AI patent eligibility: observations and lessons for the U.S. and China

By Michael Portnov, Fish & Richardson PC

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The White House issued an Executive Order on the safe, secure, and trustworthy development and use of artificial intelligence[1] at the end of October 2023. Recognizing the role of the patent system in helping to promote this development, the EO asks the United States Patent and Trademark Office to issue guidance to patent examiners and applicants to address considerations at the intersection of AI and intellectual property. The request specifically mentions updated guidance on patent eligibility as one possible area to cover.

As a patent attorney who has worked with AI technologies since the early days of the deep learning revolution and who has drafted, filed, and prosecuted hundreds of AI patent applications, I have found that all aspects of AI technology — from core machine learning models to applications of those models — can be patented in the U.S., and the USPTO's guidance should reflect this. I have also found that the situation is different in China, where long timelines and inconsistent outcomes pose challenges for obtaining the same protection that one could get in the U.S.

Patent eligibility in the U.S.

Patent eligibility in the U.S. is governed by Section 101 of the Patent Act, which makes patent protection available for "any new and useful process, machine, manufacture, composition of matter, or any new and useful improvement thereof." Over the years, the courts have carved out certain subject matter from eligibility for patent protection. These are known as "judicial exceptions" and apply to abstract ideas, natural phenomena, and laws of nature.

In *Alice Corp. v. CLS Bank International,*[2] a landmark case in software patent eligibility law, the U.S. Supreme Court held that an invention is not necessarily ineligible for patent protection merely because it involves a judicial exception. To determine whether such an invention can be patented, the Court created a two-part test. Under the first prong, the Court asks whether the patent claim at issue is directed to a judicial exception. If so, the Court asks under the second prong whether the claim recites additional elements that amount to "significantly more" than the judicial exception. If the answer to the second prong is "yes," the claim is patent eligible.

Lower courts generally have interpreted *Alice* to require that the claims at issue provide a technological solution to a technological problem. For example, in *Enfish LLC v. Microsoft Corp.*[3] the U.S. Court of Appeals for the Federal Circuit explained that software is capable of making non-abstract technological improvements just as hardware can. The key inquiry is whether the focus of the claims is on the specific asserted improvement in computer capabilities or, rather, on an abstract process for which a computer is merely invoked as a tool. The court in subsequent cases has found software claims patent eligible where they recite specific and unconventional technical solutions that are improvements over the prior art.[4]

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With these guidelines in mind, it is quite feasible for AI patent applicants to draft claims that stand up under *Alice*. The key for applicants is to clearly show that their claim improves a technological process rather than merely uses technology to perform an existing process. For example:

- A new use of machine learning for image recognition or another computer vision task that yields improved results or demonstrates computational efficiencies relative to prior art methods,

- Training a neural network architecture in a way that makes training more computationally efficient or in a way that results in an improved trained neural network, or

- A new neural network architecture that can be deployed more efficiently (e.g., that can generate outputs with reduced latency) or requires less memory to deploy

can all be seen as improving a technical process.

So long as the applicant's claims are reasonable in scope and focus on the features that provide the technological advantages of the innovation, the patent eligibility test in the U.S. is not a bar to patent eligibility for software- and AI-related inventions.

Patent eligibility in China

Article 2.2 of the patent law of China affords patent protection to "any new technical solution relating to a product, a process,

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or improvement thereof." However, Chinese patent law explicitly excludes from patent protection scientific discoveries, rules and methods for intellectual activities, and methods for the diagnosis and treatment of diseases, among other subject matter. These exceptions generally include the types of software, algorithms, and business methods that are considered "abstract ideas" in American patent law.

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Nonetheless, the China National Intellectual Property Administration (the Chinese analogue to the USPTO) may grant patent protection to inventions that recite algorithms and business methods in some cases. A patent claim that concerns an abstract algorithm or business method without any additional technical features generally is not eligible for patent protection. If the claim at issue contains a technical feature in addition to the algorithm or business method, then the claim when viewed as a whole is not excluded from eligibility for patent protection. The key inquiry is whether the claim recites a technical solution. If a claim describes a technical means that utilizes laws of nature to address a technical problem and obtains a technical effect, then the technical solution described by the claim is considered a technical solution within the meaning of Article 2.2.

While the CNIPA's "technical advantage" test is similar to the *Alice* test, obtaining patent protection for software- and AI-related inventions tends to be trickier at the CNIPA than the USPTO. In my experience with AI related applications, many Chinese patent examiners apply different standards when determining patent eligibility. For example, some examiners look to a patent's specification rather than its claims to find a technical advantage and will allow the claims even if they are generic claims that could be applied to multiple use cases.

In other cases, Chinese patent examiners may reject a patent claim even if the applicant demonstrates a technical advantage because the applicant did not initially identify a technical field of use for the invention. Such denials may continue even after the applicant cures the defect by reciting a technical field of use.

