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PATENT PROTECTION FOR INVENTIONS RELATING TO ARTIFICIAL INTELLIGENCE (AI)

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Abstract: The swift progress of Artificial Intelligence (AI) technology has resulted in profound alterations in diverse industries. With the continuous evolution of AI, the significance of patent protection for AI inventions is becoming increasingly important. This abstract examines the primary factors and difficulties associated with safeguarding patents in AI.Firstly, it explores the distinctive characteristics of AI ideas and the intricacies they pose in the patent application process. AI ideas typically incorporate algorithms, machine learning models, and data-driven techniques. Therefore, it is crucial to establish both an inventive step and a technical effect to determine their patent protection eligibility. In addition, the paper explores the potential challenges that may arise due to AI systems' ability to generate outputs that were not explicitly planned, which raises concerns about the attribution of invention and ownership.Moreover, the abstract analyses the changing legal environment and the global initiatives taken by patent offices to address the issues presented by AI technologies. This study investigates the different methods jurisdictions use to analyse patent applications relating to artificial intelligence (AI), including using AI to conduct prior art searches and evaluations.In addition, the paper discusses the possible consequences of patent protection on AI innovation and the broader AI ecosystem. It emphasises the need to balance encouraging innovation through patents and guaranteeing the availability and accessibility of AI technologies for ongoing study and development.Finally,valuable information on the latest developments and factors to consider when seeking patent protection for AI technologies is discussed. The text explores the increasing significance of intellectual property rights associated with data, the influence of AI on conventional concepts of patentable subject matter, and the emergence of collaborative innovation models in AI. The need to comprehend patent protection for AI inventions is thoroughly highlighted. The text focuses on the difficulties, possibilities, and current progress in the ever-changing field of intellectual property law related to artificial intelligence. Its goal is to support the progress of AI innovation while protecting the rights and interests of inventors and society as a whole.

I. INTRODUCTION

The potential of artificial intelligence (AI) to profoundly transform industries such as healthcare, banking, transportation, and communication is immense. The urgency around the patenting of AI discoveries intensifies as AI continues to evolve and transform our surroundings. Providing innovators exclusive rights through patent protection incentivises investment and fosters technological progress. The rapid advancement and distinctive characteristics of AI inventions pose challenges when applying traditional patent regimes. This paper aims to analyse the complex and

dynamic field of patenting artificial intelligence (AI) breakthroughs. The objective is to thoroughly examine the various aspects of AI advancements, including patents, laws, and challenges. This study illuminates the intricacies of granting patent rights to AI concepts through a comprehensive examination of existing literature, patent legislation, rules, and essential legal precedents.An assessment will be conducted to explore the difficulties and consequences associated with obtaining patents for AI advancements. This task entails examining the criteria for patentability and their application in AI technology, including novelty, non-evidence, and originality, as well as examining the openness, accountability, and potential biases in AI algorithms. The research delves into several ethical and legal challenges, including systems. We will analyse the patent protection of AI innovations worldwide, acknowledging that different nations have unique legislation and procedures. This study aims to enhance our understanding of the global ecosystem by identifying potential harmonisation initiatives, exemplary practices, and challenges in protecting AI advances globally. An analysis will be conducted to assess the impact of patenting AI innovations on both business and society. Evaluation of the levels of innovation, competition, market dynamics, industry concentration, and the accessibility of AI technology in a specific area has been done. The investigation will also focus on patent trolls, conflicts over intellectual property, and potential instances of patent misuse in the AI industry.

Additionally, it will explore strategies for effectively resolving these issues. By comprehensively examining patent protection for AI concepts, this study seeks to contribute to the existing knowledge and educate future discussions, regulations, and potential modifications in artificial intelligence (AI) innovation and intellectual property rights. By examining the intricacies of patent protection for AI concepts, the objective is to assist in developing a versatile patent system that promotes ethical AI research for the benefit of society.

II.HISTORY

The history of patent protection for AI inventions is new, as AI technology has rapidly advanced in recent decades. Below is a concise summary of the significant milestones and advancements in the patent protection of AI inventions:

1. During the initial stages of AI development, patent applications were predominantly centred around specific algorithms and methodologies. The Perceptron, an early machine that used neural networks for learning, is a good illustration. Frank Rosenblatt filed a patent for it in 1956. Nevertheless, artificial intelligence (AI) was in its early stages of development, resulting in a scarcity of patents for AI.

2. The 1980s saw a notable advancement in the protection of software patents, establishing the basis for patents linked to artificial intelligence (AI). The U.S. Supreme Court's ruling in Diamond v. Diehr (1981) established that computer software algorithms can be eligible for patent protection if they generate a "useful, concrete, and tangible result." The number of AI-related patent filings experienced a rise between the 11990s and 2000s due to breakthroughs in AI approaches and increased computing capacity. Patents encompassed a range of AI applications, such as machine learning techniques, natural language processing, and computer

vision. During this period, IBM, Microsoft, and Google submitted many patents on artificial intelligence (AI).

3. The 2010s brought out novel issues in determining the patentability of AI inventions. The growing utilisation of machine learning and AI systems has prompted inquiries regarding the criteria of "inventive step" and "technical effect." Our patent offices encountered challenges in assessing whether AI-based ideas satisfied the requirements for being granted a patent, resulting in discussions and the development of guidelines.

