human, for damages and injunctive relief for violation of copyright. *Naruto*, the monkey, cannot sue for copyright infringement because the Copyright Act does not explicitly authorise animals to file such actions, according to the Court. Because animal copyright is no

⁴⁰ UK, "Industrial Strategy: Building a Britain Fit for the Future, Government of the United Kingdom" (2017) available at: <https://www.gov.uk/government/publications/industrial-strategy-building-abritain-fit-for-the-future> (last visited on May 23, 2022).

⁴¹ *Idat* 62.

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longer an issue, artificial intelligence systems have found themselves in a similar predicament. Many copyright offices across the world do not yet record works created by machines. There has been a similar problem with patent laws. If machines meet the novelty requirements of patent law, there will be questions about ownership of such innovations. Also, can robots or machines be awarded ownership of future inventions? How may infringement and damages be calculated if AI steals a work or reproduces an invention? These are some of the hotly contested topics that occur in the context of AI and intellectual property laws.

INDIAN IP LAWS

AI systems in India will be impacted by laws such as the Copyright Act of 1957 and the Patents Act of 1970. Various facets of the above-mentioned legislation are clarified and their implications for AI are examined in this study. As a result of these laws, some AI systems are unable to be developed and their output is not protected by copyright law. It's about time these laws were updated to reflect today's more sophisticated and modern technologies.

THE FUTURE ASPECTS OF LAWS RELATED TO INTELLECTUAL PROPERTY LAW AND ARTIFICIAL INTELLIGENCE

Computer programme AlphaGo beat the defending European Go champion Fan Hui in October 2015 to make history. Over 60 million people around the world tuned in to see it defeat 18-time world champion and 9 Dan Lee Sedol in a match that was seen by an audience of more than 60 million people. This year's AIIP IV workshop was held at CREATE, the RCUK Centre for Copyright and New Business Models in the Creative Economy, between these two dates, albeit to a smaller crowd than in prior years, as in combination with the annual Jurix conference.

Two of Create's work packages since its start in 2012 have dealt with the future of copyright law and AI, highlighting the numerous ways in which AI affects copyright law. There are two ways in which artificial intelligence (AI) affects copyright and other intellectual property laws. In the first place, intelligent technology is increasingly assisting human creators, whether through co-creation with (partially) autonomous machines or the complete delegation of creative control to computer programmes. The first musical developed, written,

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and scripted largely by AI, *Beyond the Fence*, began rehearsals while the members of AIIP gathered in Braga, London.

When it comes to intellectual property (IP) law, are classical terms like “inventiveness,” “originality,” and “creator” still relevant? Despite the long history of machine-creation of art (or algorithmic creativity) that dates back to at least the 18th century.

Even while computer generated works are explicitly regulated in Britain, the precise equivalency with human works may grant unduly generous protection to work that can increasingly be created with absolutely no effort and in amounts previously inconceivable. Create also looked into the role of AIs and robots in the consumption of artistic works.

When it comes to reading, should there be a “right to mine”—i.e. a “right to data mine”—if you have a “right to read”? There are many other professions that face competition from computers as a result of artificial intelligence's rise, and they aren't just makers and artists. More problems await lawyers, notably intellectual property attorneys, in a rule-based environment that has been a successful test bed for AI applications in the past.⁴²

With increased competition from artificial intelligence (AI), we may potentially witness a situation in which large segments of the legal profession compete for jobs with AIs in the near future. It's clear from LexisNexis' recent acquisition of Lex Machina that the coalition between software developers and legal content providers/owners like LexisNexis can be powerful. Via order to determine “how probable is a judge to approve or refuse a given motion” or “how likely is it that a judge would find a patent infringement, fair use of a trademark, or Securities Act violation” a user can query a database of court judgments in the Lex Machina platform.

New and improved means of delivering standard copyright services, as well as more speculative AI-enabled copyright services, were examined by create.

The AIIP workshop series was launched by create to bring together computer scientists, attorneys, and creatives from across the academic and professional worlds, bridging the gap between academia and industry. Researchers from universities around Europe met specialists

⁴² Aviv H. Gaon, *the Future of Copyright in the Age of Artificial Intelligence* (Edward Elgar Publishing Ltd, 2021).

