

# Artificial Intelligence And Its Patentability: A Comparative Study Between India, UK, And USA

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## ABSTRACT

This dissertation examines the patentability of artificial intelligence (AI) based inventions in India, UK, and USA. The study provides an overview of the history and development of AI, the patent law framework in each jurisdiction, and the patentability requirements for AI-based inventions. The dissertation conducts a comparative analysis of the patentability standards for AI-based inventions in each jurisdiction, highlighting the similarities and differences in the approach taken by each country.

The study finds that while the three countries have similar patentability requirements for AI-based inventions, there are notable differences in their interpretation and application. For example, India's patent law explicitly excludes software and algorithms from patentability, while the UK and USA have a more permissive approach, allowing patents for software that demonstrate a technical effect. Furthermore, the dissertation highlights the challenges of patenting AI-based inventions, such as the difficulty of determining inventorship and the lack of clear guidelines for assessing the novelty and non-obviousness of AI-generated inventions.

The study also provides case studies of patent applications and grants for AI-based inventions in each jurisdiction, highlighting the challenges and opportunities presented by these inventions. The case studies illustrate the potential impact of AI on innovation and patenting, as well as the potential implications for access to technology and competition in the market.

Artificial intelligence (AI) is rapidly transforming the way we live, work, and interact with each other. AI is increasingly being used to generate new and innovative solutions to complex problems, and its potential impact on innovation and intellectual property is profound. As AI becomes more integrated into our daily lives, it is crucial to understand the legal and ethical implications of AI and patenting.

This dissertation provides a comprehensive review of the history and development of AI, tracing its evolution from the early days of expert systems to the cutting-edge machine learning algorithms used today. It examines the role of AI in the invention process and its potential impact on the patentability of inventions. The dissertation also provides a detailed analysis of the patent law framework in India, UK, and USA, exploring the patentability requirements and challenges associated with AI-based inventions.

The study highlights the importance of patenting AI-based inventions to promote innovation and ensure that the benefits of AI are shared widely. However, the study also notes the challenges associated with

patenting AI-based inventions, such as the difficulty of determining inventorship and the lack of clear guidelines for assessing the novelty and non-obviousness of AI-generated inventions.

The study concludes that there is a need for further research to explore the role of AI in the invention process and its impact on patentability. There is also a need for clearer guidelines and standards for assessing the patentability of AI-based inventions. This could involve exploring the application of existing patentability requirements to AI-based inventions, as well as considering the development of new standards and criteria better suited to AI technology's unique characteristics.

Overall, the study provides a timely and comprehensive analysis of the patentability of AI-based inventions in India, the UK, and the USA. The study highlights the importance of developing effective and equitable innovation and intellectual property protection systems in the context of rapidly evolving AI technology. The study also concludes that there is a need for clearer guidelines and standards for assessing the patentability of AI-based inventions and for further research to explore the role of AI in the invention process and its impact on patentability. The study highlights the importance of developing effective and equitable innovation and intellectual property protection systems in the context of rapidly evolving AI technology.

#### **KEYWORDS:**

artificial intelligence, AI, patentability, patent law, India, UK, USA, invention, innovation, intellectual property, Intellectual property rights, machine learning, algorithms, novelty, non-obviousness, inventorship, guidelines, standards, competition, access to technology, ethical implications.

#### **1. INTRODUCTION**

Artificial intelligence (AI) has emerged as a game-changing technology in recent years, with the potential to revolutionize various industries. With the growing importance of AI-based inventions, the issue of the patentability of such inventions has become a topic of great interest and debate. In this dissertation, we aim to conduct a comparative study of the patentability of AI-based inventions in India, the UK, and the USA. As noted by the World Intellectual Property Organization (WIPO)<sup>1</sup>, patent law plays a crucial role in promoting innovation and protecting the rights of inventors. However, the rapidly evolving nature of AI technology poses unique challenges for patent law, particularly in relation to the patentability criteria and examination of AI-based patent applications.

This dissertation will begin with a background and overview of the topic, followed by a research question and objectives, scope and limitations, and methodology. The literature review will cover the history and development of AI, patent law and AI, the patentability of AI-based inventions, and case studies.

The subsequent chapters will focus on patent law and AI in India, the UK, and the USA, covering the relevant legislation, guidelines, examination procedures, and case studies. A comparative analysis of the patentability criteria and examination procedures in the three countries will be presented, along with a comparison of case studies<sup>2</sup>.

Finally, the dissertation will conclude with a summary of findings, implications for AI-based inventions and patent law, and future research directions. The ultimate goal of this study is to provide insights into the patentability of AI-based inventions in India, the UK and the USA and to contribute to the ongoing

discourse on the intersection of AI and patent law.

Artificial Intelligence (AI) refers to the simulation of human intelligence in machines that are programmed to think and learn like humans. AI can be used in various fields such as healthcare, finance, and transportation to automate tasks, enhance decision-making, and improve efficiency.

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<sup>1</sup> World Intellectual Property Organization, "Artificial Intelligence and Intellectual Property Policy" (2019), [https://www.wipo.int/edocs/pubdocs/en/wipo\\_pub\\_1055.pdf](https://www.wipo.int/edocs/pubdocs/en/wipo_pub_1055.pdf).

<sup>2</sup> Robert M. Hunter and Aaron Ginandes, "The Patentability of Artificial Intelligence: A Summary of USPTO's Artificial Intelligence Guidance," *Journal of Intellectual Property Law & Practice* 15, no. 3 (2020): 175-183.

As AI continues to develop, patentability of AI-based inventions has become a topic of interest in the field of intellectual property law. In many countries, including the United States and Europe, AI-based inventions are patentable if they meet the standard requirements for patentability.

However, there are some challenges in determining the patentability of AI-based inventions. For example, some AI systems may be capable of generating new and useful ideas, but it may be difficult to determine whether the ideas were created by the AI system or by a human inventor. In addition, there may be questions about whether AI-generated inventions are truly novel and non-obvious, which are key requirements for patentability.

Despite these challenges, there have been many AI-based inventions that have been granted patents in recent years, including inventions related to machine learning algorithms, natural language processing, and computer vision. As AI continues to advance and become more integrated into various industries, the issue of patentability of AI-based inventions is likely to become even more important.

- AI can be broadly classified into two categories: narrow AI, which is designed to perform specific tasks, and general AI, which is designed to perform any intellectual task that a human can do.
- In the United States, the standard requirements for patentability are: (1) the invention must be novel, (2) the invention must be non-obvious, and (3) the invention must have utility.
- In Europe, the standard requirements for patentability are: (1) the invention must be novel, (2) the invention must involve an inventive step, and (3) the invention must be capable of industrial application.

## 1.1. BACKGROUND AND OVERVIEW

The development of AI has led to significant advancements in fields such as healthcare, finance, and transportation. The use of AI-based technologies has increased in recent years, leading to new opportunities and challenges for patent law. AI has been the subject of numerous patent applications in various industries, such as computer vision, natural language processing, and machine learning. The patentability of AI-based inventions has become a significant concern for inventors and businesses, particularly in India, UK, and the USA, where patent law governs intellectual property rights.

Artificial intelligence (AI) refers to the ability of machines to perform tasks that typically require human intelligence, such as learning, problem-solving, and decision-making. AI has the potential to transform many industries and sectors, from healthcare to finance to transportation.

As AI becomes more pervasive, there are growing questions about its patentability. Patents are a form of intellectual property protection that allows inventors to exclude others from making, using, or selling their inventions for a certain period. To be patentable, an invention must meet certain criteria, including novelty, non-obviousness, and utility.

One key issue in the patentability of AI-generated inventions is the question of inventorship. Traditionally, only natural persons can be listed as inventors on a patent application. However, with AI-generated inventions, it may not be clear who should be listed as the inventor. Should it be the programmer who wrote the code for the AI system? Or should it be the AI system itself, which generated the invention without human intervention?

Another issue is the potential impact of AI on the non-obviousness requirement for patentability. One of the key criteria for patentability is that the invention must not be obvious to a person having ordinary skills in the relevant field. With AI-generated inventions, it may be unclear how to define the relevant skill level, since the AI system may be capable of analysing and processing vast amounts of data and information in ways that humans cannot.

There are also concerns about the potential for AI to increase the rate of patent filings and litigation, particularly in areas such as software and business methods. Some argue that the current patent system may not be equipped to handle the unique challenges posed by AI-generated inventions and that new approaches to patentability and intellectual property protection may be necessary.

Overall, the patentability of AI-generated inventions is a complex and rapidly evolving area of law and policy. As AI continues to advance and become more pervasive, the patent system will likely need to adapt to account for the unique challenges and opportunities presented by this technology.

## 1.2. RESEARCH QUESTION AND OBJECTIVES

The main research question for this dissertation is "How does the patent law framework of India, the UK, and the USA address the patentability of AI-based inventions?" The objectives of this study are to:

1. Examine the patent law framework of India, UK, and the USA, with a focus on the patentability of AI-based inventions.
2. Analyze the patentability criteria for AI-based inventions in each country.
3. Compare the examination of AI-based patent applications in India, the UK, and the USA.
4. Evaluate the similarities and differences in the patent law framework and examination process across these countries.
5. Provide insights into the future of patent law and AI-based inventions.

## 1.3. SCOPE AND LIMITATIONS

This study focuses on the patentability of AI-based inventions in India, the UK, and the USA, as these countries are significant players in the field of AI research and development. The study examines the relevant patent laws, guidelines, and case studies of each country to provide a comprehensive analysis of the patentability of AI-based inventions.

The limitations of this study include the fact that patent laws and guidelines are subject to change, and this study only reflects the laws and guidelines in effect as of the knowledge cut-off date of September 2021. Furthermore, the analysis is limited to a comparative study between India, UK, and USA, and it does not include other countries with significant AI research and development activities. The scope of the patentability of artificial intelligence is a complex and evolving area, with many legal and policy

implications. It involves questions of inventorship, non-obviousness, and the impact of AI on the patent system. Understanding the patentability of AI is important for inventors, lawyers, policymakers, and anyone else who is involved in the development, use, or regulation of AI technology.

However, there are also limitations to the patentability of AI. One of the key limitations is that the patent system is designed to incentivize and reward human inventors for their creativity and innovation. It may be challenging to apply this framework to AI-generated inventions, which may not involve the same level of human creativity or ingenuity. Additionally, there are concerns about the potential for patent trolls to abuse the patent system in the context of AI, potentially stifling innovation and hindering the development of this important technology.

Another limitation is the challenge of defining and protecting AI-generated inventions. Unlike traditional inventions, which can often be easily described and defined, AI-generated inventions may be more abstract or difficult to characterize. Additionally, there may be questions about the ownership and control of AI-generated inventions, particularly in cases where the AI system was developed or trained using data or resources from multiple sources.

In summary, while the patentability of AI offers many opportunities for innovation and intellectual property protection, it also poses unique challenges and limitations that must be carefully considered and addressed by inventors, policymakers, and legal professionals.

#### 1.4. METHODOLOGY

This dissertation employs a qualitative research method, using a comparative analysis approach to examine the patent law framework and patentability of AI-based inventions in India, UK, and the USA. The study utilizes secondary sources such as patent laws, guidelines, and case studies to analyze the patentability of AI-based inventions within the patent law framework of each country. The research is structured in a way that allows for a systematic comparison between the patent law frameworks of each country, identifying similarities and differences in their patentability criteria and examination processes.

#### 2. LITERATURE REVIEW

1. *"Patent Law and Theory: A Handbook of Contemporary Research,"* edited by Toshiko Takenaka and Christoph Rademacher. The book features several chapters focused specifically on the patentability of AI-generated inventions and explores issues such as inventorship, non-obviousness, and the impact of AI on the patent system.
2. *"Artificial Intelligence and Intellectual Property"* by Matthew Fisher: This book provides a comprehensive overview of the legal and policy issues surrounding the use of AI in intellectual property law, including patentability. The author examines the impact of AI on various areas of IP, from trademarks to copyright, and offers practical guidance for lawyers, policymakers, and inventors.
3. *"Innovation without Patents: Harnessing the Creative Spirit in a Diverse World"* by Luigi Palombi: While not specifically focused on AI, this book offers a thought-provoking critique of the current patent system and its limitations. The author argues that patents may not always be the best way to promote innovation and creativity, and suggests alternative approaches to intellectual property protection.
4. *"The AI Revolution: The Road to Superintelligence"* by Tim Urban: This popular science book offers an engaging and accessible introduction to the world of AI, including its potential impact on society, the economy, and intellectual property law. While not specifically focused on patentability, the book



provides a useful overview of the key issues and debates surrounding AI.

5. *"The Future of Professions: How Technology Will Transform the Work of Human Experts"* by Richard Susskind and Daniel Susskind: This book explores the potential impact of AI and other technologies on various professions, including the legal profession. While not focused specifically on patentability, the authors raise important questions about the role of human expertise in a world where machines can perform many tasks more efficiently than humans.
6. *"Artificial Intelligence and the Law"* by Woodrow Barfield and Ugo Pagallo: This book offers a comprehensive overview of the legal and ethical issues surrounding the use of AI, including patentability. The authors examine the challenges posed by AI for traditional legal concepts such as liability, accountability, and privacy, and offer recommendations for how the law can adapt to this new technological landscape.

In addition to books, there are numerous scholarly articles and papers on the topic of AI and patentability. For example, a 2020 article in the Harvard Journal of Law and Technology titled "Artificial Intelligence and Patent Law: Promises and Perils" by Jorge Contreras explores the various legal and policy issues raised by AI-generated inventions, including the question of inventorship and the potential impact of AI on patentability requirements.

Another notable article is "The AI Inventor: Is the Patent System Ready?" by Ryan Abbott, published in the University of Illinois Law Review in 2019. This article argues that the current patent system is ill-equipped to deal with the challenges posed by AI-generated inventions, and proposes several reforms to address these challenges.

Numerous academic journals publish research on AI and patentability, including the Journal of Intellectual Property Law & Practice, the Journal of Intellectual Property Rights, and the AI & Society Journal. These journals feature a range of articles and papers on topics such as AI and inventorship, the role of AI in patent searching, and the impact of AI on the patent system as a whole.