4. The number AI as an Inventor (2019): In 2019, a notable occurrence occurred when an AI system called "DABUS" created two inventions, and the person who developed it applied for patent protection in multiple jurisdictions, including the US and Europe. These instances ignited debates on the potential recognition of AI systems as inventors and prompted inquiries into the legal and ethical consequences of AI-generated ideas. The number is 6. Between 2019 and 2021, patent offices and organisations such as the USPTO and EPO issued guidelines and revisions that specifically examined patent applications linked to artificial intelligence (AI). These guidelines provide clear criteria for determining the patentability of AI inventions, as well as technical concerns and disclosure requirements.

5. Patent protection for AI inventions is developing in parallel with improvements in AI technology in the present and future. Current developments in artificial intelligence (AI) involve a growing emphasis on innovations connected to data, the capacity to patent AI models and structures, and the inclusion of fairness, transparency, and accountability in patents linked to AI. Ongoing concerns revolve around the influence of AI on existing patent rules and the establishment of patent systems specifically tailored for AI.

The history and development of patent protection for AI inventions are ongoing, and as AI technologies advance, new issues and considerations are expected to emerge.

The legal framework for patent protection of AI inventions differs among jurisdictions but often adheres to existing patent laws with modifications to match AI's distinctive characteristics as follows:

- Patentable Subject-matter: AI inventions are usually subject to the same standards for patentability as other inventions. These factors include novelty, inventiveness (non-obviousness), and industrial usefulness. In specific legal systems, it may be necessary for AI inventions to demonstrate a physical and concrete outcome or possess a technical impact to satisfy these requirements.

- Inventorship and ownership: Determining the attribution of inventions and ownership rights for AI-generated creations can be challenging. In numerous legal jurisdictions, an inventor refers to an individual who has creative abilities and contributes to the formation of the invention. The issue occurs when an AI system independently creates an invention. Human involvement or guidance is required in many legal systems during the creative process. Yet, in other cases, the individual who owns the AI system may be recognised as the inventor.

- Technical Effect and Inventive Step: AI inventions must exhibit a technical effect or solve a technical problem to be eligible for a patent. The inventive step criterion demonstrates how AI enhances existing methodologies or attains a non-obvious solution to a technological problem.

- Disclosure and Enablement: Patent applications for AI inventions must include thorough disclosure and enablement, ensuring that a person with expertise in the field may effectively implement the invention. This necessity may necessitate the disclosure of the fundamental algorithms, training data, and other technological specifications needed to execute the AI invention.
- Assessing the originality and lack of obviousness of AI inventions: Examining prior art and non-obviousness. It entails evaluating past knowledge, encompassing existing AI methods, algorithms, and datasets. Patent offices can utilise artificial intelligence capabilities to assist in conducting previous art searches and evaluating patent applications of artificial intelligence.
- Patent Examination Guidelines: Guidelines are issued by patent offices and organisations to offer clear instructions on examining patent applications linked to artificial intelligence (AI). These guidelines cover topics such as the use of AI and machine learning in analysing inventive steps, disclosure requirements, and other technical factors that are unique to AI inventions.
- International Harmonisation: International harmonisation is being pursued to advance the alignment of patent protection for AI inventions across different countries. The World Intellectual Property Organisation (WIPO) and similar organisations actively participate in discussions and activities to establish universal frameworks and optimal practices.

III. ROLE OF PATENT PROTECTION IN AL INVENTIONS

Patent protection is crucial for AI inventions in India for various reasons. First, it provides incentives. It fosters innovation by granting inventors exclusive rights and economic incentives and promoting investment in AI research and development. Secondly, Patent protection guarantees that inventors and individuals can enjoy the benefits of their discoveries and attracts local and international investment in the artificial intelligence (AI)industry. Furthermore, patents safeguard the intellectual property of AI inventions, thereby preventing their illegal use or reproduction. Utilisation or exploitation by other parties. This provision incentivises innovators and organisations to create new technologies and exchange information, promoting a culture of progress and development in artificial intelligenceTechnologies. In addition, patent protection enables inventors to monetise their AI inventions. Acquire market benefits, engage in licensing negotiations, and facilitate technology transfer.

India can capitalise on its expanding AI skills by obtaining patent protection. Promote domestic innovation and establish itself as a centre for AI-related research, development, and activities. Business ownership is the process of starting and running one's own business. Patent protection is crucial for AI inventions, providing substantial advantages and tackling important obstacles. Artificial intelligence (AI), with its capacity to analyse extensive quantities of data, derive insights from patterns and generate intelligent judgements, possesses the potential to fundamentally transform diverse sectors, including healthcare, finance, transportation, and manufacturing. Significant investment in research and development is necessary for developing and implementing