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from the Fraunhofer Institute and companies like Docketalarm and Trademark Now at these workshops, which drew in participants from the US and Australia as well as other parts of Europe.⁴³

Thanks to Tom Gordon of the Fraunhofer Institute and Anna Ronkainen of TrademarkNow for acting as co-chairs on AIIP's programme committee since its debut event in Amsterdam.

cerate's workshop series is coming to an end in 2016, and TrademarkNow came up with the idea of a best paper competition in the field of AI and IP to honour the occasion. They generously supported the competition by serving on the awards committee and contributing not only cash but also with their time.

The winner of the essay prize competition was announced during AIIP IV in Braga and is featured in this special issue of scripted. If contributors were interested in focusing on AI as a problem to be controlled or as an instrument of regulation, the question "How will Artificial Intelligence impact the practise of Intellectual Property law?" was left open.

There were four researchers from Bournemouth who were awarded the overall first prize: Marcella Favale (Marcella, Neil McDonald, Shamal Faily and Christos Gatzidis). In their paper, "Human Aspects in Digital Rights Management: The Perspective of Content Developers," they present the findings of the MADRGIAL project, which aims to "understand how game developers make sense of Digital Rights Management (DRM) technology when developing video games, and explored the complex perspectives of content producers, users, and legislators" of digital content⁴⁴.

This is due in part to advancements in technology. Copyright law is embodied by DRM in the same way real property law is embodied by a physical door lock, which is why DRM is such a simple type of access restriction. For legal AI, on the other hand, the case for Lessig's equivalency is easier to make because of the more ambitious approach to self-enforcing rules that Legal AI seeks.

However, questions about the human-technology relationship are just as significant as the technological ones. In the "sister project" of DRM, "Privacy by Design," we can clearly see

⁴³ Russell & Norvig, *Artificial Intelligence: A Modern Approach* (4thedn., Pearson Education, 2022).

⁴⁴*Ibid.*

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this. Touted as a solution to the ever-increasing complexity of online data protection issues since the turn of the century, these methods' acceptance and usefulness are doomed to failure unless they are founded on a solid grasp of the human-computer interface and a strict focus on "usable privacy." In order for DRM to achieve its full potential, more research is needed on how rights holders and customers interact with it. A multidisciplinary team of computer scientists, attorneys, psychologists, and behavioural economics is needed to tackle this problem. Our award winner makes a significant contribution to this topic. Panelists were particularly impressed with the interdisciplinary aspect of the research and the clear synergies that develop between the many forms of knowledge, while keeping the rigour of the underlying disciplines.⁴⁵

Our second prize went to a very different style of paper, written in a form that, in my opinion, has practically become extinct in academic writing. A trial dialogue is used by Shamnad Basheer from Nirma University in his essay "Artificial Invention: Mind the Machine!" to address concerns of computer innovation, ownership, and the law. As a means of eliciting and disseminating information, Socrates pioneered the use of dialogue in western philosophy. Dialogue and the dialogical form play a significant role in Indian philosophy as well. Yama, the god of death, appears to Nachiketa in the Upanishad, which is structured around a conversation between the two of them. Conversation between the two focuses on human nature, knowledge, the soul or self (Atman), and how to be free. In Indian logic, samvada (conversation) and pariprana (repeated questioning) would continue to play a prominent role, not only in the approach to philosophical education, but also in the nature of logic itself. The ability to conduct a conversation or argument on behalf of one's client and the ability, as judges, to extract information from the dialogue shown in front of them are both essential to the practise of law. In legal education and legal academic writing, the ability to learn through observing a discourse, which is critical for judicial decision making, is often overlooked.. Legal AI, on the other hand, has long recognised the fundamentally dialogical nature of legal dispute – the MARKOS system previously mentioned uses the CARNEADES argumentation

⁴⁵ *idat* 101.