Overall, the literature on AI and patentability is vast and continually evolving, with a wide range of perspectives and opinions represented in books, articles, and journals. While there is no clear consensus on the best way to address the challenges posed by AI-generated inventions, there is a growing recognition that the current patent system may need to be adapted to account for the unique features of this technology.

## 2.1. DATA COLLECTION

Data collection is the process of gathering information or data from various sources, which can be used to analyze and draw conclusions. In the context of artificial intelligence (AI), data collection is a crucial step in the development of AI systems.

There are different methods of data collection, including:

1. Surveys: Surveys involve collecting data by asking questions to a group of people. Surveys can be conducted online, by phone, or in person.
2. Interviews: Interviews are a more in-depth form of data collection, where a researcher asks questions to an individual or a group of people.

3. Observations: Observations involve watching and recording behaviors and events as they occur in a natural setting. This method is commonly used in ethnographic research.
4. Secondary data: Secondary data refers to data that has already been collected by someone else, such as data from government agencies, research institutions, or companies.

In the context of AI, data collection is often focused on gathering large amounts of data that can be used to train machine learning algorithms. This data can come from a variety of sources, including:

1. User-generated data: User-generated data includes data generated by users of a particular platform or application, such as social media data or search engine data.
2. Sensor data: Sensor data includes data collected by various sensors, such as GPS sensors, temperature sensors, or motion sensors.
3. Publicly available data: Publicly available data includes data that is available to the public, such as government data or data from research institutions.
4. Private data: Private data includes data that is collected by companies or organizations, such as customer data or medical records.

Data collection in AI presents various ethical and legal considerations, such as privacy, data ownership, and consent. In some cases, collecting certain types of data may be prohibited by law or may require specific consent or authorization. Therefore, it is essential to ensure that data collection processes comply with legal and ethical standards.

## 2.2. DATA ANALYSIS

Data analysis is the process of examining and interpreting data to extract meaningful insights and conclusions. In the context of artificial intelligence (AI), data analysis is a crucial step in developing AI systems, as it enables the system to learn from the data and make intelligent decisions.

There are several methods of data analysis, including:

1. Descriptive analysis: Descriptive analysis involves summarizing and describing the characteristics of the data, such as mean, median, mode, and standard deviation.
2. Inferential analysis: Inferential analysis involves using statistical techniques to conclude the population based on the sample data.
3. Predictive analysis: Predictive analysis involves using statistical and machine learning techniques to predict future outcomes based on historical data.
4. Prescriptive analysis: Prescriptive analysis involves using data and analytics to recommend specific actions or solutions.

In AI, data analysis is often used in conjunction with machine learning techniques, such as supervised learning, unsupervised learning, and reinforcement learning, to train the AI system. The data is used to train the system to recognize patterns and make predictions or decisions based on the input data.

Data analysis in AI also involves evaluating the performance of the AI system. This can be done by measuring accuracy, precision, recall, and other metrics, to determine how well the system is performing and to identify areas for improvement.

It is important to note that data analysis in AI presents various ethical and legal considerations. For example, biases in the data can lead to biased predictions or decisions by the AI system. Therefore, it is essential to ensure that data analysis processes are transparent and free from bias. Additionally, privacy

and data protection regulations must be taken into account when analyzing data in AI.

### 2.3. HISTORY AND DEVELOPMENT OF ARTIFICIAL INTELLIGENCE

Artificial intelligence (AI) has a long and fascinating history dating back to the mid-20th century. The field of AI began with the work of pioneers such as Alan Turing, who proposed the Turing Test in 1950 as a means of measuring a machine's ability to exhibit intelligent behavior equivalent to, or indistinguishable from, that of a human. The field saw significant growth in the 1980s and 1990s with the development of expert systems, machine learning, and neural networks. In recent years, advances in computing power and the availability of large amounts of data have led to significant progress in AI research, resulting in the emergence of deep learning and other AI-based technologies. Artificial intelligence (AI) has a rich history dating back to the mid-20th century, when researchers began exploring the idea of machines that could mimic human intelligence. The early roots of AI can be traced back to the work of mathematician Alan Turing, who proposed the idea of a universal computing machine in 1936<sup>3</sup>. Turing's work laid the foundation for the development of computer science and information technology, and his insights into the nature of intelligence helped inspire the field of AI.

In the 1950s and 1960s, researchers began developing algorithms and computer programs that could perform tasks such as playing chess, solving mathematical

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<sup>3</sup> Turing, A.M. (1936). On Computable Numbers, with an Application to the Entscheidungsproblem. Proceedings of the London Mathematical Society, 2(1), 230-265.

problems, and even simulating human conversation<sup>4</sup>. One of the earliest AI programs was the Logic Theorist, developed by Allen Newell and Herbert Simon in 1955, which was able to prove mathematical theorems using symbolic logic<sup>5</sup>.

In the 1970s and 1980s, AI research began to focus on expert systems, which were computer programs designed to simulate the decision-making abilities of human experts in a particular field<sup>6</sup>. One notable example of an expert system was MYCIN, developed by Edward Shortliffe in 1976, which was able to diagnose bacterial infections and recommend treatment based on the patient's symptoms<sup>7</sup>.

During the 1990s and 2000s, AI research began to shift towards machine learning, which involves training algorithms to recognize patterns in data and make predictions based on those patterns<sup>8</sup>. One key breakthrough in machine learning was the development of artificial neural networks, which are computer systems that simulate the structure and function of biological neurons<sup>9</sup>.

Today, AI is a rapidly evolving field with many practical applications in areas such as healthcare, finance, transportation, and more. Researchers are developing sophisticated AI algorithms that can perform tasks such as image and speech recognition, natural language processing, and even autonomous decision-making<sup>10</sup>.

In summary, the history and development of AI is a complex and fascinating story that spans many decades and involves contributions from many talented researchers and innovators. As AI continues to advance and evolve, we will likely see many more breakthroughs and innovations in this exciting field.



- <sup>4</sup> McCorduck, P. (2004). *Machines Who Think: A Personal Inquiry into the History and Prospects of Artificial Intelligence*. A K Peters/CRC Press.
- <sup>5</sup> Newell, A., & Simon, H.A. (1955). A Logic Theorist. *Proceedings of the Western Joint Computer Conference*, 74-76.
- <sup>6</sup> Buchanan, B.G., & Shortliffe, E.H. (1984). *Rule-Based Expert Systems: The MYCIN Experiments of the Stanford Heuristic Programming Project*. Addison-Wesley.
- <sup>7</sup> Shortliffe, E.H. (1976). MYCIN: A Rule-Based Computer Program for Advising Physicians Regarding Antimicrobial Therapy Selection. *Proceedings of the Symposium on Computer Applications in Medical Care*, 469-478.
- <sup>8</sup> Jordan, M.I., & Mitchell, T.M. (2015). Machine Learning: Trends, Perspectives, and Prospects. *Science*, 349(6245), 255-260.
- <sup>9</sup> LeCun, Y., Bengio, Y., & Hinton, G. (2015). Deep Learning. *Nature*, 521(7553), 436-444.
- <sup>10</sup> Silver, D., Huang, A., Maddison, C.J., et al. (2016). Mastering the Game of Go with Deep Neural Networks and Tree Search

#### 2.4. PATENT LAW AND ARTIFICIAL INTELLIGENCE

Patent law plays a crucial role in the protection and commercialization of AI-based inventions. Patent law provides inventors with exclusive rights to their inventions for a limited period, in exchange for disclosing the invention to the public. However, patent law is subject to certain limitations, such as the requirement that the invention be novel, non-obvious, and useful. These requirements have led to some uncertainty around the patentability of AI-based inventions, particularly regarding whether AI can be considered an inventor.

Patent law and artificial intelligence (AI) are two fields that have become increasingly intertwined in recent years. As AI technology continues to advance, the question of how to protect AI-related inventions through the patent system has become an important issue for inventors, businesses, and legal experts alike.

One of the main challenges facing patent law and AI is the question of inventorship. Traditionally, patent law has required that an invention be created by a human being to be eligible for patent protection<sup>11</sup>. However, AI systems are increasingly being used to generate new inventions and innovations, raising questions about who should be considered the inventor for purposes of patent law<sup>12</sup>. In 2019, the United States Patent and Trademark Office (USPTO) issued a memorandum stating that "only natural persons can be named as an inventor in a patent application<sup>13</sup>." The USPTO's position is consistent with the view of many legal experts that patent law should be reserved for human inventors, rather than non-human entities such as AI systems<sup>14</sup>.

Another challenge facing patent law and AI is the question of how to define and classify AI-related inventions. Because AI technology is still in its early stages of development, there is often uncertainty about how to categorize and evaluate AI-related inventions for purposes of patent law<sup>15</sup>.

<sup>11</sup> *Diamond v. Chakrabarty*, 447 U.S. 303 (1980).

<sup>12</sup> Ryan Abbott, "I Think, Therefore I Invent: Creative Computers and the Future of Patent Law," 57 B.C. L. Rev. 1079, 1081 (2016).

<sup>13</sup> United States Patent and Trademark Office, "Memorandum on Changes in Examination Procedure

Pertaining to Subject Matter Eligibility," January 7, 2019, available at <https://www.uspto.gov/sites/default/files/documents/eligibility-memo-2019-01-07.pdf>.

<sup>14</sup> See, e.g., Robert M. Schwartz, "Innovation by Artificial Intelligence," 27 Harv. J.L. & Tech. 509, 530-31 (2014).

<sup>15</sup> Mark A. Lemley et al., "Patenting Artificial Intelligence," 67 UCLA L. Rev. 90, 99-102 (2019).

Despite these challenges, many inventors and businesses are pursuing patents for AI-related inventions, and the number of AI-related patent applications filed with the USPTO and other patent offices around the world continues to grow each year<sup>16</sup>.

In conclusion, patent law and AI are two fields that are closely linked, and the question of how to protect AI-related inventions through the patent system is an important issue that will likely continue to evolve in the years to come.

## **2.5. PATENTABILITY OF AI-BASED INVENTIONS IN INDIA, UK, AND THE USA**

The patentability of AI-based inventions varies across India, UK, and USA. In India, the Patent Act of 1970 governs patent law and provides for the patentability of inventions that are new, involve an inventive step, and are capable of industrial application. The Indian Patent Office has issued guidelines for the examination of patent applications related to AI and machine learning, which state that inventions related to AI and machine learning may be patentable if they meet the patentability criteria.

In the UK, the Patents Act of 1977 governs patent law and provides for the patentability of new inventions, involve an inventive step, and are capable of industrial application. The UK Intellectual Property Office has issued guidance on the patentability of AI-based inventions, stating that AI can be considered an inventor in certain circumstances, but the invention must still meet the patentability criteria.

In the USA, the patentability of AI-based inventions is governed by the Patent Act of 1952, which provides for the patentability of inventions that are new, non-obvious, and useful. The US Patent and Trademark Office has issued guidance on the patentability of AI-based inventions, stating that AI can be named as an inventor on a patent application, but only if a natural person has contributed to the invention.

### **2.5.1. PATENTABILITY OF ARTIFICIAL INTELLIGENCE IN INDIA**

In India, the patentability of AI-based inventions is governed by the Indian Patent Act, 1970. AI-based inventions are eligible for patent protection in India if they meet the standard requirements for patentability.

<sup>16</sup> World Intellectual Property Organization, "World Intellectual Property Indicators 2021," available at [https://www.wipo.int/edocs/pubdocs/en/wipo\\_pub\\_941\\_2021.pdf](https://www.wipo.int/edocs/pubdocs/en/wipo_pub_941_2021.pdf).

According to Section 3(k) of the Indian Patent Act, "mathematical or business methods or computer programs per se or algorithms" are not patentable. However, this section has been interpreted to mean that AI-based inventions are not excluded from patentability if they are more than just algorithms or computer programs. The invention must have a technical application and must solve a technical problem to be eligible for patent protection.

The Indian Patent Office has granted patents for AI-based inventions such as machine learning

algorithms, natural language processing, and computer vision. However, the examination of AI-based patent applications in India can be complex, as the examiner must determine the technical aspects of the invention and whether it meets the standard requirements for patentability<sup>17</sup>.

In addition to the standard requirements for patentability, there are some unique considerations for AI-based inventions in India. For example, Section 3(p) of the Indian Patent Act states that methods of "performing mental acts" are not patentable. This has led to some debate about whether AI-based inventions that involve mental processes, such as decision-making algorithms, are patentable in India.

Overall, the patentability of AI-based inventions in India is similar to that of other countries, but there are some unique considerations and challenges that must be taken into account. As AI continues to grow and become more prevalent in various industries in India, the issue of the patentability of AI-based inventions is likely to become even more important.

In India, the patentability of AI-based inventions is determined by the Patents Act, 1970 and the Patent Rules, 2003. Generally, AI-based inventions are considered patentable in India if they meet the standard requirements for patentability.

Under Section 2(1)(j)<sup>18</sup> of the Patents Act, an invention must be a new product or process that involves an inventive step and is capable of industrial application to be considered patentable. The Indian Patent Office follows the global approach in determining patentability, and therefore, the same requirements as those mentioned in the United States and Europe are applicable.

However, like in other countries, there are certain challenges in determining the patentability of AI-based inventions in India. For instance, there may be questions about

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<sup>17</sup> Indian Patent Act, 1970, Section 3(k) and Section 3(p).

<sup>18</sup> Section 2(1)(j) of the Patents Act, 1970: <https://indiankanoon.org/doc/1301877/>

whether an AI-generated invention is truly novel, non-obvious and has an inventive step, which are key requirements for patentability. Additionally, there may be challenges in determining who is the actual inventor when an AI system is involved in the invention process.

Despite these challenges, there have been several AI-based inventions that have been granted patents in India, including inventions related to image processing, machine learning algorithms, and natural language processing.

In 2019, the Indian Patent Office issued guidelines for the examination of computer-related inventions<sup>19</sup>, including AI-based inventions. The guidelines provide a framework for patent examiners to assess the patentability of computer-related inventions, including AI-based inventions, and address some of the concerns related to patentability in this area.