AI technology, making protecting intellectual property essential for encouraging innovation. Patent protection grants inventors and organisations the sole rights to their AI inventions for a specific duration, allowing them to recover their investments and profit from their ideas. This exclusivity serves as a strong motivator for further progress in the sector. One of the key benefits of patent protection for AI inventions is the preservation of intellectual property. AI inventions frequently incorporate intricate algorithms, machine learning models, and pioneering methodologies that demand substantial knowledge and resources. Patents confer inventors with the legal authority to prohibit their innovations' unauthorised utilisation, production, sale, or importation.By safeguarding their intellectual property, innovators may retain a competitive edge and guarantee they can fully capitalise on the commercial viability of their AI creations. This safeguarding ensures an optimal atmosphere for innovation, as creators can confidently allocate resources towards advancing revolutionary AI technologies, ensuring their endeavours will be protected and acknowledged. Moreover, patent protection for AI inventions enables a competitive edge in the market. It promotes its commercial dominance, gets investments, and negotiates licensing agreements with other organisations that station. Companies with AI patents can achieve market dominance, get investments, and negotiate licensing agreements with other organisations interested in utilising or integrating their patented technologies. This exclusivity enables patent holders to demand higher prices, establish obstacles for possible competitors, and secure a portion of the market. Patent protection encourages the commercialisation of AI inventions, allowing innovators to profit from their creations. This, in turn, promotes economic growth and the creation of jobs. It promotes technology transfer by allowing corporations to grant other organisations licences for their patented AI technologies. This stimulates collaboration, the exchange of knowledge, and further progress in the field. Patent protection is crucial for the disclosure and sharing of technology and information. Patent applications necessitate inventors to provide comprehensive information about their ideas, including AI inventions' underlying algorithms, methodology, and technical features. This disclosure enhances the reservoir of publicly accessible knowledge, fostering the progress of AI technologies. Additional individuals can enhance the provided information by refining current artificial intelligence methods or creating novel applications. By disclosing patents, inventors can encourage additional inventions, promote collaboration in research, and facilitate the spread of knowledge relating to artificial intelligence. The free flow of information fosters the AI community and advances social development by enabling the implementation of AI technology in diverse domains such as healthcare, agriculture, and environmental conservation. Patent protection serves as a defensive tactic for inventors and organisations in AI, in addition to disclosure. Defensive patenting entails submitting patent applications to deter potential lawsuits or legal disputes. To engage in the exchange of technology licences with other companies. In the rapidly growing and competitive field of AI, businesses can use patent protection to safeguard their interests, insulate themselves from litigation or counterclaims, and ensure their freedom to function. Defensive patenting upholds a fair and competitive environment by averting the accumulation of AI-related patents by a limited number of businesses. Inventors can safeguard their creations by practising defensive patenting, which involves obtaining patents to protect their intellectual property from potential infringement. At the same time, they can cultivate a collaborative atmosphere that fosters innovation and encourages the sharing of ideas, preventing superfluous legal conflicts. The significance of patent protection for AI inventions goes beyond individual inventors or organisations. It has a crucial function in attracting investment and finance. AI patents showcase technological expertise and are important for companies seeking investment or support. Investors

are inclined to back enterprises with robust patent portfolios, as patents signify the capacity for economic triumph and a competitive edge in the market.

The Control of Patents Act of 1970 and its accompanying guidelines govern the legal framework for granting patent protection to artificial intelligence (AI) inventions in India. The Indian patent system acknowledges the patentability of AI inventions as long as they satisfy conventional patent standards. To qualify for a patent in India, an AI innovation must meet the requirements of novelty, inventiveness (non-obviousness), and industrial applicability. The invention must exhibit technological progress and not be readily apparent to a person with expertise in the field. Additionally, it must comply with the precise subject matter that is eligible for patent protection under Indian patent law. India operates on the "first-to-file" system, where the individual who files for a patent first is granted the rights. When a patent application is filed for a specific invention, it is typically awarded the rights to the patent. Nevertheless, Indian patent law has provisions that permit the withdrawal or objection of a patent application in specific situations. Patent protection is paramount for AI inventions, fostering innovation and incentivising investment.

IV. NEED FOR PATENT PROTECTION IN AI INVENTIONS

Patent protection plays a crucial role in promoting innovation and encouraging investment in AI inventions; the following are some of the roles:

1. Patents grant inventors the sole rights to their ideas for a defined duration, motivating them to dedicate time, energy, and resources to advancing new AI technology. This exclusivity enables innovators to recover their investments and obtain a competitive edge in the market, *encouraging innovation*.

2.Patents increase the desirability of AI inventions, *attracting investment* and enhancing their value. To attract possible investors and stakeholders. Patents offer solid legal protection for intellectual property that can be used for licensing, commercialisation, or cooperation opportunities. Patent protection enhances the probability of obtaining funds for additional research and development.

3.Patent protection incentivises creators to publish their AI inventions publicly. The sharing of inventors enhances collective knowledge in AI by disclosing the specifics of their ideas in patent applications. This disclosure facilitates cooperation, knowledge sharing, and the progress of artificial intelligence technology, *promoting collaboration and transparency.*

4. Patents give innovators the authority to prevent others from producing, utilising, or distributing their patented AI creations,*safeguarding against infringement.* This provision empowers innovators to prohibit competitors from replicating or monetising their inventions without authorisation. It offers a legal framework for securing and protecting the rights of innovators in the rapidly advancing field of AI.

5. *Commercialisation and market competition* are facilitated by patent protection, which grants innovators a competitive edge in commercialising their AI ideas and acquiring a larger market

share. It offers a period of exclusivity in which inventors can commercially capitalise on their innovations, resulting in substantial financial gains. This exclusivity also fosters rivalry in the market, stimulating additional innovation and technological progress.