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framework for the evaluation of copyright licences that takes the procedural and dialogical nature of legal argumentation to its heart.⁴⁶

There was ALICE, one of the first archetypal AI systems that also used dialogues, and following her a long sequence of dialogue bots leading to today's Siri and, critically for attorneys, IBM's ROSS. As with the Loebner Prize, which is a modern successor to the Turing test, the Loebner Prize is presented in the form of a discussion. It the panel was particularly glad to see a return to such an appealing approach for analysing complex legal issues and complimented favourably on the author's ability to do so in such a competent and knowledgeable way. . Create also aims to train a new generation of interdisciplinary academics at the crossroads of computer technology, law, and economics. Additionally, we held a student paper competition to highlight this concern. Because the final winner had completed her dissertation under my guidance as part of our Law, Technology, and Innovation distance learning LLM, I was very happy to have to leave the (virtual) room during the debate of this award. If AIs become inventors in our patent system, the paper by Erica Fraser, entitled "Computers as Inventors — Legal and Policy Ramifications of Artificial Intelligence on Patent Law," explains the implications for our patent system (and indeed, what this conceptually means) While a growing body of literature on the copyright implications of computer-generated art has emerged as a result of the create project, little research has been done on the legal ramifications of AIs as inventors. This reflects the goals of the AI community as well. Robots that paint, create, write poetry or dance have all been produced in the field of computer creativity, although the type of creativity that is studied primarily originates from the arts. However, there has been a dearth of research into AIs that create new goods, processes, or tools to address issues in the physical world. As Fraser points out in his study, the patent system could be even more severely disrupted by robot-innovators than the threats to our copyright regime posed by robot-artists, which he looks at both in the present and the near future. Thank you, Scripted, for allowing me to publish these three wonderful works. As a part of the AHRC-funded script project on IP, IT, and Medical legislation at the University of Edinburgh, scripted was established in 2002. Furthermore, it

⁴⁶ Fonds de recherche du Québec, "Québec lays the groundwork for a world observatory on the social impacts of artificial intelligence and digital technologies" *News Release* (2018) available at: <https://www.newswire.ca/news-releases/quebec-lays-the-groundwork-for-a-worldobservatory-on-the-social-impacts-of-artificial-intelligence-and-digital-technologies678316673.html>. (last visited on April 30, 2022).

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has always played a key role in promoting our vision of open access, creative commons-enabled academic publication — even before faulty government science policies led to a tsunami of online 'journals' charging inexperienced authors for posting their articles online.⁴⁷

As a result, scripted is able to maintain a rigorous peer review process and excellent editorial support for authors, combining the best of the US law school journal and the traditional peer-reviewed journal, while remaining free for both authors and readers, thanks to the generous grant from the School of Law of the University of Edinburgh. However, we are always looking for sponsors that will allow us to build on the success of scripted. It's impossible for parliaments to keep pace with technological development, which is why the papers in this special edition question how knowledge is produced. For example, new forms of knowledge transmission, such as scripter's, will play a crucial part in the new data ecosystem, where both humans and robots will consume and generate, as well as create and invent.

CONCLUSION

Researcher's key tool in their toolbox has proven to be designing and implementing an IP strategy. Researcher is interested in an effective IP strategy for two main reasons. One benefit is that it guarantees the best possible use of the researcher's limited resources. Two, creating an effective IP strategy gives Researchers greater control over their circumstances, addressing any underlying uncertainty. Technology innovation has been proven to be negatively impacted by uncertainty, which is more common in developing countries where laws, business models, and technology are still in their infancy. A recent survey revealed that despite recent technological advancements, SuSu development in the uncertain developing industry of AI has not yet accelerated because of worries about AI-related IP issues including ownership and legality (Delponte, 2018). Researchers are frequently thought of as those who address societal issues by proposing innovative business strategies and solutions (Bradley et al., 2021). In light of the fact that promoting AI development by researchers is important for combating climate change and eradicating poverty (Bradley et al., 2021). There seemed to be a lack of investigation in the IP tactics used by AI Researchers despite this promise and the desire for more clarity. By filling this gap, a framework for studying IP protection in the

⁴⁷ *ibid.*

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context of AI is created. Furthermore, by incorporating preexisting ideas with fresh empirical evidence, existing understanding on IP strategy is expanded.