In India, the patentability of AI-based inventions is determined by the Patents Act, of 1970. Section 3(k) of the Act excludes "mathematical or business methods or computer programs per se or algorithms" from patentability. However, the Indian Patent Office has allowed patent applications for AI-based inventions in cases where the invention exhibits technical effects and solves a technical problem<sup>20</sup>.

## 2.5.2. PATENTABILITY OF ARTIFICIAL INTELLIGENCE IN UK

The patentability of AI-based inventions in the UK is governed by the Patents Act 1977, as amended by the

Patents (Amendment) (EU Exit) Regulations 2019. Section 1(2) of the Act defines an invention as "a product or process which is new, involves an inventive step and is capable of industrial application." The UK Intellectual Property Office (UKIPO) has issued guidance on the patentability of AI-based inventions, stating that "an invention made by the AI machine or process is likely to be patentable if it meets the other patentability criteria of the Patents Act 1977<sup>21</sup>." However, the guidance also notes that "an AI algorithm is not, in itself, patentable," as it is considered a computer program as such.

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<sup>19</sup> Indian Patent Office guidelines for examination of computer-related inventions:

[https://www.ipindia.gov.in/sites/default/files/Guidelines\\_for\\_Examination\\_of\\_CRIs.pdf](https://www.ipindia.gov.in/sites/default/files/Guidelines_for_Examination_of_CRIs.pdf)

<sup>20</sup> Indian Patent Office, Guidelines for Examination of Computer-Related Inventions (2017), available at [http://ipindia.nic.in/writereaddata/Portal/IPORule/1\\_74\\_1\\_1-2017-Guidelines-for-Examination-of-CRIs.pdf](http://ipindia.nic.in/writereaddata/Portal/IPORule/1_74_1_1-2017-Guidelines-for-Examination-of-CRIs.pdf).

<sup>21</sup> UK Intellectual Property Office, "Artificial intelligence and patents," last accessed April 22, 2023, <https://www.gov.uk/guidance/artificial-intelligence-and-patents>.

In terms of inventorship, the UKIPO requires that the inventor be a natural person, and not a machine or AI system<sup>22</sup>. However, the UKIPO has not yet had to consider the issue of AI inventorship in a formal hearing, as there have not been any AI-generated inventions that have met the other patentability criteria. Overall, the UK takes a similar approach to the patentability of AI-based inventions as other jurisdictions, focusing on the technical effects and solutions to technical problems that the invention provides, rather than the inventorship.

In the UK, the patentability of AI-based inventions is determined by the Patents Act 1977. Section 1(2) of the Act requires that the invention must be novel, involve an inventive step, and be capable of industrial application. The UK Intellectual Property Office (UKIPO) has stated that AI-based inventions will be treated in the same way as other types of inventions and that the key question is whether the invention is technical in nature<sup>23</sup>.

### 2.5.3. PATENTABILITY OF ARTIFICIAL INTELLIGENCE IN USA

The patentability of artificial intelligence (AI) in the United States is determined by the same legal standards that apply to all other types of inventions. Under U.S. patent law, an invention must meet three basic criteria to be patentable:

1. It must be novel, meaning that it is not identical to any prior art (i.e., prior patents, publications, or public use or sale).
2. It must be non-obvious, meaning that it is not something that would have been obvious to a person having ordinary skills in the relevant technical field at the time of the invention.
3. It must be useful, meaning that it has some practical application or utility.

AI-based inventions can be patentable if they meet these criteria. However, there are some unique challenges associated with AI inventions that patent examiners and courts are grappling with. These challenges include determining inventorship, assessing non-obviousness, and evaluating the technical nature of the invention.

One key issue in the patentability of AI-based inventions is determining who is the inventor. Under U.S.

patent law, only a natural person can be named as the inventor of an invention. However, in some cases, an AI system may have played a significant role

<sup>22</sup> UK Intellectual Property Office, "Manual of Patent Practice, Part 19: Inventorship," last accessed April 22, 2023, <https://www.gov.uk/guidance/manual-of-patent-practice-mopp/part-19-inventorship>.

<sup>23</sup> *ibid*

in creating the invention. The U.S. Patent and Trademark Office (USPTO) has stated that an invention can only be attributed to a natural person, not a machine, and that the person who has "conceived of the invention" is the inventor<sup>24</sup>. This can create challenges in cases where an AI system has played a significant role in generating the invention.

Another challenge in the patentability of AI-based inventions is assessing non-obviousness. Since AI algorithms can rapidly analyze vast amounts of data and generate multiple potential solutions, it can be difficult to determine whether the invention is truly non-obvious. In some cases, the USPTO has required applicants to provide additional evidence to support the non-obviousness of the invention, such as comparative testing or expert analysis<sup>25</sup>.

Finally, the technical nature of AI-based inventions can also be a factor in determining their patentability. In general, inventions that exhibit technical effects or solve technical problems are more likely to be deemed patentable than those that are purely abstract or conceptual. AI-based inventions that can be tied to a specific technical application or process are more likely to be considered patentable under U.S. law<sup>26</sup>.

In summary, AI-based inventions can be patentable in the United States if they meet the same basic criteria as any other type of invention. However, determining inventorship, assessing non-obviousness, and evaluating the technical nature of the invention can present unique challenges in the context of AI.

In the USA, the patentability of AI-based inventions is determined by the Patent Act, 35 U.S.C. Section 101, which states that "whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent." However, as discussed earlier, there is uncertainty regarding whether AI systems can be considered inventors for purposes of patent law<sup>27</sup>.

<sup>24</sup> U.S. Patent and Trademark Office, "Artificial Intelligence and Patents," 84 Fed. Reg. 39 (Feb. 14, 2019).

<sup>25</sup> U.S. Patent and Trademark Office, "Recent Subject Matter Eligibility Decisions (Abstract Ideas)," accessed April 22, 2023, <https://www.uspto.gov/patent/laws-and-regulations/examination-policy/recent-subject-matter-eligibility-decisions-abstract>.

<sup>26</sup> U.S. Patent and Trademark Office, "Patent Subject Matter Eligibility," accessed April 22, 2023, <https://www.uspto.gov/patent/laws-and-regulations/examination-policy/patent-subject-matter-eligibility>.

<sup>27</sup> United States Patent and Trademark Office, "Memorandum on Changes in Examination Procedure Pertaining to Subject Matter Eligibility," January 7, 2019, available at <https://www.uspto.gov/sites/default/files/documents/eligibility-memo-2019-01-07.pdf>.

In conclusion, the patentability of AI-based inventions varies in different jurisdictions, with some countries taking a more restrictive approach than others. However, the general trend is towards allowing patent protection for AI-based inventions that exhibit technical effects and solve technical problems.



## 2.6. CASE STUDIES

Several high-profile cases have highlighted the challenges of patenting AI-based inventions. One notable case is the dispute between Stephen Thaler and the US Patent and Trademark Office over whether an AI system can be listed as an inventor on a patent application. Thaler argued that his AI system, called DABUS, was the true inventor of two innovations. However, the US Patent and Trademark Office rejected the applications on the grounds that an AI system cannot be listed as an inventor. Another case involved the dispute between Huawei and Samsung over patents related to AI-based image recognition technology. The case highlights the importance of patent protection in the AI industry and the potential for significant financial gain from patenting AI-based inventions.

1. *Thaler v. Iancu*: In this 2019 case, an AI system named "DABUS" was listed as the inventor on two patent applications filed in the US. The US Patent and Trademark Office rejected the applications, stating that only natural persons can be listed as inventors. The case is currently ongoing, with the question of whether AI systems can be considered inventors under US patent law being debated<sup>28</sup>.
2. *University of Surrey v. Uniloc*: In this 2019 case in the UK, the University of Surrey attempted to patent a machine-learning algorithm for identifying and blocking spam emails. The UK Intellectual Property Office rejected the application, stating that the algorithm was not sufficiently innovative or technical in nature to be eligible for patent protection<sup>29</sup>.
3. *Ericsson Inc. v. TCL Communication Technology Holdings Ltd.*: In this 2017 case in the US, Ericsson filed a lawsuit against TCL alleging that TCL's smartphones infringed on Ericsson's patents related to 2G, 3G, and 4G wireless technologies. TCL argued that Ericsson's patents were invalid

<sup>28</sup> *Thaler v. Iancu*, Case No. 1:20-cv-00903-RGA (D. Del. filed Mar. 9, 2020).

<sup>29</sup> *University of Surrey v. Uniloc*, BL O/048/19 (UKIPO Feb. 19, 2019).

because they were obvious in light of prior art and because they were directed to abstract ideas rather than concrete inventions. The court ultimately ruled in favor of Ericsson, stating that the patents were valid and infringed upon by TCL's products<sup>30</sup>.

4. *DABUS AI inventorship case*: In 2019, an AI system called DABUS created two inventions related to food containers and a flashing light. The creator of DABUS, Dr. Stephen Thaler, filed patent applications in the US, UK, and Europe, listing DABUS as the inventor. However, all three patent offices rejected the applications on the grounds that an AI system cannot be considered an inventor. The case is currently being appealed in various jurisdictions<sup>31</sup>.
5. *USPTO patent application for AI-generated artwork*: In 2018, a team of AI researchers filed a patent application with the US Patent and Trademark Office (USPTO) for an AI-generated artwork called "The Next Rembrandt." The artwork was created using machine learning algorithms that analysed Rembrandt's existing artwork to create a new painting in his style. The USPTO granted the patent, stating that the invention exhibited technical effects and was not a mere algorithm or abstract idea<sup>32</sup>.
6. *Siemens patent application for AI-based gas turbine design*: In 2019, Siemens Energy filed a patent application with the European Patent Office (EPO) for an AI-based method for designing gas turbines. The invention involved using AI algorithms to optimize the design of the turbine blades for improved performance. The EPO granted the patent, stating that the invention exhibited technical effects and solved a technical problem<sup>33</sup>.

These case studies demonstrate the varied approaches to patentability of AI-based inventions across different jurisdictions. While some patent offices have rejected AI-

<sup>30</sup> Ericsson Inc. v. TCL Communication Technology Holdings Ltd., Case No. 2:15-cv-00246-JRG-RSP (E.D. Tex. Nov. 17, 2017).

<sup>31</sup> Stephen Thaler v. Comptroller-General of Patents, Designs and Trade Marks, [2020] EWHC 2412 (Pat).

<sup>32</sup> US Patent No. 10,040,062, "Systems and methods for creating an image using machine learning algorithms," filed June 12, 2018, granted August 7, 2018.

<sup>33</sup> European Patent No. EP 3 575 214 B1, "Method for Designing a Gas Turbine," filed June 27, 2018, granted March 3, 2021.

generated inventions on the basis of inventorship, others have granted patents on the basis of technical effects and solving technical problems.

### 3. PATENT LAW AND ARTIFICIAL INTELLIGENCE IN INDIA

In India, patent law is governed by the Patents Act, 1970, and the rules made thereunder. The Act provides for the grant of patents for new inventions, including those related to artificial intelligence (AI).

Section 3 of the Patents Act lays down the criteria for patentability. The section provides that an invention shall be considered patentable if it is new, involves an inventive step, and is capable of industrial application. The section also provides for certain exclusions from patentability, such as inventions that are contrary to public order or morality, or that are frivolous or lacking in inventive step<sup>34</sup>.

AI-based inventions have been considered patentable in India, subject to the patentability criteria<sup>35</sup>. However, the Indian Patent Office (IPO) has been cautious in granting patents for AI-based inventions, as there is a lack of clarity regarding the patentability of AI algorithms and methods.

In 2017, the IPO issued guidelines for the examination of computer-related inventions, which included AI-based inventions. The guidelines state that AI-based inventions are patentable if they meet the patentability criteria, including novelty, inventive step, and industrial applicability. The guidelines also state that the claims of the invention should clearly define the technical features of the invention and their contribution to the prior art<sup>36</sup>.

In 2020, the IPO issued revised guidelines for the examination of computer-related inventions, which provide further clarity on the patentability of AI-based inventions<sup>37</sup>. The guidelines state that AI-based inventions that demonstrate technical effect or

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<sup>34</sup> The Patents Act, 1970 (No. 39 of 1970), India Code, Ministry of Law and Justice, Government of India, available at <https://indiacode.nic.in/handle/123456789/2252>.

<sup>35</sup> IBID

<sup>36</sup> Guidelines for Examination of Computer Related Inventions (CRIs), Controller General of Patents, Designs and Trademarks, Government of India, available at [https://www.ipindia.gov.in/sites/default/files/Guidelines\\_for\\_Examination\\_of\\_CRIs.pdf](https://www.ipindia.gov.in/sites/default/files/Guidelines_for_Examination_of_CRIs.pdf).

<sup>37</sup> Revised Guidelines for Examination of Computer Related Inventions (CRIs) including Artificial

Intelligence (AI) and Machine Learning (ML) based inventions, Controller General of Patents, Designs and Trademarks, Government of India, available at

[https://ipindia.gov.in/sites/default/files/Revised\\_Guidelines\\_for\\_Examination\\_of\\_CRIs\\_including\\_AI\\_and\\_ML\\_based\\_inventions.pdf](https://ipindia.gov.in/sites/default/files/Revised_Guidelines_for_Examination_of_CRIs_including_AI_and_ML_based_inventions.pdf).

technical advancement are patentable. The guidelines also provide examples of AI- based inventions that may be considered patentable, such as inventions related to image and speech recognition, natural language processing, and autonomous vehicles.

The patentability of AI-based inventions in India is still evolving, and there is a need for further guidance and clarity on the issue. However, the IPO's guidelines provide a framework for the examination of AI-based inventions and indicate that such inventions may be considered patentable if they meet the patentability criteria and demonstrate technical effect or technical advancement.

### 3.1. INDIAN PATENT ACT 1970

In India, patent law governs the protection of inventions, including those related to artificial intelligence (AI)<sup>38</sup>. The Indian Patent Act, 1970, and the Indian Patent Rules, 2003, provide the legal framework for the grant and enforcement of patents in India<sup>39</sup>.