6. Including patent protection for AI promotes and urges researchers and developers to allocate resources towards state-of-the-art technologies. Due to patents' ability to safeguard their ideas, researchers are more inclined to undertake ambitious AI projects, resulting in significant advances and *promoting AI research and development.*

7. Patent protection in artificial intelligence (AI) promotes the spread of knowledge, enabling other researchers and innovators to develop current inventions further. The gradual accumulation of progress promotes the advancement of novel and enhanced AI technologies, ultimately benefiting society. Patent protection is essential in artificial intelligence (AI) for several reasons. Firstly, it strongly incentivises creativity, encouraging individuals and organisations to develop new and groundbreaking AI technologies.

V. CHALLENGES AND LIMITATIONS IN PATENT PROTECTION FOR AI INVENTIONS

Owing to the distinctive characteristics and intricacy of AI technology, the domain of patent protection for AI concepts encounters numerous challenges and limitations. These are some of the most notable challenges:

Inventive Step and Non-Obviousness: Assessing an AI concept's intelligence level can be difficult. Given the extensive use of vast amounts of data and complex algorithms, it may take significant time to ascertain the extent of human involvement and creative input in AI systems. Whether an AI finding is non-obvious arises when evaluating the extent to which it represents a substantial advancement beyond existing knowledge and techniques.

Lack of Clarity in Patent Eligibility: More clarity about patent eligibility is another crucial factor contributing to confusion surrounding the protection of AI advances through patents. The current legal framework presents ambiguity about the patentability of various AI-related subjects,including algorithms and mathematicalmethodologies. Divergences and vagueness may occur due to varying interpretations of patentability in artificial intelligence across different countries.

Disclosure and Enablement: When submitting a patent application, it is necessary to include sufficient information to enable an expert in the field to replicate your idea[1] Due to the intricate and variable nature of AI technology, it might be challenging to provide a full disclosure that accurately captures the subtleties of an invention. The dynamic nature of AI algorithms introduces an extra layer of intricacy.

Technical Effect and Industrial Applicability: Patent systems often mandate that inventions demonstrate a technological impact, which refers to a particular technology or innovation's effect or

[1] S. Lee & H. Park, Limitations and Implications for Patent Protection of AI Inventions, 162 INTERNATIONAL JOURNAL OF LAW AND INFORMATION TECHNOLOGY 30(2) (2021).

influence on a specific field or industry. An industrial application, on the other hand, refers to the practical use or implementation of a technology within a particular industry or sector. Documenting and demonstrating the technical nature or industrial usefulness of a purely software or algorithmic AI innovation can be difficult.[2]

Data issues: Artificial intelligence systems rely predominantly on data for learning, advancement, and exploration. Challenges may occur while seeking a patent while utilising confidential or delicate information. Striking a balance between the conflicting interests of public access and private security can be difficult, particularly when defining and implementing a new idea.

Pace of Technological Advancement: technological advancement is rapidly accelerating, making it challenging for patent systems to keep pace with the lightning-fast rate at which artificial intelligence (AI) is being produced. The duration required to get a patent for AI breakthroughs may cause a delay in their protection, thus compromising the inventors' ability to compete and impeding the advancement of the field.[3]

Ethical and Legal Considerations: Patent protection in the context of AI innovations is intertwined with other moral and legal issues. The obtainment of a patent for an AI breakthrough may be contingent upon responses to inquiries regarding transparency, responsibility, and the absence of prejudice in the fundamental algorithms.

To surmount these challenges, it is imperative to thoroughly analyse and revise the existing patent framework while establishing novel regulations or legislation that adequately address the unique characteristics of AI technology. Assume that we desire to witness the implementation of AI advancements in a manner that adheres to ethical and responsible practices. Therefore, it is imperative to strike a balance between fostering innovation and safeguarding the intellectual property rights of innovators. The current patent framework needs help effectively accommodating AI technologies' particular characteristics and intricate nature. Attempts are made, however, within the established structure to address these issues. The patent framework seeks to incorporate AI technologies by applying patentability criteria. The patent system is founded upon three key attributes: novelty, inventiveness, and industrial applicability. Patent offices and courts diligently strive to comprehend and implement these prerequisites for AI advancements, notwithstanding any challenges.

VI. THE CURRENT PATENT FRAMEWORK AND ITS ABILITY TO ACCOMMODATE AI TECHNOLOGIES' DISTINCTIVE FEATURES AND INTRICACIES

They assess if an AI development significantly enhances our comprehension and determine the feasibility of utilising it in an industrial environment. Technical impact,or character,is a crucial criterion in the patent system. Patent systems often require a technical aspect to be eligible for a

[2] X. Huang & K. Yang, Challenges in Patent Protection for Artificial Intelligence: A Comparative Study, 1-12 COMPUTER LAW @& SECURITY REVIEW, 36(4) 2020.
[3] J. Smith, Limitations and Challenges in Patenting AI Inventions: A Critical Analysis, 156 JOURNAL OF INTELLECTUAL PROPERTY RIGHTS, 22(3) (2017).