Which intellectual property tactics are employed by start- and scale-ups in the realm of artificial intelligence products? was the study topic that was inspired by these preliminary findings. where IP strategies were established by how numerous appropriability methods were set up. Studies by Wan et al. (2020) and Kulkarni & Padmanabham (2017) discovered that software Researcher and AI Researcher are most similar. A comparison of IP linked to software and IP related to AI, however, outlines a number of elements that are different between the two, despite previously being discovered to have an impact on IP strategy. Therefore, an abductive method was used, utilising extensive literature while also being open to new findings.

The first step was to discover pertinent appropriability methods utilised by software researchers by reviewing the literature on software SuSu IP tactics. The literature study that followed was inspired by Teece (1984) and Hemphill (2004), who highlighted how market and innovation considerations affect IP strategy. Different IP strategy variations were predicted by six theory-driven themes. The next step was to approach a variety of AI SuSu stakeholders for semi-structured interviews where variables from earlier literature and (new) emergent aspects might be discussed. Thematic analysis was then conducted to produce (new) data-driven themes and uncover support for theory-driven themes. 39 The findings point to an increase in informal appropriability mechanisms use overall as compared to software researchers. As AI researchers trust in the protection offered from the ambiguity of AI-related intellectual property, secrecy is used the most.

Additionally, models are kept under wraps because open disclosure to clients can prevent further revenue. Additionally, the use of secrecy is ascribed to client demands, which limit the storage of data and models to only locally. Open-source objectives, on the other hand, lessen a tendency toward secrecy. Rapidly shifting consumer needs make lead times more favourable, requiring ongoing AI product development. Due to a lack of resources and market share, AI researchers only seldom employ complementary assets and do not anticipate attracting significant opensource development groups. Products created by researchers are frequently created with limited resources and data quantities, which restricts their

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functionality and performance. The little market share of AI Researcher is viewed as a drawback for luring outside developers. Micro-pixels and bogus data entries, examples of technological intricacy, are used. These measures streamline auditing procedures while defending IP through legal threat. During talks with clients or investors, IP can be strategically shared. It is thought that it is crucial to disclose IP during negotiations because customers and investors are sceptical about whether the product actually uses AI. Additionally, in order to augment the restricted knowledge of potential clients and investors, AI Researchers must divulge parts of IP.

Formal techniques for appropriability are typically thought to be unsuccessful since, once legal protection has been established, IP infringement is thought to be practically impossible because of the ambiguity of AI-related IP. Because tacit information makes it impossible to legally define IP, copyrights are under decline. Additionally, as certain creative commons outright forbid legal protection of end goods, heavy use of open-source assets conditions copyright usage. Database rights become more important in the eyes of AI researchers due to a movement in key resources toward the data pipeline. However, use of these rights is discouraged since AI researchers are afraid to rely on this tool because the conditions for obtaining database access are not clearly described to them. AI models vary in how dependent they are on data, which has an impact on how likely they are to use database rights. Five data-driven themes emerged, with trade secrets being used sparingly in the form of employee contracts, NDAs with clients, and licence agreements with service providers. Mega databases are created to support comparison and retraining. Additionally, these databases can be used to create products for different uses or clientele. The vast majority of data storage and model training is done through third-party services. This dependence threatens profitability and can have an impact on IP strategies. Due to a lack of resources or because they think there is little possibility of getting detected, some AI researchers ignore the nuances of creative commons licencing.

Due to the negative effects of ambiguity, AI-related intellectual property is strategically released. Clients or partners ask for explanations of the steps taken from data to prediction since they either don't comprehend them or question whether AI was actually applied. The hazards of IP that come with sharing this important knowledge are reduced by strategically exposing IP. Large volumes of information are given, persuading clients or partners while

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omitting crucial information. Current legal restrictions are reached due to the market's freshness and the distinctive qualities of AI-related IP. As a result, formal processes are not used because legislation has not yet established consensus on 40 important issues, including effort and the eligibility of synthetic or derivative databases.