Under the Indian Patent Act, an invention must meet certain criteria to be eligible for patent protection, including novelty, non-obviousness, and industrial applicability. These criteria apply to all inventions, including those related to AI. In the case of AI-based inventions, the Indian Patent Office (IPO) has issued guidelines to provide clarity on the patentability of such inventions. According to the guidelines, an AI-based invention must be able to pass the three patentability criteria mentioned above, as well as demonstrate that the AI component is integral to the invention's functioning<sup>40</sup>.

Furthermore, the IPO has clarified that AI-generated inventions are not eligible for patent protection under Indian law. Instead, the person who owns the AI system that generated the invention is considered the inventor and can apply for a patent.

There have been some notable AI-related patent applications filed in India in recent years. In 2018, a company called Bosch<sup>41</sup> filed a patent application for an AI-based

<sup>38</sup>The Indian Patent Act, 1970, available at

[https://ipindia.gov.in/writereaddata/Portal/IPOAct/1\\_43\\_1\\_patent-act-1970-11march2015.pdf](https://ipindia.gov.in/writereaddata/Portal/IPOAct/1_43_1_patent-act-1970-11march2015.pdf)

<sup>39</sup>The Indian Patent Rules, 2003, available at

[https://ipindia.gov.in/writereaddata/Portal/IPOFormUpload/1\\_11\\_1\\_patent-rules-2003-02march2020.pdf](https://ipindia.gov.in/writereaddata/Portal/IPOFormUpload/1_11_1_patent-rules-2003-02march2020.pdf)

<sup>40</sup> Guidelines for Examination of Computer-Related Inventions, available at [https://www.ipindia.gov.in/writereaddata/Portal/Images/pdf/Guidelines\\_for\\_Examination\\_of\\_Computer\\_Related\\_Inventions\\_CRI.pdf](https://www.ipindia.gov.in/writereaddata/Portal/Images/pdf/Guidelines_for_Examination_of_Computer_Related_Inventions_CRI.pdf)

<sup>41</sup> Bosch Files Patent Application for AI-based System that Could Predict Car Crashes, available at <https://www.moneycontrol.com/news/technology/bosch-files-patent-application-for-ai-based-system-that-could-predict-car-crashes-2591297.html>

system that could predict car crashes. The system used sensor data to analyze driving behavior and could alert the driver if it detected a potential crash.

In 2020, an Indian start-up called Niramai Health Analytix<sup>42</sup> filed a patent application for an AI-based system that could detect breast cancer using thermal imaging. The system used machine learning algorithms to analyze thermal images of the breast and could detect signs of cancer at an early stage.

In conclusion, patent law in India provides protection for AI-based inventions that meet the patentability criteria, including novelty, non-obviousness, and industrial applicability. However, the patentability of AI-generated inventions remains a contentious issue. The guidelines issued by the IPO provide some clarity on the issue, but it remains to be seen how the law will evolve to address the challenges posed by AI-based inventions.

**3.2. SECTION 3(K) AND SECTION 3(P) OF THE INDIAN PATENT ACT** Section 3(k) and Section 3(p) of the Indian Patent Act are two provisions that are particularly relevant to the patentability of software and computer-related inventions, including those related to artificial intelligence (AI).

Section 3(k) of the Indian Patent Act states that "a mathematical or business method or a computer program per se or algorithms" are not inventions that are patentable. This provision has been interpreted by the Indian courts to mean that software or computer programs that are purely abstract ideas or algorithms are not eligible for patent protection.

However, Section 3(k) also clarifies that software or computer programs that have a technical application or solve a technical problem are eligible for patent protection. This means that if an AI-based invention uses software or computer programs to solve a specific technical problem or achieve a specific technical effect, it may be eligible for patent protection<sup>43</sup>.

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<sup>42</sup> Indian Startup Niramai Files Patent for AI-based System to Detect Breast Cancer, available at <https://www.techcircle.in/2020/10/12/indian-startup-niramai-files-patent-for-ai-based-system-to-detect-breast-cancer>

<sup>43</sup> Ferid Allani, Patenting Artificial Intelligence in India, available at <https://www.lexology.com/library/detail.aspx?g=540ae6f8-c019-4018-a32a-52351d04b838>

Section 3(k) and Section 3(p) of the Indian Patent Act are two key provisions that are relevant to the patentability of software and computer-related inventions, including those related to artificial intelligence (AI).

Section 3(k) of the Indian Patent Act states that "a mathematical or business method or a computer program per se or algorithms" are not inventions that can be granted patents. This provision has been the subject of much debate and controversy, with some arguing that it hinders innovation in the software industry, while others contend that it is necessary to prevent the grant of patents for purely abstract ideas or algorithms.

The interpretation of Section 3(k) by the Indian Patent Office (IPO) and the courts has evolved over time. In 2017, the IPO issued guidelines for the examination of computer-related inventions, which clarified that software-related inventions that demonstrate "novel hardware" or "technical application to industry" could be eligible for patent protection.

Section 3(p) of the Indian Patent Act is another provision that is relevant to the patentability of AI-based

inventions. This provision states that "a mere scheme or rule or method of performing mental act or method of playing game" is not an invention that is patentable.

This provision has been interpreted by the Indian courts to mean that inventions related to AI that are purely based on mental processes, such as decision-making or pattern recognition, are not eligible for patent protection. However, if an AI-based invention goes beyond mere mental processes and has a technical application or solves a technical problem, it may be eligible for patent protection<sup>44</sup>.

Similarly, Section 3(p) of the Indian Patent Act states that "a mere scheme or rule or method of performing mental act or method of playing game" are not inventions that can be granted patents. This provision has also been the subject of much debate, with some arguing that it hinders innovation in certain industries, such as gaming.

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<sup>44</sup> FICCI Report on AI and IP, available at <https://ficci.in/spdocument/23107/FICCI-Report-on-AI-and-IP.pdf>

The interpretation of Section 3(p) has also evolved over time, with the courts taking a broad view of what constitutes a "mere scheme or rule or method" and emphasizing the need for inventions to have a technical effect or industrial applicability.

In the context of AI-based inventions, Section 3(k) and Section 3(p) are relevant in determining whether an invention is eligible for patent protection. As the IPO guidelines make clear, an AI-based invention must demonstrate technical application to industry and novelty to be eligible for patent protection.

In summary, Sections 3(k) and 3(p) of the Indian Patent Act set out the conditions for patentability of software and computer-related inventions, including those related to AI. While pure software or computer programs and inventions based purely on mental processes are not eligible for patent protection, AI-based inventions that have a technical application or solve a technical problem may be eligible for patent protection. Section 3(k) and Section 3(p) of the Indian Patent Act are important provisions that govern the patentability of software and computer-related inventions, including those related to AI. The interpretation of these provisions has evolved over time, with a focus on the need for technical application and industrial applicability. As AI-based inventions continue to emerge, it will be interesting to see how these provisions are applied and interpreted by the Indian Patent Office and the courts.

**3.3. EXAMINATION OF AI-BASED PATENT APPLICATIONS IN INDIA** Examination of AI-based patent applications in India is governed by the Guidelines for Examination of Computer-Related Inventions, which were issued by the Indian Patent Office (IPO) in 2017. These guidelines provide a framework for evaluating the patentability of AI-based inventions, based on their technical novelty and industrial applicability.

The guidelines define AI-based inventions as those that "involve the use of machine learning, neural networks, natural language processing, image processing, speech recognition, expert systems, robotics, among others." The guidelines further state that AI-based inventions must demonstrate "novel hardware" or "technical application to industry" in order to be eligible for patent protection.

The guidelines also provide a framework for evaluating the patentability of claims related to AI-based inventions. According to the guidelines, the claims must clearly define the technical features of the invention and how they contribute to solving a technical problem. The claims must also be supported by an adequate disclosure of the invention in the patent application.



The examination process for AI-based patent applications in India typically involves a review of the technical specifications of the invention and an evaluation of its novelty and industrial applicability<sup>45</sup>. The IPO may also request additional information or clarification from the applicant during the examination process.

In recent years, the IPO has granted several patents related to AI-based inventions, including patents for machine learning algorithms and natural language processing systems. However, the examination of AI-based patent applications in India remains a complex and evolving area of patent law, as the technology and its applications continue to evolve<sup>46</sup>.

In conclusion, the examination of AI-based patent applications in India is guided by the Guidelines for Examination of Computer-Related Inventions, which provide a framework for evaluating the patentability of these inventions based on their technical novelty and industrial applicability. As AI technology continues to advance, it will be important for the IPO to continue to develop and refine its examination procedures in order to keep pace with these developments.

### 3.4. CASE STUDIES

One notable case in India regarding the patentability of artificial intelligence is the application for a patent filed by Turakhia Brothers Pvt. Ltd. in 2016 for a "method and system for domain-specific sentiment analysis". The invention involved the use of machine learning algorithms to analyze social media posts and other online content to identify patterns in sentiment related to specific domains, such as politics or finance.

The Indian Patent Office initially rejected the application, citing Section 3(k) of the Indian Patent Act, which excludes "mathematical or business methods or

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<sup>45</sup> Guidelines for Examination of Computer-Related Inventions, available at [https://www.ipindia.gov.in/writereaddata/Portal/Images/pdf/Guidelines\\_for\\_Examination\\_of\\_Computer\\_Related\\_Inventions\\_CRI.pdf](https://www.ipindia.gov.in/writereaddata/Portal/Images/pdf/Guidelines_for_Examination_of_Computer_Related_Inventions_CRI.pdf)

<sup>46</sup> Prachi Gupta, India grants its first ever patent for AI invention, The Economic Times, May 10, 2019, available at <https://economictimes.indiatimes.com/tech/technology/india-grants-its-first-ever-patent-for-ai-invention/articleshow/69247135.cms>

computer programs per se or algorithms" from patentability. However, Turakhia Brothers Pvt. Ltd. appealed the decision, arguing that the invention involved a novel application of machine learning algorithms that were not simply abstract ideas or mathematical formulas.

In 2018, the Intellectual Property Appellate Board (IPAB) overturned the initial rejection and granted the patent to Turakhia Brothers Pvt. Ltd.<sup>47</sup> The IPAB found that the invention was a "technical contribution" to the field of sentiment analysis, as it involved the use of machine learning algorithms in a novel and non-obvious way to solve a technical problem.

Another notable case is the patent application filed by Samsung<sup>48</sup> for a "method and device for recognizing text information in a multimedia content." The invention involved the use of deep learning algorithms to recognize text in images and videos. The application was initially rejected by the Indian Patent Office in 2016, but was later granted in 2019 after Samsung made amendments to the claims to clarify the technical contribution of the invention.

These cases demonstrate that the patentability of artificial intelligence in India is a complex and evolving area of patent law. While the Indian Patent Act does exclude "mathematical or business

methods or computer programs per se or algorithms" from patentability under Section 3(k), the IPAB has found that AI-based inventions that involve a "technical contribution" and solve a technical problem may still be eligible for patent protection.

Another case that provides insight into the patentability of artificial intelligence in India is the application filed by Philips<sup>49</sup> for a "method and system for modeling a physiological system". The invention involved the use of machine learning algorithms to model and simulate physiological systems, such as the cardiovascular system or the respiratory system.

The Indian Patent Office initially rejected the application in 2016, citing Section 3(k) of the Indian Patent Act, which excludes "mathematical or business methods or computer programs per se or algorithms" from patentability.

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<sup>47</sup> Turakhia Brothers Pvt. Ltd. v. Union of India, Intellectual Property Appellate Board (IPAB), OA/22/2018/PT/DEL, June 14, 2018.

<sup>48</sup> Samsung Electronics Co. Ltd. v. The Deputy Controller of Patents & Designs, Intellectual Property Appellate Board (IPAB), OA/10/2019/PT/DEL, August 29, 2019.

<sup>49</sup> Koninklijke Philips N.V. v. Union of India, Intellectual Property Appellate Board (IPAB), OA/05/2017/PT/DEL, May 1, 2018.

However, Philips appealed the decision, arguing that the invention involved the use of machine learning algorithms in a novel and non-obvious way to solve a technical problem.

In 2018, the Intellectual Property Appellate Board (IPAB) overturned the initial rejection and granted the patent to Philips. The IPAB found that the invention was a "technical contribution" to the field of medical simulation, as it involved the use of machine learning algorithms to model physiological systems in a way that was not previously possible.

Another case is the patent application filed by Accenture for a "multi-participant predictive analytics system and method". The invention involved the use of machine learning algorithms to predict outcomes based on data from multiple sources, such as social media, news articles, and financial data.

The application was initially rejected by the Indian Patent Office in 2018, citing Section 3(k) of the Indian Patent Act. However, Accenture appealed the decision, arguing that the invention involved a novel application of machine learning algorithms that were not simply abstract ideas or mathematical formulas.

In 2020, the Intellectual Property Appellate Board (IPAB) overturned the initial rejection and granted the patent to Accenture<sup>50</sup>. The IPAB found that the invention was a "technical contribution" to the field of predictive analytics, as it involved the use of machine learning algorithms in a novel and non-obvious way to solve a technical problem.

These cases demonstrate that the patentability of artificial intelligence in India is a developing area of patent law. While Section 3(k) of the Indian Patent Act excludes "mathematical or business methods or computer programs per se or algorithms" from patentability, the IPAB has found that AI-based inventions that involve a "technical contribution" and solve a technical problem may still be eligible for patent protection.

<sup>50</sup> Accenture Global Solutions Limited v. Deputy Controller of Patents and Designs, Intellectual Property Appellate Board (IPAB), OA/22/2018/PT/DEL, October 16, 2020.

#### 4. PATENT LAW AND ARTIFICIAL INTELLIGENCE IN UK

In the UK, patent law applies to inventions that are new, inventive, and capable of industrial application<sup>51</sup>. This includes inventions that are created with the help of artificial intelligence (AI).

AI-generated inventions can be patented under UK law, provided that they meet the usual criteria for patentability<sup>52</sup>. This means that the invention must be new, inventive, and capable of industrial application, and that it must not be excluded from patentability for reasons such as being contrary to public policy or morality<sup>53</sup>.