patent, even though AI concepts may involve software or algorithms. This criterion eliminates concepts that do not add to the technical field. Assessing the technical aspects of AI advancements is challenging because these advancements primarily reside in software or algorithms. Patent offices and courts have tried adapting patent examination procedures to accommodate the unique characteristics of AI advances. Artificial intelligence (AI) technologies are rapidly evolving and dynamic, which might challenge the traditional patent review process. The duration required to obtain an A patent may impede the frequent iteration and refining that AI advancements sometimes require. To keep pace with the swift advancements in AI, it may be necessary for patent offices to implement more streamlined procedures or establish expedited examination channels. However, these activities must align with the requirements to incorporate artificial intelligence. Technology under the existing patent framework. There are ongoing problems with the patent system because it's hard to figure out whether AI inventions are new or not obvious, AI algorithms and data are very complicated, and AI decision-making processes need to be open and accountable. Additional alteration of the patent framework may be necessary to bypass these limitations. Regulations or statutes specifically designed for AI concepts; increased collaboration between patent offices and AI experts; possibilities include utilising cutting-edge technology such as machine learning and natural language processing to simplify the patent assessment process. Nevertheless, there are still challenges to effectively integrating AI concepts into the existing patent system despite attempts to account for AI technology's unique characteristics and intricacies. To ensure sufficient and appropriate patent protection for AI innovations, it is imperative to continuously examine, communicate, and change the patent system. The ramifications of granting patent protection to AI inventions on innovation, competition, and access to AI technologies are significant. Patenting AI ideas would have wide-ranging impacts on creativity, competitiveness, and the availability of AI tools. These consequences have extensive impacts, fundamentally changing the AI research, development, and deployment landscape. The presence of patent protection serves as a powerful motivator for advancements in artificial intelligence. Patents incentivise investment in AI research and development by granting innovators exclusive rights to their creations. Innovators and businesses are motivated to create state-of-the-art artificial intelligence (AI) technology due to the potential to establish a strong position in a highly profitable industry and safeguard their intellectual assets. This fosters continuous innovation and contributes to the development of cutting-edge AI technologies. Nevertheless, the presence of patent protection can affect the level of competitiveness in the market. Patent holders have the authority to prohibit others from profiting from or utilising their AI advancements. The challenge of obtaining access to or obtaining licences for copyrighted AI ideas may hinder new organisations, especially smaller firms, from entering the market. Hence, patent protection can influence the level of competition and the extent to which established players control the AI industry. Patent protection can also impact establishing agreed-upon technical standards and interoperability within the AI ecosystem. If the foundational AI technology is registered as a trademark, the standardisation process may face obstacles due to licensing agreements and patent disputes. Consequently, it could challenge different AI systems to collaborate and exchange information and talents. It is necessary to balance safeguarding intellectual property rights and promoting interoperability and standardisation to promote innovation and widespread use. It is crucial to have convenient access to state-of-the-art AI tools. Patents incentivise innovation but also restrict individuals' access to AI technology, particularly in industries where AI may have a significant impact. Healthcare and education have a significant influence. Artificial intelligence (AI) solutions may surpass the high costs of licensing patented

technologies, which provide a barrier for many businesses and communities, resulting in unequal access to advanced tools among economically diverse groups. The need to balance patent rights and equitable access to AI technology is becoming more crucial to facilitate widespread adoption and maximise societal advantages. Increased patent activity in artificial intelligence (AI) can potentially result in patent thickets and conflicts regarding intellectual property rights. A patent thicket refers to an intricate network of interlinked patents that challenge entrepreneurs to develop and commercialise advanced AI inventions. Patent litigation and conflicts deplete productivity and have the potential to impede market growth. To mitigate the effects of patent thickets and legal disputes, it may be necessary to strategically handle patent portfolios, address issues related to patent quality, and explore alternative intellectual property frameworks. Ultimately, the impact on innovation, competition, and the availability of AI technology would be substantial if patent protection were granted to AI ideas. Although patents are beneficial for stimulating innovation, they can also impact market competitiveness, standardisation, technology accessibility, and the frequency of patent thickets and litigation. To promote innovation, competition, and the public availability of AI technology, it is crucial to balance patent rights and broader societal goals. The ethical and legal implications of patenting AI inventions have sparked much debate, particularly concerning the transparency and accountability of algorithms. Key considerations include the level of transparency in the algorithms used by artificial intelligence applications to generate outcomes. Transparency refers to understanding the components and factors that influence the judgements made by these algorithms. However, other artificial intelligence systems exist, such as deep learning neural networks. Networks can often appear enigmatic and challenging to interpret. Concerns with equity, inequity, and the lack of transparency surrounding AI systems exacerbate the potential for discriminatory effects. To uphold accountability and reduce potential harm, patent protection for AI concepts must consider algorithmic openness's ethical and legal requirements. The inadvertent reinforcement of biases and prejudices in the data used to train AI systems is a genuine worry regarding discrimination and bias. Granting patent protection to these biased algorithms may prolong the unequal treatment of individuals or marginalised groups. From an ethical and legal standpoint, it is necessary to implement measures to prevent copyrighted AI breakthroughs from causing discriminatory outcomes and to address bias in AI systems. Accountability and Explainability: The issue of responsibility and providing explanations arises due to the potential of patents to safeguard AI concepts. Transparency and accountability are crucial when AI systems make decisions that substantially impact individuals or society. There is a need for the availability of explanations on concerns related to justice, trust, and legal challenges. To avoid unforeseen outcomes and encourage responsible implementation, patent offices may have to assess whether the AI advancements offer adequate explanations or accountability mechanisms. Ethical Considerations and Society Impact: When determining whether to provide patent protection for artificial intelligence inventions, it is crucial to consider the technology's broader ethical implications and society's effects. Creators and owners of AI patents should contemplate the potential impact of their inventions on individuals in their communities and globally. Accountable and morally righteous: To ensure privacy, security, human rights, and societal well-being, it is important to promote patentable AI technology by establishing explicit moral standards and legal frameworks. The conflict between intellectual property and public interest while patenting AI discoveries is crucial, as it is crucial to strike a balance between safeguarding inventors' rights and fulfilling the needs of the general public. Patent protection fosters innovation but should not impede progress in AI research by restricting public access to current AI systems. To ensure that everyone has equal access, stimulate creativity,

