

Moving Forward with AI – Today and the Next Five Years

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Before considering whether seeking patent protection for an artificial intelligence (AI) innovation is a worthwhile endeavor, one must first understand what AI is. To some, the R2-D2 droid from the Star Wars franchise released in 1977, and which has basic motion and speech capabilities, is an undisputed symbol of AI. Fast forward to today, and one may ask whether the ChatGPT chatbot that has taken the Internet by storm can also be considered AI? (The ChatGPT chatbot can answer questions, tell jokes and even write computer code.) What about LaMDA, a Google chatbot, that some believe has become sentient? Is LaMDA AI? How about the robots that walk around grocery stores or the self-driving cars that are prevalent in many cities across U.S.? Are those AI?

AI can more simply be considered as a computing system that “appears smart” to human users by convincingly mimicking some or all aspects of human intelligence. AI technology is a broad-based field that is increasingly affecting many different interactions between humans and a wide variety of different technologies—some old, and some new.

USPTO Categorizations of AI

While defining AI precisely can be challenging, for patent purposes, the United States Patent and Trademark Office (“USPTO”) has divided AI technology into eight overlapping categories:

1. knowledge processing,
2. speech,
3. AI hardware,
4. evolutionary computation,
5. natural language processing,
6. machine learning,

7. vision, and
8. planning and control.¹

Knowledge processing involves using AI to derive facts about the real-world and then using those facts in automated systems.

Speech involves using AI to understand or process a sequence of words that make up human speech.

AI hardware includes specialized computer equipment with the computing power and efficiency required to perform math intensive calculations required for AI applications.

Evolutionary computations involve AI that uses evolutionary modeling.

Natural language processing involves using AI to convert natural language into encoded data and analyzing that, e.g., providing summaries of documents or other types of text.

Machine learning involves AI models that are trained on data and learn how to make decisions and/or categorizations from this data.

Vision involves using AI to extract and understand information contained in images and videos.

Lastly, planning and control involves using AI to identify and model activities that achieve specific plans or goals.

Patent Filing Trends in AI at the USPTO

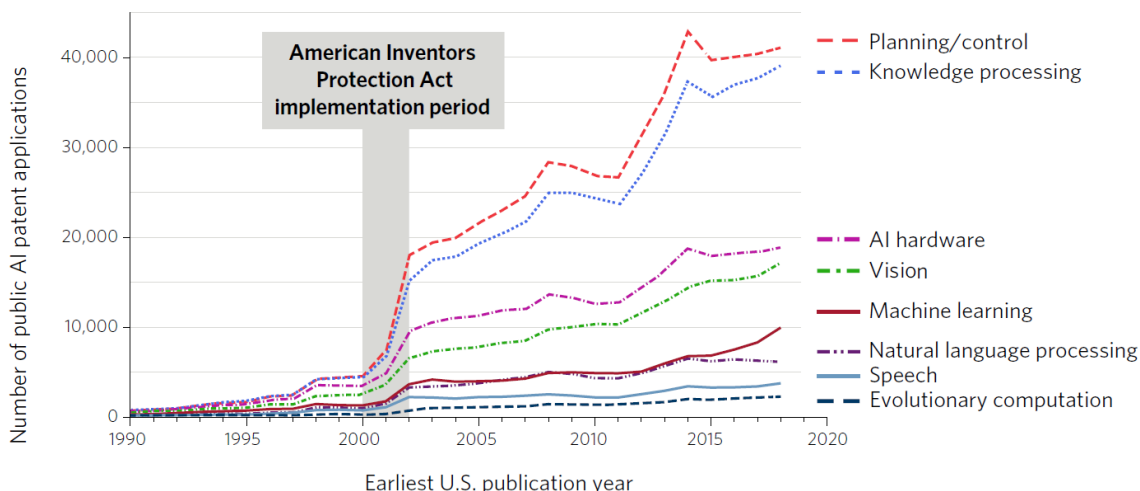
A hallmark of any emerging technology is an uptick in patent application filings. AI is no different. Since 2013, more than 60,000 AI-based patent applications are published each year, based on the data circulated by the USPTO.² These AI applications fit into one or more of the eight

¹ <https://www.uspto.gov/sites/default/files/documents/OCE-DH-AI.pdf>

² <https://www.uspto.gov/sites/default/files/documents/OCE-DH-AI.pdf>

categories that the USPTO created for AI. And since 2010, the number of AI patent applications in planning and control, knowledge processing, AI hardware, vision, and machine learning categories has increased by more than fifty percent, and in some cases more than doubled.³

Figure 3: The volume of public AI patent applications by AI component, 1990-2018



The top AI patent owners are the same companies that have and continue to invest heavily in patents. For example, as of 2018, IBM Corp. had the largest number of AI patents (46,752), followed by Microsoft Corp. (22,067), and Google Inc. (10,928).⁴ The remaining top 30 U.S.-based AI patent owners are largely in the technology sector and include major Silicon Valley corporations with a focus on the development of computer hardware, software, telecommunications, and finance technologies.