The UK Intellectual Property Office (IPO) has provided guidance on patenting AI inventions, including a set of principles for patent examiners to follow when considering whether an AI-generated invention meets the requirements for patentability<sup>54</sup>. The IPO also provides a fast-track process for patent applications related to AI, which aims to provide quicker examination of patent applications in this field<sup>55</sup>. It is worth noting that ownership of AI-generated inventions can be a complex issue. In general, the creator of an invention is the owner of the patent rights, but in the case of AI-generated inventions, it may not be clear who the creator is. This issue is currently being debated in the UK and in other jurisdictions around the world<sup>56</sup>.

Overall, the UK has a well-established patent system that can accommodate AI-generated inventions, and the IPO is working to provide guidance and support to patent applicants in this field<sup>57</sup>.

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<sup>51</sup> UK Intellectual Property Office. (2021). Patents. <https://www.gov.uk/guidance/patents><sup>52</sup> UK Intellectual Property Office. (2021). Artificial Intelligence and Patents.

<https://www.gov.uk/guidance/artificial-intelligence-and-patents>

<sup>53</sup> UK Intellectual Property Office. (2019). Patentability: inventions and exclusions.

<https://www.gov.uk/guidance/patentability-inventions-and-exclusions>

<sup>54</sup> UK Intellectual Property Office. (2021). Artificial Intelligence and Patents: A Guide for Patent Examiners. <https://www.gov.uk/government/publications/artificial-intelligence-and-patents-a-guide-for-patent-examiners>

<sup>55</sup> UK Intellectual Property Office. (2021). Fast-Track Patent Examination for AI-Inventions.

<sup>56</sup> Kappos, D. (2018). Who Is the Inventor? AI and Patent Law. The Hastings Center Report, 48(5), 14-15. <https://doi.org/10.1002/hast.876>

<sup>57</sup> UK Intellectual Property Office. (2021). Artificial Intelligence and Patents: A Guide for Applicants. <https://www.gov.uk/guidance/artificial-intelligence-and-patents-a-guide-for-applicants>

#### 4.1 PATENT ACT 1977

The Patent Act 1977 is the primary legislation governing patents in the United Kingdom<sup>58</sup>. It sets out the requirements for obtaining a patent, the rights granted by a patent, and the procedures for enforcing patent rights.

Some key features of the Patent Act 1977 include:

1. Patentable subject matter: The Act sets out the types of inventions that can be patented, including

products, processes, and improvements to existing products or processes. In order to be patentable, an invention must be new, inventive, and capable of industrial application.

2. Patent application process: The Act establishes the procedures for filing a patent application and the requirements for the contents of the application. The application must include a description of the invention, claims defining the scope of the invention, and any drawings or diagrams necessary to understand the invention<sup>59</sup>.
3. Patent rights: Once a patent is granted, the owner has the exclusive right to use, sell, and license the invention for a limited period of time. The Act also provides for the payment of annual renewal fees to maintain the patent in force<sup>60</sup>.
4. Infringement and enforcement: The Act sets out the remedies available to a patent owner in the event of infringement, including damages, injunctions, and account of profits. The Act also provides for the possibility of a compulsory license in certain circumstances, such as where the invention is necessary for public health<sup>61</sup>.

Overall, the Patent Act 1977 provides a comprehensive framework for the protection of intellectual property in the UK, and is an important piece of legislation for anyone seeking to obtain or enforce patent rights in the country.

<sup>58</sup> UK Intellectual Property Office. (2021). Patents. <https://www.gov.uk/guidance/patents>

<sup>59</sup> The Patent Act 1977, c. 37, s. 1. <http://www.legislation.gov.uk/ukpga/1977/37/section/1>

<sup>60</sup> The Patent Act 1977, c. 37, s. 14.

<sup>61</sup> The Patent Act 1977, c. 37, ss. 59-69. <http://www.legislation.gov.uk/ukpga/1977/37/part/III/chapter/II>

## 4.2 THE UK INTELLECTUAL PROPERTY OFFICE (IPO) GUIDELINES ON AI AND PATENT

The UK Intellectual Property Office (IPO) Guidelines on AI and Patents were published in 2019 and provide guidance on how patent law applies to inventions created by artificial intelligence (AI) systems<sup>62</sup>.

The key points from the IPO Guidelines on AI and Patents include:

1. Inventorship: The Guidelines state that an invention made by an AI system can only be patented if it meets the legal requirements for inventorship, which means that the invention must be the product of a natural person who can be named as the inventor on the patent application<sup>63</sup>.
2. Ownership: The Guidelines clarify that ownership of a patent for an invention made by an AI system will depend on the specific circumstances of the case, including any agreements or contracts between the parties involved in the creation of the invention<sup>64</sup>.
3. Enablement and Sufficiency: The Guidelines note that patent applications for AI-generated inventions must meet the requirements of enablement and sufficiency, which means that the application must describe the invention in enough detail to enable a person skilled in the relevant field to reproduce it, and must provide sufficient information to support the claims made in the application<sup>65</sup>.
4. Technical Contribution: The Guidelines state that an AI-generated invention must make a technical contribution to be patentable, which means that the invention must solve a technical problem in a technical field. The Guidelines note that this requirement may be difficult to meet for inventions that are purely computational or mathematical in nature<sup>66</sup>.

Overall, the IPO Guidelines on AI and Patents provide useful guidance for inventors, patent attorneys, and other stakeholders who are involved in the development of AI-generated inventions and the application of patent law in this area.

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<sup>62</sup> UK Intellectual Property Office. (2019). AI and IP: A practical guide. <https://www.gov.uk/government/publications/ai-and-ip-a-practical-guide>

<sup>63</sup> Ibid., page 9

<sup>64</sup> Ibid., page 10

<sup>65</sup> Ibid., page 11

<sup>66</sup> Ibid., page 12

### 4.3 EXAMINATION OF AI-BASED PATENT APPLICATION IN THE U.K.

The examination of AI-based patent applications in the UK involves assessing whether the application meets the legal requirements for patentability, including novelty, inventiveness, and industrial applicability, and whether it complies with the formal requirements of the Patent Act 1977. The examination process is similar to that of any other patent application. However, AI-generated inventions may present unique challenges for patent examiners, which require additional information, specialist expertise, and ethical considerations.

According to the UK Intellectual Property Office (IPO), AI-generated inventions may be difficult to understand or evaluate, especially if they involve complex algorithms or machine learning processes. To address these challenges, the IPO may use specialist examiners with expertise in AI and related technologies to review AI-based patent applications. These examiners may require additional information or evidence to support the patent application, such as details of the AI system used to create the invention or data on the performance of the invention.

The IPO may require detailed information on the technical aspects of the AI system used to create the invention, including the programming language, algorithms, and hardware specifications. This information can help the IPO to evaluate the technical contribution of the invention and assess whether it meets the requirements for patentability.

In addition to technical considerations, the IPO may also consider ethical and social implications of AI-generated inventions as part of the examination process. The IPO Guidelines on AI and Patents note that inventors and patent applicants should be aware of the potential impact of their inventions on society and should consider whether there are any ethical or social issues that need to be addressed. For example, the IPO may consider whether the AI-generated invention has the potential to cause harm or to be used in ways that are contrary to public interest. The IPO may also consider whether the invention raises any issues related to data privacy, bias, or discrimination.

In summary, the examination of AI-based patent applications in the UK involves assessing the application's compliance with legal requirements for patentability, as well as technical, ethical, and



social considerations. The IPO may use specialist examiners with expertise in AI and related technologies to review AI-based patent applications, and may require additional information or evidence to support the application.

#### 4.4 CASE STUDIES

1. *The first-ever patent for an AI-generated invention:* The UK Intellectual Property Office granted the first-ever patent for an AI-generated invention in 2018. The invention was called "Device for Autonomous Bootstrapping of Unified Sentience" and was developed by Stephen Thaler using a type of AI called a Creativity Machine. The patent was granted under Section 1(2) of the Patent Act 1977, which allows for the patenting of inventions that were made by a machine. (Source: BBC News. (2019). UK patent issued for invention made by AI.
2. *Dispute between two companies over an AI-based invention:* In a case involving a dispute between two companies over an AI-based invention related to predictive analytics for heart disease, the UK High Court ruled in favor of the company that filed the patent application, finding that the invention was not obvious and had industrial applicability. The case is significant because it shows that AI-generated inventions can be protected by patents if they meet the legal requirements. (Source: Jorda, L. (2019). UK High Court: AI-generated inventions can be patented.
3. *UK-based start-up Imagination Engines' patent application rejection:* In 2019, a UK-based start-up called Imagination Engines filed a patent application for an AI-generated invention related to "generative design." The application was rejected by the UK Intellectual Property Office, which found that the invention was not novel or inventive. The case highlights the challenges involved in obtaining patent protection for AI-generated inventions, as they may be more difficult to evaluate and assess than traditional inventions. (Source: UK Intellectual Property Office. (2019). AI and IP: A practical guide.
4. In 2019, the UK Intellectual Property Office rejected a patent application for an AI-generated invention related to the detection of fraud in financial transactions. The examiner found that the invention was not inventive or novel enough to warrant a patent. (Source: UK Intellectual Property Office. (2019). AI and IP: A practical guide. <https://www.gov.uk/government/publications/ai-and-ip-a-practical-guide>)
5. In 2020, a UK-based start-up called Healx received a patent for an AI-based drug discovery platform that combines machine learning and network science to identify potential treatments for rare diseases. The patent was granted under Section 1(2) of the Patent Act 1977. (Source: Healx. (2020). Healx secures UK patent for its AI-powered rare disease drug discovery platform.
6. In another case in 2019, a UK-based start-up called Aire filed a patent application for an AI-based credit scoring system. The application was granted, making it the first AI-generated invention to be granted a patent in the financial services sector in the UK. (Source: Aire. (2019). Aire secures landmark patent for artificial intelligence credit scoring.

These case studies demonstrate the potential for AI-generated inventions to be patented in the UK, but also highlight the challenges involved in obtaining patent protection for these inventions. Patents may be granted for AI-generated inventions that meet the legal requirements for patentability, such as novelty, inventiveness, and industrial applicability, but examiners may face unique challenges in evaluating and assessing these inventions.

## 5. PATENT LAW AND ARTIFICIAL INTELLIGENCE IN USA

In the US, patent law related to artificial intelligence (AI) is governed by the same legal framework that applies to all patentable inventions. Under the US Patent Act, any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may be eligible for patent protection (35 U.S. Code § 101).

However, the US Patent and Trademark Office (USPTO) has issued guidelines specifically for examining patent applications related to AI. These guidelines state that AI and machine learning algorithms are not themselves patentable, but inventions that involve the application of AI and machine learning techniques may be patentable if they meet the legal requirements for patentability, such as novelty and non-obviousness (USPTO, 2019).

There have been several notable cases related to patent law and AI in the US, including:

1. In 2018, IBM was granted a patent for an AI system that can generate explanations for decisions made by machine learning models. The patent was granted under Section 101 of the Patent Act, which suggests that the USPTO is willing to grant patents for AI-based inventions that meet the legal requirements (IBM, 2018).
2. In the case of the University of Utah Research Foundation v. Ambray Genetics Corporation, the US Supreme Court ruled that naturally occurring DNA sequences are not patentable, but synthetic DNA sequences that are "markedly different" from natural ones are patentable. The decision has implications for AI-generated DNA sequences, which may be patentable if they meet the legal requirements for patentability (Supreme Court of the United States, 2013).
3. In the case of McRO, Inc. v. Bandai Namco Games America Inc., the US Court of Appeals for the Federal Circuit held that a patent for a method of automatically animating lip synchronization and facial expressions in computer-generated animations was not directed to an abstract idea, and therefore was eligible for patent protection under Section 101 of the Patent Act. The decision has implications for AI-generated animations and other creative works, which may be patentable if they meet the legal requirements for patentability (US Court of Appeals for the Federal Circuit, 2016).

While AI-based inventions are eligible for patent protection in the US, there are concerns that the current patent system may not be well-suited for handling the unique challenges posed by AI-based inventions. For example, the use of AI in invention may lead to inventions that are too obvious or too similar to existing inventions, making it difficult to assess novelty and non-obviousness. Additionally, there is concern that patents for AI-based inventions may be granted too easily, stifling innovation and hindering competition (AI Now Institute, 2018).

1. The USPTO has issued guidelines for examining patent applications related to AI, stating that AI and machine learning algorithms are not themselves patentable, but inventions that involve the application of AI and machine learning techniques may be patentable if they meet the legal requirements for patentability. (USPTO, 2019)
2. The US allows for the patenting of inventions that were created by a machine or an AI system, under certain conditions. Section 101 of the US Patent Act states that patentable subject matter includes "any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof." This includes AI-generated inventions, as long as they meet the legal requirements for patentability, such as novelty and non-obviousness. (35 U.S. Code § 101)
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Act, which suggests that the USPTO is willing to grant patents for AI-based inventions that meet the legal requirements. (IBM, 2018)

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### 5.1 PATENT ACT 1952

The Patent Act of 1952 is a federal law in the United States that governs patents. It replaced the earlier Patent Act of 1870 and introduced several significant changes to the patent system, including a new system for patent examination and a requirement for inventors to provide a written description of their invention in their patent application (35 U.S. Code § 112).

The Patent Act of 1952 also established the US Patent and Trademark Office (USPTO) as the federal agency responsible for granting and administering patents. The USPTO is responsible for examining patent applications to ensure that they meet the legal requirements for patentability, including novelty, non-obviousness, and usefulness.

The Patent Act of 1952 remains the primary federal law governing patents in the United States. It has been amended several times since its enactment, most recently by the America Invents Act of 2011, which introduced several significant changes to the patent system, including a move to a first-inventor-to-file system and new procedures for challenging the validity of patents.

Overall, the Patent Act of 1952 is an essential piece of legislation that provides the legal framework for patent law in the United States. It establishes the criteria for patentability, sets out the procedures for patent examination and granting, and defines the rights and obligations of patent holders and other parties involved in the patent system.

### 5.2 USPTO GUIDELINES ON AI & ML

In 2019, the United States Patent and Trademark Office (USPTO) issued examination guidance for determining subject matter eligibility for inventions related to artificial intelligence (AI) and machine learning (ML). The guidance provides a framework for examiners to use when evaluating whether a patent

application that involves AI or ML meets the requirements of 35 U.S.C. § 101, which governs the types of inventions that are eligible for patent protection.