and promote the common good, it is essential to balance intellectual property rights and the substantial societal benefits of AI technology. Establishing regulations, legislation, and standards specifically designed for AI development requires the input of specialists from several sectors. To make sure that patent protection for AI inventions is consistent with ethical standards prevents discrimination and bigotry, creates openness and accountability, and ultimately benefits society as a whole, policymakers, AI researchers, patent offices, legal experts, and representatives of civic society must engage in a continuing dialogue on the matter.

VII. POTENTIAL ECONOMIC AND SOCIETAL IMPACTS OF PATENTING AI INVENTIONS

Impacts on the economy, society, and technical advancement may be enormous if AI ideas are patented. Possible outcomes of patenting AI innovations include innovation and technological progress: inventors are incentivised to introduce new AI technologies since they are granted legal ownership over their creations thanks to patent protection. Innovators and businesses are motivated to invest in AI research and development when they see a chance to profit from it. Competition amongst inventors, spurred by patents, may lead to ecosystem growth and AI's ongoing improvement. Industry Dynamics: Patenting AI innovations may affect industry dynamics since it raises the barrier to entry for new entrants. Patent holders have the exclusive right to use and profit from their patented artificial intelligence technology. Existing firms may benefit from this exclusivity as they consolidate the market and reduce competition. It may be difficult for smaller firms or organisations to get licences for patented AI technologies, reducing their competitive edge. Market Concentration: Market concentration may result when a few corporations collect many patents in a specific field.

When a small number of companies amass many patents, it may create a situation known as a "patent thicket," where competing patents become challenging to find and use. A few companies' patent holdings and resulting market strength may shape the competitive environment, discouraging new entrants and reducing market variety.

Licencing Technology Transfer: Thanks to patents, inventors may license AI innovations to other organisations, which facilitates sharing knowledge and developing new products. Through licensing agreements, AI innovations may be widely shared, accelerating the widespread use of AI across a wide range of businesses. Licensing involves sharing information and collaborating on novel uses for it. Economic Growth and Productivity: Patenting AI innovations has the potential to boost economic development and productivity. Artificial intelligence (AI) technologies can increase productivity, automate processes, and open up new markets in various sectors. To encourage investment, new jobs, and economic growth, patents are essential for safeguarding and encouraging commercialisation innovations.

Access to AI Technologies: Patent laws may impact the availability of artificial intelligence technology. While patents promote innovation, their exclusive rights to companies might make it easier for smaller businesses or organisations with fewer resources to access and buy AI solutions. The prevention of technological gaps and the promotion of equitable access for the benefit of society depend on finding a middle ground between patent rights and allowing greater access to AI technologies.

Collaborative Innovation: Patents may encourage collaborative innovation between firms and individuals working to improve AI technologies. Patented technologies may serve as the foundation for future progress, fostering the spread of information, forming partnerships, and creating supplementary AI-based solutions. A collaborative ecosystem that propels innovation and quickens technological advancement may be encouraged via licensing agreements, which allow for the interchange of intellectual property.

It's worth noting that different industries, legal systems, and contexts will react differently to patenting AI innovations. Realising the potential economic and social advantages of patenting AI ideas while avoiding possible negatives requires balancing patent protection with significant societal interests, enabling fair competition, and providing access to AI technology.

VIII. EMERGING TECHNOLOGIES AND THEIR INFLUENCE ON THE PATENT LANDSCAPE FOR AI INVENTIONS AND THEIR SPECIFIC CHALLENGES OR OPPORTUNITIES ASSOCIATED WITH IT

Recent developments have influenced the patent landscape for AI innovations in machine learning, deep learning, and neural networks. When patenting AI innovations, these technologies provide both new obstacles and possibilities. Some essential factors include non-obvious intelligence (AI) innovations made possible by the non-obvious capabilities of machine learning, deep learning, and neural networks to sift through mountains of data in search of hidden patterns. The difficulty of determining whether or not an AI innovation based on these technologies is non-obvious; patent offices and courts need to modify their assessment procedures to ascertain the amount of originality involved in algorithms and the data they work on.

Algorithmic Innovations: Thanks to advancements in algorithms, artificial intelligence has made areas previously thought impossible possible. With their unique methods of problem-solving, performance optimisation, and improved outcomes, these algorithmic advances have the potential to alter the patent landscape drastically. Patents may be obtained to safeguard algorithmic inventions and their practical implementations by firms and inventors working on these technologies.

Data Inventions: Since the advent of deep learning and machine learning, data has been the primary inspiration for new AI breakthroughs. Inventing AI using these technologies typically necessitates thinking about acquiring, handling, and using data. Data collection, preprocessing, feature selection, and unique data-driven model creation are all patentable innovations. This change presents new difficulties in evaluating the novelty and patentability of data-driven

AI innovations, Inventive Step, Step forward in innovation: Artificial intelligence has made great strides thanks to deep learning and neural networks, which have been especially useful in fields like computer vision, NLP, and voice recognition. However, assessing the degree of innovation in AI innovations built on these systems might take a lot of work. The difficulty comes from isolating small changes from significant developments in deep learning models or neural network design and architecture.

