Machine Learning Patentability in 2019: 5 Cases Analyzed and Lessons Learned Part 1

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Introduction

This article is the first of a five-part series of articles dealing with what patentability of machine learning looks like in 2019. This article begins the series by describing the USPTO’s 2019 Revised Patent Subject Matter Eligibility Guidance (2019 PEG) in the context of the U.S. patent system. Then, this article – and the four following articles – will describe one of five cases in which Examiner’s rejections under Section 101 were reversed by the PTAB under this new 2019 PEG. Each of the five cases discussed deal with machine-learning patents, and may provide some insight into how the 2019 PEG affects the patentability of machine-learning, as well as software more broadly.

Patent Eligibility Under the U.S. Patent System

The US patent laws are set out in Title 35 of the United States Code (35 U.S.C.). Section 101 of Title 35 focuses on several things, including whether the invention is classified as patent-eligible subject matter. As a general rule, an invention is
considered to be patent-eligible subject matter if it “falls within one of the four enumerated categories of patentable subject matter recited in 35 U.S.C. § 101 (i.e., process, machine, manufacture, or composition of matter).”[1] This, on its own, is an easy hurdle to overcome. However, there are exceptions (judicial exceptions). These include (1) laws of nature; (2) natural phenomena; and (3) abstract ideas. If the subject matter of the claimed invention fits into any of these judicial exceptions, it is not patent-eligible, and a patent cannot be obtained. The machine-learning and software aspects of a claim face 101 issues based on the “abstract idea” exception, and not the other two.

Section 101 is applied by Examiners at the USPTO in determining whether patents should be issued; by district courts in determining the validity of existing patents; in the Patent Trial and Appeal Board (PTAB) in appeals from Examiner rejections, in post-grant-review (PGR) proceedings, and in covered-business-method-review (CBM) proceedings; and in the Federal Circuit on appeals. The PTAB is part of the USPTO, and may hear an appeal of an Examiner’s rejection of claims of a patent application when the claims have been rejected at least twice.

In determining whether a claim fits into the “abstract idea” category at the USPTO, the Examiners and the PTAB must apply the 2019 PEG, which is described in the following section of this paper. In determining whether a claim is patent-ineligible as an “abstract idea” in the district courts and the Federal Circuit, however, the courts apply the “Alice/Mayo” test; and not the 2019 PEG. The definition of “abstract idea” was formulated by the Alice and Mayo Supreme Court cases. These two cases have been interpreted by a number of Federal Circuit opinions, which has led to a complicated legal framework that the USPTO and the district courts must follow.[2]

**The 2019 PEG**

The USPTO, which governs the issuance of patents, decided that it needed a more practical, predictable, and consistent method for its over 8,500 patent examiners to apply when determining whether a claim is patent-ineligible as an abstract idea. [3] Previously, the USPTO synthesized and organized, for its examiners to compare to an applicant’s claims, the facts and holdings of each Federal Circuit case that deals with section 101. However, the large and still-growing number of cases, and the confusion arising from “similar subject matter [being] described both as abstract and not abstract in different cases,”[4] led to issues. Accordingly, the USPTO issued its 2019 Revised Patent Subject Matter Eligibility Guidance on January 7, 2019 (2019 PEG), which shifted from the case-comparison structure to a new examination structure.[5] The new examination structure, described below, is more patent-applicant friendly than the prior structure,[6] thereby having the potential to result in a higher rate of patent issuances. The 2019 PEG does not alter the federal statutory law or case law that make up the U.S. patent system.