The inconsistency of patent examination in China poses a challenge for patent applications that are directed to new AI innovations that have multiple use cases (e.g., a neural network training algorithm that can be used both for speech recognition and image recognition), because limiting the claim to a single field of use at filing significantly limits the scope of protection. On the other hand, filing a claim without a field of use may make it difficult to obtain a patent in China even if the applicant later amends the claim to recite one or more possible fields of use.

A comparison of the data

In my experience, and confirmed by the data, I have found that obtaining patent protection for foundational AI innovations generally is a greater challenge in China than in the U.S. Patent prosecution tends to move more slowly in China than in the U.S., and once patent examination begins, prosecution at the CNIPA tends to be just as difficult, if not more so, than before the USPTO. This is especially true for subject matter eligibility issues. Moreover, recent experiences have shown that prosecuting AI-related technologies at the CNIPA is an unpredictable process that varies significantly even between cases with seemingly similar subject matter.

To investigate the differences in outcomes between China and the U.S., I used the patent analytics tool Innography to analyze published patent applications filed in the AI examination units at the USPTO from 2015 to 2019, as well as their counterparts from the same patent families at the CNIPA over the same period. By only considering cases filed before 2020, the impact on the statistics of applicants potentially being able to wait 30 months after an initial U.S. filing to file a counterpart application in China was mitigated. In this analysis, I excluded applications having priority dates before 2014.

My results are summarized in the table below:

	Granted Applications	Pending Applications	Abandoned Applications	Allowance Rate for Non-Pending Applications
United States	66%	12%	22%	75.1%
China	52%	34%	14%	78.2%

These statistics show that while allowance rates (the percentage of abandoned or granted cases that have been granted) are broadly similar between the two patent offices (75.1% in the U.S. and 78.2% in China), the current yield of granted patents is lower and prosecution is taking longer in China, with the percentage of pending cases being almost three times higher in China than in the U.S.

Even receiving a Section 101 rejection during patent prosecution at the USPTO does not appear to be a major hurdle for AI patent applicants to overcome. In my above analysis, I found that approximately 48% of the applications considered received at least one Section 101 rejection during prosecution. However, of those cases that were rejected under Section 101, the allowance rate was still 71%, showing that U.S. patent applicants in the AI art units are able to overcome Section 101 rejections in many circumstances. Moreover, given that the overall allowance rate for all patent applications at the USPTO is about 74%, my analysis did not show that AI patent applicants in the US are at a significantly greater disadvantage at the USPTO than applicants in other technologies.

As time passes, it will be interesting to see what happens to the large number of long-pending Chinese applications (i.e., to see how many of these cases go abandoned rather than proceeding to grant).

Advice to applicants

Patent applicants can obtain patent protection for software- and AI-related innovations in the U.S. by keeping three considerations in mind. First, focus on the technical advantage of the invention. Does it use less memory? Does it generate outputs with reduced latency? Does it use less computing power? The more specific applicants can be in demonstrating that their claims improve the functioning of a computer, the more likely they are to pass the patent eligibility test.

Second, ensure that the scope of the claims is reasonable. Abstract ideas, natural phenomena, and laws of nature are considered to be the "basic tools of scientific and technological work," and the USPTO is wary of granting claims that could potentially monopolize those tools. Applicants should therefore claim specific inventions or technological solutions rather than generalized versions of inventions. When drafting claims, emphasize that the innovation is tied to the technical advantages described in the patent application.

Third, provide detailed support for use cases for the innovation where possible. Claiming an innovation in too general of terms can lead to a rejection in both the U.S. and China. For example, provide details for how the innovation is used; if the innovation is a speech recognition model, be specific about what the input and output values are. If the innovation can be applied to multiple fields, provide details on what the model's inputs and outputs are for those additional applications.

While it can be challenging to give advice that is specific to China given the examination uncertainty described above, if obtaining patent protection in China is paramount, applicants may consider filing claims that are limited to a single field of use, even if the underlying technology can be applied to multiple fields. If successful, it may be possible to obtain coverage of one or more additional fields of use through a divisional application. Additionally, new CNIPA patent examination guidelines are apparently set to take effect in the coming months. It will be interesting to see what impact these new guidelines will have on the prosecution of AI-related patent applications in China.

Notes

[1] https://bit.ly/3St7Anh

[2] 573 U.S. 208 (2014)

[3] 822 F. 3d 1327 (Fed. Cir. 2016)

[4] *See, e.g., McRO Inc. v. Bandai Namco Games America Inc.*, 837 F. 3d 1299 (Fed. Cir. 2016); *Amdocs (Israel) Ltd. v. Openet Telecom Inc.*, 841 F. 3d 1288 (Fed. Cir. 2016); *Ancora Technologies Inc. v. HTC America Inc.*, 908 F. 3d 1343 (Fed. Cir. 2018).

About the author

Principal **Michael Portnov** is a patent prosecutor in **Fish & Richardson PC**'s Silicon Valley office in California, where he focuses on innovations relating to machine learning, artificial intelligence and computer-related technologies. Involved in AI and ML patent prosecution since the early days of the deep learning revolution, he brings insight, familiarity and experience to support clients' long-term success. He can be reached at portnov@fr.com.

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