Discourse

Restrictions

The study has some methodological constraints, despite the conclusion to the research question. Due to an initial overestimate of response rates, the final sample size remained very low. Additionally, the COVID-19 pandemic's economic impacts may have led to Researcher's bankruptcy, reducing the size of the available sample. External validity is jeopardised by the sample size, which is tiny in comparison to the larger population. If the sample size had been larger, a more accurate picture of IP tactics would have been obtained. Additionally, because the survey was carried out for the NL AI Coalition, only AI researchers based in the Netherlands were included in the sample. Incorporating AI researchers from different places would have produced outcomes that were more globally applicable and less reliant on local characteristics (e.g., local legislation, culture, etc.).

This constraint is overcome by applying the framework to AI Researchers from other geographical areas, evaluating the viability of themes, and then honing them accordingly. There were also other theoretical restrictions. A fundamental analytical framework was utilised because the research was exploratory and intended to provide a foundational understanding of AI SuSu IP tactics. As a result, interactions between themes were disregarded as the impacts of each theme were evaluated independently. Considering these interactions would have led to more reliable results on both the internal and external levels. In order to confirm that the themes extended across cases and supported internal validity, a condensed review of AI development was used. The data pipeline and the use of third-party services were two components of AI development that had previously gone unnoticed but whose inclusion in the study would have resulted to a more accurate representation of AI SuSu IP strategy. These insights could be used in subsequent study to alleviate this problem. Theoretical repercussions Calvin et al. (2020) recommended looking into IP tactics used by AI stakeholders besides big US corporations.

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Our study is the first to use theories from comparable industries to offer light on IP tactics in the context of AI researchers. Results showed that these hypotheses were generally true, indicating that this theoretical underpinning is appropriate for use in the context of AI. Filling the knowledge gap offers insights applicable to both the larger body of IP strategy literature and the literature on AI specifically. For following innovation science study, the descriptions of the IP tactics used by AI Researcher may serve as a springboard. It is hoped that focusing on unique appropriability methods and factors may provide more information. Wachowicz & Gonçalves defined key resources as data, algorithms, hardware, and data (2019). Findings add data gathering and model hosting to these definitions, though. Information in software was previously only partially disclosed due to signals about business worth and patent applications (Baccara & Razin, 2012). It became more important to reveal IP in order to win over new customers and demonstrate how well AI was being used.

In order to determine whether software researcher-derived ideas still hold true in the context of AI, general IP strategy theories are validated. Our work expands on previous research that examined the consequences of changing major resources on IP strategy (Blind et al., 2006; Chatterjee, 2017b; Tantleff, 2015a; M Wachowicz & Gonçalves, 2019). It shows additional ramifications when switching from software to AI goods. Similar to this, research by Hall et al. (2014) on tacitness is supported by findings that show how detrimental it is to IP strategy. Due to conflicting data and muddled product maturity, Veugelers & Schneider's (2018) theories on the effects of R&D intensities cannot be confirmed nor refuted. Last but not least, general IP strategy theory is expanded, offering fresh perspectives due to data-driven themes. One, future research on AI IP strategies should give more consideration to the idea of ambiguity, which has historically been considered as a barrier preventing companies from using specific appropriability procedures (Fromer, 2019; Kearns & Lederer, 2003). Ambiguity is welcomed and exploited as a defence mechanism against infringement in the domain of AI. Therefore, knowing ambiguity's impacts is necessary to completely comprehend IP tactics in the context of AI. Understanding these consequences can also be helpful for research on technologies that have comparable IP-related properties. For instance, to research the use of IP in quantum computing (Cusumano, 2018). By recognising the novelty of law, Chen et al. (2005)'s notion of market newness can be expanded. This is especially important for AI since it challenges traditional notions of authorship and

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ownership (Calvin et al., 2020). Future study will be necessary to operationalize the originality of legislation.

Management repercussions

The study offers significant insights for managers and policy makers in addition to advances to theory. Findings mostly reduce IP-related uncertainty. Results show which appropriability techniques are suitable for AI and most available. These insights can be used by researchers in AI to create more successful intellectual property (IP) tactics. Delponte (2018) stated that knowing the sources of uncertainties can help to lessen them. By demonstrating how innovation-specific and market factors influence IP strategy decision-making, results provide a first understanding of these sources. Important AI-related IP data and models are readily available online, posing a threat to the confidentiality of information. Therefore, giving staff members remote electronic access to these resources is not recommended (Hemphill, 2004). This is especially important in light of current "working from home" tendencies (Ozimek, 2020). Understanding the value of data and models, managers can effectively limit employee access to only those portions that are necessary for performing their main responsibilities. Our findings support those of Klein (2020), who discovered that software researchers use ambiguity as a defence against infringement.