The 2019 PEG has a structure consisting of four parts: Step 1, Step 2A Prong 1, Step 2A Prong 2, and Step 2B. Step 1 refers to the statutory categories of patent-eligible subject matter, while Step 2 refers to the judicial exceptions. In Step 1, the Examiners must determine whether the subject matter of the claim is a process, machine, manufacture, or composition of matter. If it is, the Examiner moves on to Step 2.
In Step 2A, Prong 1, the Examiners are to determine whether the claim “recites” a judicial exception – including laws of nature, natural phenomenon, and abstract ideas. For abstract ideas, the Examiners must determine whether the claim falls into at least one of three enumerated categories: (1) “mathematical concepts” (mathematical relationships, mathematical formulas or equations, mathematical calculations); (2) “certain methods of organizing human activity” (fundamental economic principles or practices, commercial or legal interactions, managing personal behavior or relationships or interactions between people); and (3) “mental processes” (concepts performed in the human mind: encompassing acts people can perform using their mind, or using pen and paper). These three enumerated categories are not mere examples, but are fully-encompassing. The Examiners are directed that “[i]n the rare circumstance in which they believe[] a claim limitation that does not fall within the enumerated groupings of abstract ideas should nonetheless be treated as reciting an abstract idea,” they are to follow a particular procedure involving providing justifications and getting approval from the Technology Center Director.

Next, if the claim limitation “recites” one of the enumerated categories of abstract ideas under Prong 1 of Step 2A, the Examiner is instructed to proceed to Prong 2 of Step 2A. In Step 2A, Prong 2, the Examiners are to determine if the claim is “directed to” the recited abstract idea. In this step, the claim does not fall within the exception, despite reciting the exception, if the exception is integrated into a practical application. The 2019 PEG provides a non-exhaustive list of examples for this, including, among others: (1) an improvement in the functioning of a computer; (2) a particular treatment for a disease or medical condition; and (3) an application of “the judicial exception in some other meaningful way beyond generally linking the use of the judicial exception to a particular technological environment, such that the claim as a whole is more than a drafting effort designed to monopolize the exception.”

Finally, even if the claim recites a judicial exception under Step 2A Prong 1, and the claim is directed to the judicial exception under Step 2A Prong 2, it might still be patent-eligible if it satisfies the requirement of Step 2B. In Step 2B, the Examiner must determine if there is an “inventive concept”: that “the additional elements recited in the claims provide[] ‘significantly more’ than the recited judicial exception.” This step attempts to distinguish between whether the elements combined to the judicial exception (1) “add[] a specific limitation or combination of limitations that are not well-understood, routine, conventional activity in the field”; or alternatively (2) “simply append[] well-understood, routine, conventional activities previously known to the industry, specified at a high level of generality.” Furthermore, the 2019 PEG indicates that where “an additional element was insignificant extra-solution activity, [the Examiner] should reevaluate that conclusion in Step 2B. If such reevaluation indicates that the element is unconventional . . . this finding may indicate that an inventive concept is present and that the claim is thus eligible.”

In summary, the 2019 PEG provides an approach for the Examiners to apply, involving steps and prongs, to determine if a claim is patent-ineligible based on being an abstract idea. Conceptually, the 2019-PEG method begins with categorizing the type of claim involved (process, machine, etc.); proceeds to determining if an
exception applies (e.g., abstract idea); then, if an exception applies, proceeds to
determining if an exclusion applies (i.e., practical application or inventive concept).
Interestingly, the PTAB not only applies the 2019 PEG in appeals from Examiner
rejections, but also applies the 2019 PEG in its other Section-101 decisions,
including CBM review and PGRs.[7] However, the 2019 PEG only applies to the
Examiners and PTAB (the Examiners and the PTAB are both part of the USPTO), and
does not apply to district courts or to the Federal Circuit.

**Case 1: Appeal 2018-007443**[8] (Decided October 10, 2019)

This case involves the PTAB reversing the Examiner’s Section 101 rejections of
claims of the 14/815,940 patent application. This patent application relates to
applying AI classification technologies and combinational logic to predict whether
machines need to be serviced, and whether there is likely to be equipment failure in
a system. The Examiner contended that the claims fit into the judicial exception of
“abstract idea” because “monitoring the operation of machines is a fundamental
economic practice.” The Examiner explained that “the limitations in the claims that
set forth the abstract idea are: ‘a method for reading data; assessing data;
presenting data; classifying data; collecting data; and tallying data.’” The PTAB
disagreed with the Examiner. The PTAB stated:

Specifically, we do not find ‘monitoring the operation of machines,’ as recited in the
instant application, is a fundamental economic principle (such as hedging,
insurance, or mitigating risk). Rather, the claims recite monitoring operation of
machines using neural networks, logic decision trees, confidence assessments,
fuzzy logic, smart agent profiling, and case-based reasoning.