A growing number of AI patent application filings may not by itself be a convincing reason for some to invest in an AI patent portfolio. After all, the *quid pro quo* of the patent system—where an inventor must fully disclose an invention in return for a twenty-year limited monopoly right to exclude others from making, using, selling, offering for sale, or importing the invention—may not appear to be a sufficient reason to file for AI patents. Some would also argue that AI

³ <https://www.uspto.gov/sites/default/files/documents/OCE-DH-AI.pdf>

⁴ <https://www.uspto.gov/sites/default/files/documents/OCE-DH-AI.pdf>

inventions are often not detectable and can instead be kept as trade secrets. Additionally, patents can be expensive and slow to obtain. Upon a closer examination of the AI industry, however, it becomes apparent that traditional reasons for passing on patent protection do not necessarily apply to AI. At the same time, filing for AI patents when AI technology is still a rapidly developing field may provide patent owners with a tremendous benefit in the years to come.

Detectability of AI technology

The inner structure of AI models that are used for planning and control, knowledge processing, vision, machine learning, and natural language processing are often not easily detectable. These AI models frequently operate as black boxes that are trained to process data and generate a result. Further, AI models commonly operate on internally controlled systems, making it difficult, if not impossible, to obtain and reverse engineer the AI models to detect potential patent infringement.

While detectability, or lack thereof, is often a key reason to not file for patent protection, and rely on other methods for protecting IP such as trade secrets, this approach may be counterintuitively disadvantageous. The AI industry is a highly academic and research paper-driven field. In fact, inventors, whether employees of companies or students at universities worldwide, annually submit thousands of papers to various AI conferences, such as NeurIP, ICLR, IJCAI, and ACL. The acceptance of these papers by the conferences confers prestige and sets its authors as leaders in the field. These papers describe in detail structures, algorithms, methodologies, and training techniques for the AI models. These models described in the papers are frequently the same (or similar) AI models that end up operating in industry as black boxes on backend computers under control of a private entity. These papers also include names of inventors,

corporate associations such as email addresses belonging to an employer, and the basis for the relevant research in a long list of citations. As a result, while deployed AI models themselves may not be easily accessible, the details of how these models work, who makes them, and whether there is a potential of infringement may be gleaned from the submitted papers.

Trustworthiness of AI as an Emerging Technology

As with any emerging technology, there is skepticism about the trustworthiness of AI. If a new technology is deemed to be trustworthy, the technology will likely flourish under widespread adoption. On the other hand, if the technology—no matter how brilliant or revolutionary—is deemed to be untrustworthy, the technology may face an uphill battle toward adoption or may be supplanted by another less brilliant product that is perceived as being more trustworthy. Because AI operates as a black box that “mysteriously” produces an answer to a presented problem, AI is often viewed with skepticism. This view is compounded by media reports that gleefully highlight outlier cases of AI products malfunctioning. These examples include situations where an autonomous vehicle confuses a setting sun with a yellow light and decides to brake on a highway, or when an AI chatbot produces an obsolete answer, such as suggesting that the current USPTO director is still Andrei Iancu, not Kathi Vidal.

One way to show trustworthiness is through explainability. The term “explainable AI” was coined for this exact purpose and attempts to clarify the black box nature of AI by explaining how AI models work, which algorithms these AI models use, how these AI models are trained, and the training data that is used for training. Many companies that produce AI technologies also invest in training, research, documentation, seminars, and the like that deconstruct the technology and explain how it works. These companies may also use explainable AI to show that the AI

technologies are trained to be unbiased and do not favor one gender, race, or demographic against another. This investment is done with a forethought that the AI technologies are deemed safe, unbiased, and should be adopted.

For the companies that are investing in explainable AI, it is imperative to file patent applications to protect their technologies. Even though the AI technology itself may execute on a cloud server or as a black box, the company has often explained how the technology works and has used the explanation itself as a vehicle for getting the technology adopted. This explanation is likely to be dissected by competitors that are creating their own products and patent owners, including patent trolls, who may seek to minimize competition, prevent competitors from obtaining market share, or simply cash in by suing for patent infringement and using the companies' explanations as part of infringement contentions.

Continuous Training of AI Models & AI as a Service May Increase Detectability

While in the past the AI models were often trained once and then uploaded to a cloud sever to perform their trained functions, many AI models today are often trained continuously on new training data and/or at predefined time increments. This is done, in part, to update AI models with current datasets. These AI models are also analyzed by data scientists to determine whether the models exhibit bias. The more these AI models are trained and analyzed, the more employees, contractors, and end users have access and exposure to the AI models and their structure. Accordingly, even if some specifics of the AI models themselves are not easily detected, the continuous training and analytics performed on the models—at least in part to foster widespread adoption—increase the likelihood that some details of the AI models and structures would be exposed externally .

AI as a service (by a third-party provider) will also see increased usage and adoption as AI continues to evolve. This provides an additional avenue for detection of AI patent infringement.

An AI service or AI software package used by a competitor may have easily obtainable feature documentation that can allow for infringement analysis (although some implementation details could still be buried in code). In some instances, the third-party software itself (binary or source code) may be available for analysis and reverse engineering, increasing the usefulness of AI patents that might be considered as covering something “under the hood.”