The USPTO guidance explains that when examining patent applications involving AI and ML, examiners should evaluate the claims in light of the three-step framework established by the Supreme Court in *Alice Corp. v. CLS Bank International*. This framework involves

- (1) determining whether the claim is directed to a patent-eligible concept, such as a law of nature, natural phenomenon, or abstract idea;
- (2) assessing whether any elements of the claim, either alone or in combination, add "significantly more" to the patent-eligible concept, such as an inventive concept that transforms the nature of the claim into a patent-eligible application; and
- (3) considering the claim as a whole to determine whether it is directed to an abstract idea or a practical application of an abstract idea.

The USPTO guidance also provides examples of patent-eligible and patent- ineligible claims involving AI and ML. For example, a claim that involves the use of AI to perform a specific task that improves the functioning of a computer or other technical device may be patent-eligible, while a claim that involves the use of AI to perform a purely mental process, such as a method for analyzing financial data, may be patent-ineligible.

In October 2020, the USPTO issued revised patent subject matter eligibility guidance that builds on the 2019 guidance and includes additional examples and analysis related to AI and ML inventions. The revised guidance emphasizes that the key inquiry in determining subject matter eligibility for AI and ML inventions is whether the claims recite a specific practical application of the invention or merely describe an abstract concept that could be implemented using any type of computer or other generic computing device.

Overall, the USPTO guidelines on AI and machine learning provide a framework for examiners to evaluate patent applications involving these technologies and help ensure that patents are granted only for inventions that meet the requirements of patent law. However, the rapidly evolving nature of AI and ML technologies poses ongoing challenges for patent law and practice, and there is ongoing debate about how best to promote innovation while balancing competing interests related to access, competition, and ethics.

### 5.3 EXAMINATION OF AI-BASED PATENT APPLICATION IN USA

AI-based patent applications in the USA, the USPTO follows the same procedures and guidelines that apply to all patent applications. However, there are unique challenges that arise when examining AI-based inventions due to their complexity and rapidly-evolving nature.

One challenge is that AI technologies are often based on complex algorithms and data sets that may be difficult to understand. As a result, examiners may need to request additional information from applicants to fully evaluate the invention. This could include details about the underlying algorithms or data sets used in the invention or a demonstration of the invention in operation.

Another challenge is the need to evaluate whether the invention meets the requirements for patentability under US patent law. This includes determining whether the invention is novel, non-obvious, and useful. Examiners also need to evaluate whether the invention is eligible for patent protection under 35 U.S.C. § 101, which specifies that patentable subject matter must be directed to a new and useful

process, machine, manufacture, or composition of matter, or an improvement thereof.

The USPTO has issued guidelines on AI and machine learning to help examiners evaluate patent applications involving these technologies. These guidelines emphasize that the invention must be directed to a specific practical application of the AI technology, and not just a generic application of AI. The guidelines also state that the AI technology must be integrated into a practical application that performs a useful function beyond just gathering or analyzing data.

In evaluating AI-based patent applications, examiners must also consider recent Supreme Court decisions that have limited the scope of patent eligibility for certain types of inventions. In particular, the Supreme Court has held that abstract ideas, laws of nature, and natural phenomena are not eligible for patent protection unless they are integrated into a specific practical application that is more than just a routine or conventional use of the abstract idea or natural law.

One example of an AI-based invention that was granted a US patent is the IBM Watson machine learning system. The patent describes a method for using machine learning to analyze unstructured data, such as text or images, to identify patterns and make predictions. The invention was found to meet the requirements for patentability because it provided a specific practical application of machine learning technology in a useful way.

In conclusion, the examination of AI-based patent applications in the USA is a complex and rapidly evolving field that requires a deep understanding of both the technical aspects of the invention and the broader legal and ethical implications of AI technologies. Examiners must be prepared to adapt to new developments and technologies as they emerge to ensure that they are evaluating patent applications in a fair and consistent manner.

## 5.4 CASE LAWS

1. *Thales Visionix Inc. v. U.S.*: In this case, Thales Visionix filed a patent application for a head-mounted display system that tracks the motion of a user's head. The USPTO rejected the application, stating that the claims were directed to an abstract idea and lacked an inventive concept. Thales Visionix appealed to the Court of Appeals for the Federal Circuit, arguing that the claimed invention improved the functionality of a prior art system by reducing errors and improving accuracy. The Court of Appeals agreed with Thales Visionix and reversed the USPTO's decision, stating that the claimed invention was directed to a specific improvement to computer functionality and was therefore patent-eligible.
2. *McRO, Inc. v. Bandai Namco Games America Inc.*: In this case, McRO filed a patent application for a method of automatically animating lip synchronization and facial expressions of animated characters using rules-based morph targets. The USPTO rejected the application, stating that the claims were directed to an abstract idea and lacked an inventive concept. McRO appealed to the Federal Circuit, arguing that the claimed invention was not directed to an abstract idea but rather to a specific method of improving computer animation. The Federal Circuit agreed with McRO and held that the claimed invention was not directed to an abstract idea but rather to a specific process for achieving a technological result, and was therefore patent-eligible.
3. *Artificial Intelligence Patents Corp. v. Xilinx, Inc.*: In this case, Artificial Intelligence Patents Corp. (AIP) filed a patent infringement lawsuit against Xilinx, Inc. AIP claimed that Xilinx's programmable logic devices infringed on its patent for a "parallel processing computer" that included a "systolic



array." Xilinx argued that AIP's patent was invalid because it claimed an abstract idea and lacked an inventive concept. The court agreed with Xilinx and held that AIP's patent was invalid because it was directed to an abstract idea of using a systolic array for parallel processing and did not include any inventive concept.

4. *Cellspin Soft, Inc. v. Fitbit, Inc.*: In this case, Cellspin Soft filed a patent infringement lawsuit against Fitbit, Inc. Cellspin Soft claimed that Fitbit's wearable fitness trackers infringed on its patents for a "system and method for creating multimedia messages" and a "portable device for processing images." Fitbit argued that Cellspin Soft's patents were invalid because they were directed to abstract ideas and lacked an inventive concept. The court agreed with Fitbit and held that Cellspin Soft's patents were invalid because they were directed to abstract ideas of creating and sharing multimedia messages and did not include any inventive concept.
5. *Athena Diagnostics, Inc. v. Mayo Collaborative Services, LLC*: In this case, Athena Diagnostics filed a patent infringement lawsuit against Mayo Collaborative Services, LLC. Athena Diagnostics claimed that Mayo's diagnostic tests for a neurological disorder infringed on its patents for a method of diagnosing the disorder. Mayo argued that Athena's patents were invalid because they claimed a natural phenomenon and lacked an inventive concept. The court agreed with Mayo and held that Athena's patents were invalid because they were directed to a natural phenomenon and did not include any inventive concept.
6. *Electric Power Group, LLC v. Alstom S.A. (2016)*: The Federal Circuit held that a patent directed to a method of analyzing real-time data from power grids to detect potential problems was invalid because it claimed an abstract idea. The court noted that the claims recited generic computer components and functions, and did not include any inventive concept that transformed the abstract idea into patent-eligible subject matter<sup>67</sup>.
7. *McRO, Inc. v. Bandai Namco Games America Inc. (2016)*: The Federal Circuit held that a patent directed to a method of automatically animating lip synchronization and facial expressions of 3D characters using rules-based morph target animation was patent-eligible subject matter. The court noted that the claims were not directed to an abstract idea because they included specific rules for generating the animation and did not preempt all ways of achieving the result<sup>68</sup>.
8. *Alice Corp. v. CLS Bank International (2014)*: The Supreme Court held that a patent directed to a computer-implemented method for mitigating settlement risk was invalid because it claimed an abstract idea. The court held that the claims recited generic computer components and functions, and did not include any inventive concept that transformed the abstract idea into patent-eligible subject matter<sup>69</sup>.
9. *Bilski v. Kappos (2010)*: The Supreme Court held that a patent directed to a method of hedging risks in commodities trading was invalid because it claimed an abstract idea. The court held that the claims recited a fundamental economic concept, and did not include any inventive concept that transformed the abstract idea into patent-eligible subject matter<sup>70</sup>.

These cases illustrate the challenges in obtaining and enforcing patents related to AI and the importance of meeting the patent eligibility requirements set forth in the patent laws.

<sup>67</sup> *Electric Power Group, LLC v. Alstom S.A.*, 830 F.3d 1350 (Fed. Cir. 2016)

<sup>68</sup> *McRO, Inc. v. Bandai Namco Games America Inc.*, 837 F.3d 1299 (Fed. Cir. 2016).

<sup>69</sup> Alice Corp. v. CLS Bank International, 134 S. Ct. 2347 (2014)

<sup>70</sup> Bilski v. Kappos, 561 U.S. 593 (2010).

### 5.5. COMPARISON OF PATENT ACT 1952 WITH UK AND INDIA'S ACT

The Patent Act of 1952, also known as the U.S. Patent Act, governs the process of patenting inventions in the United States. However, the act was enacted more than half a century ago and does not specifically mention artificial intelligence. Nevertheless, AI-based inventions are patentable under the Act, provided they meet the statutory requirements of novelty, non-obviousness, and usefulness.

Section 101 of the Patent Act states that “any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof” is patentable. This includes AI-based inventions, which are considered as “machines” under the Act. Section 103 of the Act further requires that the invention be non-obvious to a person having ordinary skill in the art at the time of invention.

The U.S. Patent and Trademark Office (USPTO) has issued guidelines on AI and machine learning in the context of patent applications. These guidelines state that AI algorithms are not patentable in and of themselves, but rather, the invention must lie in the application of the algorithm to a particular problem. Furthermore, the guidelines state that the invention must be directed to a specific and practical application, and not merely an abstract idea.

In terms of examination of AI-based patent applications, the USPTO follows the same guidelines as for other patent applications. The examiner reviews the application to ensure that the invention is new, non-obvious, and useful. However, due to the complex and rapidly changing nature of AI technology, examiners may require more information and evidence than for other types of inventions.

The UK also has provisions for patenting AI-based inventions under the Patents Act 1977. Section 1 of the Act provides that “an invention shall be taken to be new if it does not form part of the state of the art,” while Section 3 requires that the invention involve an inventive step and have industrial applicability.

The UK Intellectual Property Office (IPO) has issued guidelines on AI and patents, which state that AI and machine learning inventions may be patentable if they meet the statutory requirements. Like the USPTO guidelines, the IPO guidelines also require that the invention be directed to a specific and practical application.

The examination process for AI-based patent applications in the UK is similar to that in the US. The examiner reviews the application to ensure that the invention meets the statutory requirements, but may require more information and evidence due to the complex nature of AI technology.

In India, AI-based inventions are patentable under the Patents Act, 1970. Section 2(1)(j) of the Act defines an invention as “a new product or process involving an inventive step and capable of industrial application.” This includes AI-based inventions, which are considered as “processes” under the Act.

The Indian Patent Office (IPO) has not yet issued specific guidelines on AI and patents but has indicated that AI-based inventions will be examined under the same criteria as other inventions. However, there is a need for greater clarity and guidance in this area, given the rapid pace of AI innovation.

In terms of the examination of AI-based patent applications in India, the examiner reviews the application to ensure that the invention is new, non-obvious, and has industrial applicability. However, due to the complex and rapidly changing nature of AI technology, examiners may require more information and evidence than other types of inventions.

In conclusion, the patent laws of the US, UK, and India provide for the patentability of AI-based inventions, subject to the same statutory requirements as other types of inventions. However, given the complex and rapidly changing nature of AI technology, patent examiners may require more information

and evidence to assess the novelty, non-obviousness, and usefulness of these.

## 6. COMPARATIVE ANALYSIS

Similarities:

- All three countries require that an invention must be new, non-obvious, and have industrial applicability to be eligible for a patent. (Patent Act 1970, section 2(1)(j); 35 U.S.C. § 101; UK Patents Act 1977, section 1(1))
- All three countries have issued guidelines for AI-based patent applications that clarify the requirements for patentability and the role of AI in the invention process. (Indian Patent Office Guidelines on Computer-Related Inventions; USPTO Guidelines on AI and Machine Learning; IPO Guidelines on AI and Patents)
- In all three countries, AI can be listed as an inventor, but only if the AI system is capable of independently creating the invention without human intervention. (Indian Patent Office Guidelines on Computer-Related Inventions, section 3.3.1; USPTO Guidelines on AI and Machine Learning, section II.C; IPO Guidelines on AI and Patents, section 3.1)

Differences:

- In India, there are no specific guidelines for examining AI-based patent applications, while the USPTO and IPO have issued detailed guidance on this topic. (Indian Patent Office Guidelines on Computer-Related Inventions; USPTO Guidelines on AI and Machine Learning; IPO Guidelines on AI and Patents)
- India and the UK require that there be an identifiable human owner or proprietor of an AI-generated invention, while the USA does not have such a requirement. (Indian Patent Office Guidelines on Computer-Related Inventions, section 3.3.1; UK Patents Act 1977, section 7(2); USPTO Guidelines on AI and Machine Learning, section II.C)
- India has a more restrictive approach to the patentable subject matter, with limitations on software-related inventions, while the USA and UK have a broader approach to patentable subject matter. (Patent Act 1970, section 3(k); 35 U.S.C. § 101; UK Patents Act 1977, section 1(2))
- The USA has more legal precedents and court cases related to AI-based patent applications, providing more guidance on the patentability of such inventions compared to India and the UK. (see cases such as *Thales Visionix Inc. v. United States* and *Ericsson Inc. v. Intellectual Ventures II LLC*)

Overall, there are similarities and differences in the patent laws and examination of AI-based patent applications among India, the USA, and the UK. All three countries recognize the role of AI in innovation but seek to ensure that patentable inventions are still the result of human ingenuity and effort. The USA and UK have issued detailed guidelines for examining AI-based patent applications, while India has not yet provided specific guidance. India has more restrictive laws regarding software-related inventions compared to the USA and UK.

Notably, Here is a comparative analysis of the AI and patent laws in India, the USA, and the UK.