Managers gain from a greater comprehension of this relationship and an appreciation of its value in preventing infringement. Managers may increase ambiguity by delivering AI products via the cloud or edge devices, if allowed by the use-case and budget. Since other businesses cannot directly access models and data, reverse engineering and IP theft are discouraged. In contrast, managers can reduce ambiguity by using "explainable" AI model variations when use-cases or budget make this strategy impractical. These models lessen uncertainty by more precisely demonstrating how data lead to a prediction. Upon completion, an AI researcher would be able to submit an application for a computer implemented invention (EPO, 2021). By specifying how the company intends to acquire its own hosting and machine learning gear, AI Researcher can examine options to become less dependent on outside parties. As an alternative, the AI NL Coalition may look into providing these services. This addresses two problems. One, securing constant payments for AI researchers reduced concerns about prospective price rises that would endanger profitability. Two, a large

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number of prospective customers were found to demand that data be stored and processed within national boundaries. Due to the inability of some third-party services to ensure that data would remain within European borders, this need is presently not always able to be met. These problems are resolved by offering domestically based, budget-friendly alternatives to third-party services, giving AI Researchers access to broader client bases.⁴⁸

The results directly affect database rights policies. AI Researchers believe that this method is important, however cases have shown that applications are restricted by ambiguous descriptions of the prerequisites. The definition of effort required to obtain database rights must be made clear by policymakers while taking into account a number of AI-specific issues. For instance, if derived datasets that were created by fusing two or more public databases are eligible. Or under what circumstances artificial intelligence (AI)-generated datasets can be safeguarded utilising database rights. In conclusion, research shows that lead times, trade confidentiality, and secrecy are now the most favourable conditions for AI researchers. These results may serve as a starting point for other researchers to investigate how each of these methods can be used by AI researchers. First, by researching how tacitness, ambiguity, and the use of open-source assets affect strategic secrecy management. Second, by thinking about when trade secrecy is the most effective method for protecting AI-related IP. Utilizing longitudinal case studies, which collect information from business records, interviews, and observations, will provide information on the precise causal linkages between these components. Additionally, deeper investigation into the effects of data-driven themes may result in representations of AI SuSu IP methods that are more accurate. For instance, by considering data gathering and model distribution as significant resources, taking into account the impact of relying on IP methods for third-party services, and determining when AI-related ambiguity is adequately reduced for CII application.

SUGGESTIONS

There is a pressing need today more than ever to adopt IP regulations that can protect AI innovation and award new works and innovations with copyright or patent protection.⁴⁹

⁴⁸*Id* at 105.

⁴⁹ Finland, "Finland's Age of Artificial Intelligence - Turning Finland into a Leader in the Application of AI" *Finnish Ministry of Economic Affairs and Employment* (2017) available at: <https://tem.fi/en/artificial-intelligence-programme> (last visited on May 19, 2022).

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- To distinguish between AI-created works and AI-aided works, a special test must be devised. The precise IP holder can then be identified.
- It is not yet clear where AI systems fall in the patent law's definition of an innovation vs an inventor. Clarity and specificity in the law are required, as is the inclusion of such provisions in plain language.
- Furthermore, the concept of authorship under the Copyright Act should be evaluated and updated as the dynamics of copyright law evolve.
- Trademark laws have also been ambiguous. AI's relationship to humans and its ability to function, especially in cases where human common sense plays a large role, must be specified.
- However, international policy should be developed to address the emerging challenges of AI, which WIPO has already recognised and discussed in numerous forums.
- Data protection for AI software requires a specific law to be passed. It must include all civil and criminal obligations and offences that have the same legal effect as one another.
- IP sharing between artificial intelligence's creator and the AI itself may become a reality in the coming years. It's going to be an integral part of the overall development and maintenance strategy. It's hard to imagine what the future of transportation may hold, but it's sure to be exciting.

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