In view of the factors above, companies developing AI innovations may have strong motivations to disclose their innovations in order to obtain a period of exclusivity for their AI that is provided by the patent system.

Standardization

How to standardize AI technology is a present topic of debate. ETSI, one of the main European Standards Organizations, has been charged with developing standards for AI.⁵

Some of the AI standards ETSI has developed relate to telecommunication technologies, such as 5G technologies that use AI as part of the 5G Radio Access Network (5G RAN) and 5G Network Capabilities (5G NR Core). This is not surprising given that companies such as AT&T, Qualcomm Inc., Cisco Tech., Motorola Inc., and Verizon Communications Inc. are among the top 30 AI patent owners and have already made significant investment in the use of AI in telecommunications.⁶ For these AI standards, there are already races to the patent offices worldwide to patent portions of the standards.

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https://www.etsi.org/images/files/ETSIWhitePapers/etsi_wp34_Artificial_Intelligence_and_future_directions_for_ETSI.pdf

⁶ <https://www.uspto.gov/sites/default/files/documents/OCE-DH-AI.pdf>

Other AI standards that ETSI is looking at are more amorphous, and relate to AI network optimization, network automation, Internet of Things, security, privacy, and testing. It should be noted that these standards are still in their infancy and standardization in this area may prove to be a struggle. Nevertheless, there are likely to be races to patent offices world-wide between players in these fields if ETSI is successful in its standardization efforts. In other words, the market for AI patents could become similar to the market for the standards essential patents prevalent in the telecommunication industry.

There are also discussions for creating a 3D Internet where each webpage is a 3D space and multiple 3D spaces create interconnected worlds. The 3D spaces are filled with avatars and other 3D objects that are created using AI. A person can use a virtual reality headset to enter different 3D spaces in a similar manner that a person traverses among different webpages and websites. A person using the Internet today to access different websites, regardless of the browser, uses well known Internet standards such as HTML, CSS, and PNG. Similarly, as the 3D Internet evolves so will the AI standards for communicating and creating objects in this space. As with telecommunication standards, there will likely be a rush to the patent office by the players in this field to file patent applications and shape the AI standards related to the 3D Internet.

USPTO Investment

Over the past few years, the USPTO has hired examiners trained in AI to examine the ever-increasing volume of the AI patent applications. The USPTO also recognized that—except for AI hardware category—AI technologies are generally software applications that are susceptible to patent eligibility challenges.

To minimize patent eligibility issues during prosecution, the USPTO signaled that AI technologies may be patent eligible. In fact, the USPTO recently provided a patent eligibility example that demonstrates how AI claims can be structured to recite patent eligible subject matter, along with arguments that applications can present to overcome patent eligibility rejections.⁷

These efforts by the USPTO demonstrate that filing AI patent applications is worthwhile. As a result of the USPTO hiring AI examiners, many AI patent applications are being examined within two to three years from the date the applications are filed. Further, because the examiners are trained in AI, and many AI technologies are new, the patent applications are typically granted in two to four rounds of prosecution. Additionally, by providing the patent eligibility examples as part of the USPTO guidance, the USPTO has reduced the number and veracity of the 35 U.S.C. § 101 rejections that are being issued by the Office for the AI patent applications. This has significantly reduced the patent examination process which is traditionally viewed as slow and inefficient. It also reduces the expense associated with prosecution because AI applications do not currently tend to languish at the USPTO but end up issuing into patents.

Looking Forward

The USPTO is now issuing thousands of AI patents. Because many AI technologies are still in their infancy, these AI patents often have broad claims that may have great value and licensing potential.

Further, today many companies are in creation mode and generating AI technologies in the same or overlapping spaces. For example, on November 30, 2023, OpenAI launched a prototype of its chatbot called ChatGPT. Since then, ChatGPT has taken the Internet by storm as the new

⁷ https://www.uspto.gov/sites/default/files/documents/101_examples_37to42_20190107.pdf

and revolutionary chatbot. However, what is less well known is that there are competing chatbots, including ChatSonic, Chinchilla, Bloom, Replika, Jasper Chat, LaMDA, Else Speak, DialogPT, YouChat, and Perplexity, among others.

Right now, the chatbots companies are not trying to edge each other out of the chatbot space because the chatbot technology is still in its infancy with little economic value. As the AI technology matures, the competing products would begin fighting for market share, including through patent licensing and litigation.

This is where obtaining IP protection for AI-based inventions becomes even more important. Patent owners that obtained AI-related patents while the AI technology was in its infancy are more likely to hold patents directed to more technology with broader claims. And early disclosure of the claimed inventions in the patent applications themselves may present additional challenges for invalidity challenges. As a result, these early adopter patent owners are more likely to enter negotiations or litigation from a position of relative strength.

In all, since the AI technology is still in its infancy, there is potential for patent owners to obtain fairly broad patents. Companies that invest heavily in patent are already filing AI patent applications. The companies that are considering in keeping their AI a trade secret, should also consider whether such route is feasible given the detectability of AI technologies through conferences, investment in explainable AI, AI training, and standardization.