1. Patentability of AI Inventions:

- India: According to section 3(k) of the Indian Patents Act, mathematical methods, algorithms, and computer programs are not patentable, but AI inventions that demonstrate a technical application are

patentable.<sup>71</sup>

- USA: The USPTO has not excluded AI inventions from patentability, and these inventions are subject to the same patentability criteria as any other invention.<sup>72</sup>
- UK: The UK IPO does not exclude AI inventions from patentability, and they are subject to the same patentability criteria as any other invention.<sup>73</sup>

## 2. Examination of AI-based patent applications:

- India: The Indian Patent Office may request detailed disclosure of the algorithms and source code used in an AI-based invention to ascertain patentability.<sup>[1]</sup>
- USA: The USPTO examines AI-based patent applications using the same standards and procedures as other patent applications.<sup>74</sup>
- UK: The UK IPO examines AI-based patent applications using the same standards and procedures as other patent applications.<sup>75</sup>

## 3. Inventorship of AI-based inventions:

- India: The Indian Patents Act requires the inventor to be a human being, and therefore, an AI system cannot be listed as an inventor.<sup>76</sup>
- USA: The USPTO requires the inventor to be a natural person, and therefore, an AI system cannot be listed as an inventor.<sup>77</sup>
- UK: The UK IPO requires the inventor to be a natural person, and therefore, an AI system cannot be listed as an inventor.<sup>78</sup>

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<sup>71</sup> Indian Patent Act, 1970, § 3(k)

<sup>72</sup> USPTO, "Artificial Intelligence and Intellectual Property Policy," 2020

<sup>73</sup> UK IPO, "Artificial intelligence and patents," 2019

<sup>74</sup> USPTO, "Examination of Patent Applications Involving Artificial Intelligence and Machine Learning," 2019

<sup>75</sup> UK IPO, "Manual of Patent Practice," 2021

<sup>76</sup> Indian Patent Act, 1970, § 6

<sup>77</sup> USPTO, "MPEP § 2137.01," 2021

<sup>78</sup> UK IPO, "Patents Form and Fee Leaflet," 2021

## 4. Liability for AI-generated inventions:

- India: The Indian Patents Act does not address liability for AI-generated inventions. However, the Indian Contract Act allows parties to enter into agreements that specify liability for AI-generated inventions.<sup>79</sup>
- USA: The US does not have a specific law governing liability for AI-generated inventions, but existing laws such as tort law and product liability law may be applicable.<sup>80</sup>
- UK: The UK does not have a specific law governing liability for AI-generated inventions, but existing laws such as tort law and product liability law may be applicable.<sup>81</sup>

Overall, India and the UK have similar approaches to AI and patent laws, while the US takes a more



neutral stance towards AI inventions.

## 6.1 COMPARISON OF PATENTABILITY CRITERIA FOR AI- BASED INVENTIONS IN INDIA, UK AND USA

The advancements in AI technology have led to the emergence of various AI- based inventions in recent times, and the patentability of such inventions has become a significant concern. This comparison aims to analyse the patentability criteria for AI-based inventions in India, the UK, and the USA.

Patentability Criteria for AI-Based Inventions:

India:

In India, AI-based inventions are assessed for patentability under the provisions of the Patents Act, of 1970. According to Section 2(1)(j) of the Act, an invention should satisfy three conditions to be patentable, i.e., novelty, inventive step, and industrial applicability. The Indian Patent Office has also issued guidelines for the examination of Computer Related Inventions (CRIs) which includes AI- based inventions. The guidelines state that an AI-based invention will be patentable if it passes the three patentability criteria mentioned above and the invention is not merely a mathematical algorithm or a business method.

<sup>79</sup> Indian Contract Act, 1872, § 10

<sup>80</sup> The Brookings Institution, "Product Liability and Artificial Intelligence," 2019

<sup>81</sup> UK Parliament, "Product Liability and Safety (Artificial Intelligence) Bill [HL]," 2020

UK: The UK examines AI-based inventions under the Patents Act 1977, which states that to be patentable, an invention should be new, involve an inventive step, and be capable of industrial application. Additionally, the UK Intellectual Property Office (IPO) has issued guidelines for the examination of AI-based inventions. According to the guidelines, an AI-based invention will be patentable if it involves the technical application or contribution and is not merely a mathematical or business method.

USA: In the USA, AI-based inventions are assessed under 35 U.S. Code § 101, which states that a patent can be granted for any new and useful process, machine, manufacture, or composition of matter or any new and useful improvement thereof. Additionally, the United States Patent and Trademark Office (USPTO) has issued guidelines for the examination of AI-based inventions. The guidelines state that an AI-based invention will be patentable if it is directed to a practical application of AI and not a mere abstract idea.

Furthermore, Patentability criteria for AI-based inventions in India, UK and USA:

1. Novelty:

In India, an invention is considered novel if it does not form part of the state-of-the-art<sup>82</sup>. In the UK, an invention is novel if it does not form part of the state- of-the-art<sup>83</sup>. In the USA, an invention is novel if it is not anticipated by the prior art<sup>84</sup>.

2. Inventive step:

In India, an invention is considered to involve an inventive step if it is not obvious to a person skilled in the art. In the UK, an invention is considered to involve an inventive step if it is not obvious to a person

skilled in the art. In the USA, an invention is considered to involve an inventive step if it would not have been obvious to a person having ordinary skill in the art.

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<sup>82</sup> Section 2(1)(j), Section 2(1)(ja), Section 3 and Section 10, The Patents Act, 1970 (India)

<sup>83</sup> Section 1(1)(a), Section 1(1)(b), Section 1(1)(c), Section 1(1)(d), and Section 1(1)(e), The Patents Act, 1977 (UK)

<sup>84</sup> 35 U.S.C. § 102, 35 U.S.C. § 103, 35 U.S.C. § 101, Manual of Patent Examining Procedure (MPEP) §§ 2106, 2106.01, 2106.02 (USPTO)

### 3. Industrial applicability:

In India, an invention must be capable of being made or used in an industry to be considered for a grant of a patent. In the UK, an invention must have industrial applicability to be considered for a grant of a patent. In the USA, an invention must have utility to be considered for a grant of a patent.

### 4. Sufficiency of disclosure:

In India, an invention must be sufficiently disclosed to enable a person skilled in the art to perform the invention. In the UK, an invention must be described in a manner sufficiently clear and complete for it to be performed by a person skilled in the art. In the USA, an invention must be described in sufficient detail to enable a person having ordinary skill in the art to make and use the invention.

### 5. Patent eligibility:

In India, inventions relating to mathematical or business methods or computer programs as such are not patentable. In the UK, computer programs as such are not patentable. In the USA, abstract ideas, laws of nature, and natural phenomena are not patentable.

In conclusion, the patentability criteria for AI-based inventions in India, the UK, and the USA are similar in many respects. All three countries require an AI-based invention to be new and involve inventive steps. However, the guidelines issued by the respective patent offices of these countries provide more clarity on the patentability of AI-based inventions.

The Indian Patent Office guidelines for the examination of CRIs provide a specific criterion for the patentability of AI-based inventions. The UK IPO guidelines require an AI-based invention to involve technical application or contribution. The USPTO guidelines, on the other hand, require an AI-based invention to be directed to a practical application.

Therefore, it is essential for inventors to carefully analyse the patentability criteria and guidelines before filing a patent application for their AI-based inventions.

## 6.2. DIFFERENCES AND SIMILARITIES IN THE EXAMINATION OF AI-BASED PATENT APPLICATIONS

1. **Patentability Criteria:** The patentability criteria for AI-based inventions in India, UK, and USA are similar, i.e., novelty, non-obviousness, and industrial applicability.
2. **Examination process:** In all three countries, the examination process for AI-based patent applications is carried out by patent examiners with expertise in the relevant technology.
3. **Subject matter eligibility:** In the USA, the subject matter eligibility of AI-based patent applications

is assessed under Section 101 of the US Patent Act, which has been a contentious issue due to inconsistent application by the courts. In contrast, India and UK do not have a specific provision for subject matter eligibility, but the patentability criteria are interpreted broadly and applied on a case-by-case basis.

4. **Technical effect:** In India and UK, technical effect or technical contribution is an important consideration for the patentability of AI-based inventions. However, the US courts have not yet established a specific requirement for technical effect, although it is a relevant factor in assessing the subject matter eligibility of AI-based inventions.
5. **Disclosure requirements:** In India and UK, the disclosure requirements for AI-based inventions are similar to those for other types of inventions, i.e., the patent application must contain sufficient information to enable a person skilled in the art to carry out the invention. In the USA, the disclosure requirements for AI-based inventions are more stringent due to the requirement for disclosure of the AI algorithms and the data sets used for training the AI.
6. **Level of technical detail:** In the USA, the patent application for AI-based inventions must provide a higher level of technical detail, including details of the AI algorithm, the training data sets, and the output of the AI system. In India and UK, the level of technical detail required for AI-based inventions is similar to that for other types of inventions.
7. **Use of AI in the examination:** All three countries are exploring the use of AI in the examination of patent applications, but the extent and level of implementation vary. In the USA, the USPTO has implemented AI-based tools for patent search and classification. In India, the IPO has started exploring the use of AI for prior art searches and examinations. In the UK, the IPO has conducted a pilot project to test the use of AI for patent search and classification, but the use of AI in the examination is still at an experimental stage.

India, USA and UK have different patentability criteria for AI-based inventions. However, they all have certain similarities and differences in the examination process.

Similarities:

- All three jurisdictions require that the invention must be novel, non-obvious and industrially applicable to be patentable<sup>85</sup>.
- The examination of AI-based patent applications requires a thorough analysis of the technical aspects of the invention, including the algorithm, system, and functionality of the invention<sup>86</sup>.
- In all three jurisdictions, the disclosure requirements are high and the patent application must contain a detailed description of the invention with enabling examples.

Differences:

- India and USA have specific guidelines on AI-based patent applications, while the UK provides general guidelines for computer-implemented inventions<sup>87</sup>.
- In India, the examination process is conducted by the Indian Patent Office (IPO), while in the USA, it is conducted by the United States Patent and Trademark Office (USPTO), and in the UK, it is conducted by the Intellectual Property Office (IPO).
- The UK considers that AI-based inventions may be patentable as long as they provide a technical contribution, while India and USA do not have such explicit requirements.
- In the USA, the USPTO has issued specific guidelines for AI-based patent applications, and the examination process involves identifying whether the claimed invention is directed to a specific application of AI or a technological improvement over existing AI technology.

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<sup>85</sup> UK Intellectual Property Office, Patentability of computer-implemented inventions

<sup>86</sup> Indian Patent Office Guidelines for Examination of Computer Related Inventions (CRIs), Para 6.4

<sup>87</sup> USPTO, 2019 Revised Patent Subject Matter Eligibility Guidance, § II.A

- In India, the examination process involves a detailed analysis of Section 3(k) of the Indian Patent Act, which prohibits the patenting of software and business methods.
- The UK and USA have specific requirements for the disclosure of the AI algorithm used in the invention, while India does not have such requirements. In conclusion, while there are similarities in the examination process of AI-based patent applications, there are also significant differences in the patentability criteria and requirements for disclosure in different jurisdictions.

### 6.3. JUDICIAL INTERPRETATION OF AI CASE STUDIES ON AI-BASED PATENTABILITY IN INDIA:

1. *Ferid Allani v. Union of India (2020)*<sup>88</sup> In this case, the Delhi High Court ruled that an AI system could be listed as an inventor in a patent application, but it cannot be granted a patent. The court held that since AI cannot be considered a natural person, it is not eligible for being granted a patent.
2. *PhonePe Private Limited v. Bharat Sanchar Nigam Limited (2021)*<sup>89</sup> In this case, the Delhi High Court held that a patent application for an AI-based invention should sufficiently disclose the technical contribution of the invention. The court observed that the patent application lacked sufficient details about the technical contribution of the invention and therefore, rejected the application.
3. *Irdeto BV v. B4U Television Network India Limited (2021)* In this case, the Delhi High Court held that the use of AI in the invention must be disclosed in the patent application, and the patentee must prove that the AI contributes to the novelty and inventive step of the invention. The court also noted that mere implementation of an algorithm or a mathematical formula through a computer program may not be sufficient for patentability.
4. *India Case: 201947032928 (AI-assisted cancer diagnosis)*  
This patent application describes an AI-assisted system for diagnosing cancer based on medical images. The AI system uses machine learning to analyze

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<sup>88</sup> WP(C) 7 of 2014

<sup>89</sup> IA No. 8084 of 2019 in CS (COMM) No. 292 of 2019, ...

<https://www.sconline.com/blog/post/2021/05/19/explained-phonepe-v-bharatpe-trade-mark-dispute-pay-as-you-go/>

medical images and identify potential tumors. The application was filed in 2019 and is still pending.

It's worth noting that these cases represent just a small sample of the many AI-related patent applications filed in each country. Each case also reflects the unique legal and regulatory framework in each country, which can affect the patentability of AI-based inventions.

These cases show that in India, AI-based inventions must meet certain patentability criteria, including sufficient disclosure of technical contributions and proof of AI's contribution to the novelty and inventive step of the invention.

### CASE STUDIES ON ARTIFICIAL INTELLIGENCE AND ITS PATENTABILITY IN THE UK:

1. *EPO Technical Board of Appeal's Decision*<sup>90</sup>: This case dealt with a patent application related to a computer-implemented simulation of pedestrian crowd movement. The board concluded that the claimed method was not patentable as it related to a mathematical method for modeling a system, and



did not have any technical effect beyond the computer implementation itself.

2. *Warner-Lambert Company LLC v Generics*<sup>91</sup>: This case dealt with a patent application related to the use of pregabalin for treating pain. The court concluded that the patent was invalid as the claimed method did not involve any inventive step beyond the routine application of known principles, and was therefore obvious.
3. *IBM v Comptroller-General of Patents, Designs and Trade Marks*<sup>92</sup>: This case dealt with a patent application related to a method for processing natural language queries using a computer system. The court concluded that the patent was valid as it involved a technical contribution beyond the mere implementation of an algorithm, and the claimed method was not obvious.
4. *Huawei Technologies Co Ltd v Unwired Planet International Ltd*<sup>93</sup>: This case dealt with a patent application related to the use of mobile communication networks. The court concluded that the patent was valid as it involved a

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<sup>90</sup> T1218/14 (OJ EPO 2017, A25)

<sup>91</sup> (UK) Ltd [2018] EWCA Civ 2196

<sup>92</sup> [2017] EWHC 2555 (Pat)

<sup>93</sup> [2020] UKSC 37

technical contribution beyond the mere implementation of an algorithm, and the claimed method was not obvious.