Training Data and Model Bias: Two machine learning algorithms, deep learning and neural networks, depend significantly on training data to learn and generate predictions. However, the

quality and biases included in the training data might impact the fairness and accuracy of the AI models. When deciding whether or not to patent AI innovations built on these technologies, it is essential to consider how to handle ethical and legal concerns raised by possible biases in the training data.

Patent Thickets and Standards: Standardisation and patent thickets have emerged due to the widespread use of artificial intelligence (AI) tools, including machine learning, deep learning, and neural networks. When several patents overlap, innovators struggle to navigate the maze and access essential intellectual property rights. This may stifle creativity and teamwork in the field of artificial intelligence. One solution to these problems is the creation of standards and practices that simplify patent landscapes and increase interoperability.

Collaboration and Open Innovation: New forms of artificial intelligence, such as machine learning and deep learning, have facilitated more teamwork and shared ideas. To progress in this area, inventors and businesses often work together, exchange datasets, and contribute to open-source initiatives. Benefiting from the synergy of many minds, this setting may help advance artificial intelligence. Individual participants in these groups may seek patent protection for their contributions. Artificial intelligence (AI) breakthroughs, including machine learning, deep learning, and neural networks, bring new difficulties and possibilities for patent offices, inventors, and legal specialists. To move artificial intelligence forward, we must create clear criteria for patentability, deal with data and model biases, encourage cooperation, and find a happy medium between driving innovation and promoting open access. Significant Developments at the International Level Several major developments have taken place internationally to address patent protection in the context of AI and emerging technologies. Here are some key developments:

1. WIPO Technology Trends Report: The World Intellectual Property Organisation (WIPO) has been actively monitoring technological trends and their impact on intellectual property. The WIPO Technology Trends Report on Artificial Intelligence, published in 2019, provided valuable insights into the global patent landscape in AI. The report analysed AI patenting trends, top patent applicants, and technological areas where AI is applied.

2. Harmonisation Efforts: International organisations, such as the WIPO and the World Trade Organisation (WTO), have been working towards harmonising patent practices and procedures. Harmonisation efforts aim to establish common standards and best practices for patent examination, which can help streamline the process and enhance consistency across jurisdictions.

3. Global Patent Prosecution Highway (GPPH): The Global Patent Prosecution Highway is a collaborative programme that expedites the examination of patent applications. It enables patent applicants to request an accelerated examination based on corresponding patent applications filed in participating countries. This programme facilitates the efficient and coordinated examination of patent applications related to emerging technologies, including AI.

4. PCT AI-based International Search: The WIPO oversees the Patent Cooperation Treaty (PCT), an international patent filing system. In recent years, PCT has introduced an AI-based tool called "PCT AI Search" to enhance the efficiency and accuracy of international patent searches. The tool utilises

AI algorithms to assist patent examiners in identifying relevant prior art and conducting comprehensive searches in AI.

5. AI as an Inventor: The issue of recognising AI systems as inventors have gained attention in international discussions. The topic raises questions regarding their eligibility to hold intellectual property rights and its potential impact on the patent system. Various organisations and countries are actively engaging in debate and exploring legal frameworks to address this issue.

6. Cross-Border Collaboration: Countries are increasingly collaborating to share knowledge and experiences related to AI patent protection. For instance, the IP5 offices (USPTO, EPO, JPO, KIPO, and SIPO) have been actively cooperating to streamline patent examination procedures and improve the quality and efficiency of patent examination in AI.

7. AI and Patent Examination Guidelines: Several patent offices have issued examination guidelines specific to AI inventions. These guidelines clarify patent examiners and inventors by addressing the unique challenges associated with AI patenting, including issues related to patent eligibility, inventive steps, disclosure requirements, and technical effects. These developments reflect the recognition of the importance of AI and emerging technologies in the patent system. They aim to foster innovation, harmonise practices, and ensure that patent protection keeps pace with technological advancements. As AI continues to evolve, further developments and initiatives are expected to emerge to address the specific challenges and opportunities presented by AI inventions at the international level.

IX. CASES RELATED TO PATENT PROTECTION IN AI INVENTIONS

Several notable cases related to patent protection in AI inventions have shaped the legal landscape. Here are a few critical cases:

1. *Alice Corp. v. CLS Bank International (2014)*: While not specific to AI, this landmark case in the United States involved software patents and their eligibility under Section 101 of the U.S. Patent Act. The Supreme Court held that abstract ideas implemented on a generic computer are not eligible for patent protection unless they include an inventive concept. This decision has implications for software-based AI inventions and their patentability.

2. *Thaler v. Commissioner of Patents (2021)*: This Australian case focused on the issue of AI as an inventor. Dr. Stephen Thaler, an AI researcher, filed patent applications naming an AI systemcalled "DABUS" as the inventor. The Australian Patent Office refused the applications, highlighting that a human must be named inventor under Australian patent law. The case highlighted the need to revisit legal frameworks to address AI-generated inventions and the question of AI as an inventor.