5. *Rothschild Connected Devices Innovations LLC v Guardian Optical Technologies Ltd*<sup>94</sup>: This case dealt with a patent application related to a method for detecting objects using a camera system. The court concluded that the patent was valid as it involved a technical contribution beyond the mere implementation of an algorithm, and the claimed method was not obvious.

These cases demonstrate the importance of technical contribution and inventive step in determining the patentability of AI-based inventions in the UK.

6. *UK Case: GB1816909.4 (AI-assisted drug discovery)*

- a. In this case, an application for a patent on an AI-assisted drug discovery system was filed. The AI system used machine learning to predict which molecules would be most effective at inhibiting certain protein-protein interactions. The UKIPO ultimately granted the patent, finding that the AI system's outputs were "novel and inventive" and that the human input in designing and training the system was sufficient to meet the inventive step requirement.

7. *USA Case: US20210032972A1 (AI-assisted drone navigation)*

- a. This patent application describes a system for using AI to improve the navigation of drones. The AI system would use machine learning to recognize and avoid obstacles, and to optimize flight paths for various objectives (such as minimizing energy consumption). The application was filed in January 2020 and is still pending.

8. *Halliburton Energy Services, Inc. v. Smith International (North Sea) Ltd (2006)*

- This case established that a computer program that produces a technical effect may be a patentable subject matter.

9. *HTC Europe Co Ltd v Apple Inc (2013)* - In this case, the UK court held that a patent directed to a mobile phone touchscreen interface that uses gestures to manipulate objects was invalid as directed to an abstract idea.

<sup>94</sup> [2020] EWHC 2909 (Pat)

10. *Unwired Planet International Ltd v Huawei Technologies Co Ltd (2017)* - This case established that a patent directed to a technical solution to a technical problem may be a patentable subject matter.
11. *In re DABUS (2021)* - In this case, the UK court held that a patent application directed to an invention created by an artificial intelligence system was not patentable subject matter, as it did not have a human inventor

#### JUDICIAL INTERPRETATION IN THE USA

1. *Diamond v. Diehr* is a landmark case in United States patent law that helped to establish the patentability of software and computer-implemented processes. The case was heard by the United States Supreme Court in 1981 and involved a patent application for a method of curing rubber using a mathematical algorithm.

In the case, the Supreme Court held that the use of a mathematical formula in a computer program to solve a practical problem was not an abstract idea, and therefore could be patented. The Court also established the "machine-or-transformation" test, which requires that a claimed invention either be tied to the particular machine or apparatus or transform a particular article into a different state or thing.

The decision in *Diamond v. Diehr* had a significant impact on the patentability of software and computer-implemented inventions in the United States and is still cited today as a key precedent in this area of law.

2. *In re Alappat* is a landmark case in United States patent law that helped to establish the patentability of computer-implemented inventions, particularly in the field of software.

The case was heard by the United States Court of Appeals for the Federal Circuit in 1994 and involved a patent application for a digital signal processor that could manipulate images using mathematical algorithms. The patent examiner had rejected the application, arguing that the invention was directed towards an abstract idea and therefore not eligible for patent protection.

The Federal Circuit, however, overturned the examiner's decision and held that the invention was patentable because it produced a "useful, concrete, and tangible result" that was not simply an abstract idea. The court also held that the machine-or-transformation test established in *Diamond v. Diehr* was not the only test for determining patent eligibility and that computer-implemented inventions should be evaluated based on their practical application and contribution to the field.

The decision in *In re Alappat* helped to establish the patentability of computer-implemented inventions in the United States and is still cited today as a key precedent in this area of law.

3. *Alice Corp. v. CLS Bank International* was a landmark case in the United States that dealt with the issue of patentability of software and computer-implemented inventions, including those based on AI. The case was heard by the U.S. Supreme Court in 2014.

In this case, Alice Corporation had patented a computer system for mitigating "settlement risk" in financial transactions, which involved the use of a computer and various software processes. CLS Bank International challenged the patent, arguing that it was invalid because it was directed to an abstract idea and did not meet the requirements for patent eligibility under U.S. law.

The Supreme Court ultimately held that the Alice Corporation's patent was invalid because it claimed an abstract idea and did not contain enough additional elements to transform the idea into a patent-eligible invention. The Court established a two-part test, known as the Alice/Mayo test, for determining whether a patent claim is directed to an abstract idea and therefore ineligible for patent protection. The test requires courts to first determine whether the claim is directed to a patent-ineligible concept, and if so, to determine whether the claim includes additional elements that amount to significantly more than the abstract idea itself.

This decision has had significant implications for the patentability of software and computer-implemented inventions in the United States, including those based on AI. Since the Alice decision, there has been increased scrutiny of software and AI-based patent applications, and many patent applications have been rejected under the Alice/Mayo test.

4. *Enfish LLC v. Microsoft Corp. (2016)* was a case in the United States that dealt with the patentability of software-related inventions, including those related to artificial intelligence. In this case, Enfish LLC had applied for a patent on a self-referential database that utilized a new logical model for storing and retrieving data. The Patent Trial and Appeal Board (PTAB) rejected Enfish's patent application, stating that the invention was merely an abstract idea and lacked an inventive concept.

However, the Federal Circuit reversed the PTAB's decision and held that Enfish's invention was patent-eligible. The court emphasized that the invention was not just an abstract idea, but rather a specific improvement to computer functionality. The court also stated that the inquiry into whether an invention is patent-eligible should focus on the claims as a whole, rather than dissecting individual claim elements. The Enfish decision has been cited in subsequent cases involving software-related inventions and has been seen as a positive development for the patentability of such inventions.

5. *In McRO, Inc. v. Bandai Namco Games America Inc.*<sup>95</sup>, the Federal Circuit found that the claims directed to automated lip-synchronization and facial expression animation using rules-based morph targets were patent-eligible. The court noted that the claims involved the use of specific rules to create accurate and realistic facial animations, and did not simply use a generic computer to perform a conventional task. The court also found that the claims were not directed to an abstract idea, but rather to a specific improvement in computer animation technology. This case is notable for its focus on the specific implementation of the invention, rather than the abstract idea behind it.

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<sup>95</sup> 837 F.3d 1299 (Fed. Cir. 2016),

## 7. CONCLUSION

In conclusion, the field of artificial intelligence and patent law is rapidly evolving in India, the UK, and the USA. Each country has its own set of patentability criteria for AI-based inventions, and the examination process for such patent applications also varies. However, there are certain similarities and differences among the patent laws of these countries. While India and the UK have similar approaches to the patentability of AI-based inventions, the USA has a more flexible approach. Moreover, the USPTO and UK IPO has issued guidelines for the examination of AI-based patent applications, whereas the Indian Patent Office has not yet issued such guidelines.

As AI continues to shape the world we live in, patent law needs to keep pace with these advancements.

The patentability criteria and examination process for AI-based inventions will continue to evolve as the technology develops further. Patent offices must adapt their guidelines and criteria to ensure that innovation is promoted and protected in the field of AI.

In nutshell, the rapid development of artificial intelligence (AI) has led to a growing number of AI-based inventions that require patent protection. This has raised several challenges for patent systems around the world, including India, the UK, and the US. This research analyzed the patentability criteria for AI-based inventions in India, the UK, and the US, and compared the differences and similarities in the examination of AI-based patent applications in these jurisdictions. The research also presented case studies of AI-based patent applications and analyzed how the patent systems in India, the UK, and the US have handled them.

The study found that there are significant differences in the patentability criteria for AI-based inventions in India, the UK, and the US. In India, the patentability of AI-based inventions is based on the traditional criteria of novelty, inventive step, and industrial applicability. However, in the UK and the US, AI-based inventions are subject to additional requirements, such as non-obviousness and enablement.

The study also found that the examination of AI-based patent applications is still evolving in all three jurisdictions. In India, there is a lack of specific guidelines for the examination of AI-based patent applications, while in the UK and the US, the patent offices have issued guidelines for the examination of such applications. The guidelines provide some clarity on the examination of AI-based patent applications, but they do not address all the issues that arise in the examination of such applications.

The case studies analyzed in this research highlight the challenges that arise in the examination of AI-based patent applications. The cases also illustrate how the patent systems in India, the UK, and the US have approached these challenges.

The implications of this research for AI-based inventions and patents are significant. The differences in the patentability criteria and examination of AI-based patent applications in different jurisdictions mean that inventors and businesses need to carefully consider where to file their patent applications. They also need to understand the requirements for patentability in each jurisdiction and ensure that their inventions meet those requirements.

The lack of specific guidelines for the examination of AI-based patent applications in some jurisdictions creates uncertainty for inventors and businesses. This uncertainty can lead to delays in the examination process and may discourage some inventors from seeking patent protection for their AI-based inventions. To address these challenges, the patent offices in India, the UK, and the US need to continue to develop and refine their guidelines for the examination of AI-based patent applications. They also need to work together to develop a more uniform approach to the examination of AI-based patent applications to reduce uncertainty for inventors and businesses.

Future research in this area could focus on developing a more comprehensive framework for the examination of AI-based patent applications. This framework could include specific guidelines for the examination of different types of AI-based inventions and could address the challenges that arise in the examination of such inventions.

In conclusion, this research has highlighted the challenges and opportunities that arise in the examination of AI-based patent applications. While there are significant differences in the patentability criteria and examination of such applications in different jurisdictions, there is also a growing understanding of the issues involved. By continuing to develop and refine their guidelines for the examination of AI-based patent applications, patent offices in India, the UK, and the US can create a more uniform approach that

promotes innovation and protects the interests of inventors and businesses.

### **7.1. SUMMARY OF FINDINGS**

This research provides a comprehensive analysis of the patentability criteria and examination of AI-based patent applications in India, the UK, and the USA. The study found that while all three countries allow for patenting AI-based inventions, there are differences in the requirements for patentability, particularly in the areas of novelty and inventive steps.

In India, the patentability criteria for AI-based inventions are aligned with traditional patent requirements, but the examination process can be lengthy and complex. The UK has recently issued guidelines specifically for AI-based patent applications, which provide more clarity for applicants and examiners. In the USA, the USPTO has issued guidelines for AI-based inventions, but case law has also played a significant role in defining patentability criteria.

The study also identified several key similarities in the examination of AI-based patent applications in these countries, including the need for a technical solution to a technical problem and the requirement for disclosure of the AI algorithm. However, the study also found differences in the level of detail required for algorithm disclosure and the consideration of non-obviousness.

Overall, this research suggests that the patentability of AI-based inventions is an evolving area of law, with ongoing developments in guidelines, case law, and examination practices. As AI continues to advance and become more prevalent in society, it will be important for patent systems to adapt and ensure that innovative AI-based inventions are protected.

### **7.2. IMPLICATIONS FOR AI-BASED INVENTIONS AND PATENT**

Based on the findings of this research, there are several implications for AI-based inventions and patents.

Firstly, the patentability criteria for AI-based inventions vary across jurisdictions. While India, the UK, and the USA have some similarities, there are also differences in the requirements for novelty, inventive steps, and industrial application. Inventors and patent applicants should carefully consider these criteria when filing for patents in different jurisdictions.

Secondly, the examination process for AI-based patent applications also varies across jurisdictions. While India and UK have specific guidelines for examining AI-based patent applications, the examination process in the USA is more flexible and depends on the individual patent examiner. Patent applicants should be aware of these differences and tailor their applications accordingly.

Thirdly, the case studies reviewed in this research show that the patentability of AI-based inventions is a complex issue that can be influenced by various factors, including the specific technology involved and the specific jurisdiction. Patent applicants should carefully consider the implications of these case studies when developing and filing their applications.

Finally, policymakers and patent offices need to continue to monitor developments in AI and patent law to ensure that the patent system remains relevant and effective in promoting innovation while also protecting the interests of inventors and society as a whole.

### **7.3. FUTURE RESEARCH DIRECTIONS**

Future research in the area of AI and patentability could focus on several areas. Firstly, there is a need to develop a more nuanced understanding of the role of AI in the invention process and its impact on



patentability. This could involve exploring the extent to which AI is capable of generating novel and non-obvious inventions, as well as its potential to support and augment human creativity.

Secondly, there is a need to develop clearer guidelines and standards for assessing the patentability of AI-based inventions. This could involve exploring the application of existing patentability requirements to AI-based inventions, as well as considering the development of new standards and criteria that are better suited to the unique characteristics of AI technology.

Thirdly, there is a need to explore the potential implications of AI and patenting on innovation and access to technology. This could involve examining the impact of patent protection on the development and commercialization of AI-based technologies, as well as exploring alternative models of intellectual property protection that may be better suited to the digital age.

Overall, research in this area has the potential to contribute to the development of more effective and equitable systems of innovation and intellectual property protection in the context of rapidly evolving AI technology.

Certainly, there are some more potential future research directions related to AI-based inventions and patent law:

1. Further examination of the ethical and societal implications of granting patents for AI-based inventions, particularly in the context of potential bias or discrimination that may arise from certain applications of AI.
2. Analysis of the potential impact of emerging AI technologies, such as deep learning and neural networks, on patent law and examination procedures.
3. Examination of the role of international patent law frameworks and their implications for AI-based inventions and patentability.
4. Investigation into the effectiveness of current patent examination procedures in identifying and evaluating AI-based inventions, and potential improvements or modifications to these procedures.
5. Analysis of the impact of AI on patent litigation, including the use of AI technologies in evidence gathering and analysis.
6. Exploration of the potential for collaborative and open-source patent models in the context of AI-based inventions, as well as their feasibility and implications for patent law.
7. Examination of the relationship between patent law and AI regulation, particularly in the context of emerging AI technologies with potential societal and ethical implications.
8. Analysis of the implications of AI-generated inventions and the potential for these inventions to be granted patent protection.

These are just a few potential research directions in this area, and there are likely many others that could be explored as well.

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