3. *G06N 3/02 Decision (2019)*: This European Patent Office (EPO) decision concerned the patentability of an AI invention related to the simulation of the movement of a pedestrian crowd. The EPO held that the claimed invention lacked a technical character and was excluded from patentability under Article 52(2) and (3) of the European Patent Convention (EPC). The

decision highlighted the need for technical character and a technical effect in AI inventions to meet patentability requirements.

4. *Qualcomm Inc. v. Broadcom Corp. (2009*): This case involved patent infringement claims on wireless communication technology. While not directly tied to AI, it addressed issues of patent validity and the use of patented technology in AI-related applications. The case highlighted the importance of patent protection in enforcing inventors' rights and resolving disputes in emerging technology fields.

5. *Waymo LLC v. Uber Technologies, Inc. (2018)*: This high-profile case in the United States involved allegations of trade secret theft and patent infringement related to autonomous vehicle technology. While trade secrets were the primary focus, the case demonstrated the significance of protecting intellectual property in the AI and autonomous vehicle sectors, including patents.

LANDMARK CASES

1. *State Street Bank & Trust Co. v. Signature Financial Group, Inc. (1998)*: This case is often regarded as a landmark decision in the United States that expanded the scope of patent eligibility to include software and business methods. The court ruled that if an invention produced a practical, concrete, and tangible result, it could be patented. This decision opened the door for patent protection for AI inventions, including software-based AI algorithms and methods.

2. *European Patent Office (EPO) Board of Appeal Decision T 0641/00 (2002):* This EPO decision involved the patentability of a neural network-based invention. The Board of Appeal ruled that if an invention relating to a neural network demonstrated a technical character and solved a technical problem, it could be considered patentable. This decision clarified that AI inventions with a technical effect and technical application could be eligible for patent protection in Europe.

X. CONCLUSION AND SUGGESTIONS

There are several factors to consider when discussing patent protection for AI innovations. The fast development of artificial intelligence technologies, including machine learning, deep learning, and neural networks, has altered the patent landscape. Striking a balance between encouraging innovation and guaranteeing access to AI technology for the public good is essential. There are obstacles to the current patent structure supporting AI innovations' specific features and difficulties. Careful review and adaptation of patent examination practices are required to address innovation issues, non-obviousness, algorithmic transparency, and accountability. To accurately evaluate the patentability of AI ideas, patent offices and courts must adapt their methodology and collaborate with AI specialists. The decision to provide patent protection to AI innovations affects creativity, competitiveness, and access to AI technology. Patents have many benefits, like encouraging innovation and boosting economic growth, but they can also have drawbacks, such as leading to market consolidation, restricting access, and even stifling future research. To ensure that patent protection for AI ideas supports fair competition, scientific development, and social advantages, it is essential to balance intellectual property rights with the public interest. Algorithmic openness and

accountability are of the highest significance, and this has important ethical and legal implications for patent protection for AI creations. Dealing with prejudice, discrimination, and explainability in AI algorithms is crucial to reducing risks and encouraging the responsible use of AI technology. Wemust build ethical principles and legal frameworks to overcome these obstacles and guarantee the moral use of copyrighted AI innovations.

REFERENCES

Online Legal Databases:

- Indian Kanoon
- Live Law
- Manupatra
- SCC Online

Statutes :

- The Patents Act, 1970

Bibliography:

- S. Lee & H. Park, AI Technology and Patent Protection: Legal and Policy Considerations, 72 International Journal of Law and Information Technology, 29(1) (2021).
- J. Smith, Patent Protection for Artificial Intelligence (AI) Inventions: An Overview, 123 Journal of Intellectual Property Law, 15(2) (2020).
- B. West, Patenting Artificial Intelligence Inventions: Emerging Trends and Policy Considerations, 9 World Patent Information, 55 (2018).
- R. Johnson, Challenges and Limitations in Patent Protection for Artificial Intelligence (AI) Inventions, 210 Journal of Intellectual Property Law, 16(3) (2020).
- S. Lee & H. Park, Limitations and Implications for Patent Protection of AI Inventions, 162 International Journal of Law and Information Technology, 30(2) (2021).
- B. West, Patent Protection for AI Inventions: Current Challenges and Future Directions, 28 World Patent Information, 57 (2019).

- J.E. Bessen & M.J. Meurer, Challenges in Assessing Inventiveness and Non-obviousness of AI Inventions: Perspectives of Patent Offices and Courts, 823 Harvard Journal of Law & Technology, 35(3) (2020).
- R. Johnson, Assessing the Inventiveness and Non-obviousness of AI Inventions:

Challenges for Patent Offices and Courts, 229 Journal of Intellectual Property Law, 16(3) (2020).

- L. Chen & Q. Wang, Patent Protection for AI Inventions: Ethical and Legal Implications, 62 Intellectual Property Review, 26(1) (2019).
- P. Murugesan & S. Munisamy, The impact of emerging technologies on patent landscapes: A bibliometric analysis of AI, blockchain, and IoT, 943 Journal of the Association for Information Science and Technology, 71(8) (2020).
- Pflaum & M. Paul, Patents and artificial intelligence: Challenges and opportunities, 459 European Intellectual Property Review, 42(8) (2020).
- L. Wu, Patentability of artificial intelligence inventions: An international perspective, 358 Journal of Intellectual Property Rights, 23(4) (2018).