As explained in the previous section of this paper, the 2019 PEG set forth three
possible categories of abstract ideas: mathematical concepts, certain methods of
organizing human activity, and mental processes. Here, the PTAB addressed the
second of these categories. The PTAB found that the claims do not recite a
fundamental economic principle (one method of organizing human activity) because
the claims recite AI components like “neural networks” in the context of monitoring
machines. Clearly, economic principles and AI components are not always mutually
exclusive concepts.[9] For example, there may be situations where these algorithms
are applied directly to mitigating business risks. Accordingly, the PTAB was likely
focusing on the distinction between monitoring machines and mitigating risk; and
not solely on the recitation of the AI components. However, the recitation of the AI
components did not seem to hurt.

Then, moving on to another category of abstract ideas, the PTAB stated:

Claims 1 and 8 as recited are not practically performed in the human mind. As
discussed above, the claims recite monitoring operation of machines using neural
networks, logic decision trees, confidence assessments, fuzzy logic, smart agent
profiling, and case-based reasoning. . . . [Also,] claim 8 recites ‘an output device
that transforms the composite prediction output into human-readable form.’

. . .

In other words, the ‘classifying’ steps of claims 1 and ‘modules’ of claim 8 when read
in light of the Specification, recite a method and system difficult and challenging for non-experts due to their computational complexity. As such, we find that one of ordinary skill in the art would not find it practical to perform the aforementioned ‘classifying’ steps recited in claim 1 and function of the ‘modules’ recited in claim 8 mentally.

In the language above, the PTAB addressed the third category of abstract ideas: mental processes. The PTAB provided that the claim does not recite a mental process because the AI algorithms, based on the context in which they are applied, are computationally complex.

The PTAB also addressed the first of the three categories of abstract ideas (mathematical concepts), and found that it does not apply because “the specific mathematical algorithm or formula is not explicitly recited in the claims.” Requiring that a mathematical concept be “explicitly recited” seems to be a narrow interpretation of the 2019 PEG. The 2019 PEG does not require that the recitation be explicit, and leaves the math category open to relationships, equations, or calculations. From this, the PTAB might have meant that the claims list a mathematical concept (the AI algorithm) by its name, as a component of the process, rather than trying to claim the steps of the algorithm itself. Clearly, the names of the algorithms are “explicitly recited”; the steps of the AI algorithms, however, are not recited in the claims.

Notably, reciting only the name of an algorithm, rather than reciting the steps of the algorithm, seems to indicate that the claims are not directed to the algorithms (i.e., the claims have a practical application for the algorithms). It indicates that the claims include an algorithm, but that there is more going on in the claim than just the algorithm. However, instead of determining that there is a practical application of the algorithms, or an inventive concept, the PTAB determined that the claim does not even recite the mathematical concepts.

Additionally, the PTAB found that - even if the claims had been classified as reciting an abstract idea, as the Examiner had contended - the claims are not directed to that abstract idea, but are integrated into a practical application. The PTAB stated:

“Appellant’s claims address a problem specifically using several artificial intelligence classification technologies to monitor the operation of machines and to predict preventative maintenance needs and equipment failure.”

The PTAB seems to say that because the claims solve a problem using the abstract idea, they are integrated into a practical application. The PTAB did not specify why the additional elements are sufficient to integrate the invention. The opinion actually does not even specifically mention that there are additional elements. Instead, the PTAB’s conclusion might have been that, based on a totality of the circumstances, it believed that the claims are not directed to the algorithms, but actually just apply the algorithms in a meaningful way. The PTAB could have fit this reasoning into the 2019 PEG structure through one of the Step 2A, Prong 2 examples (e.g., that the claim applies additional elements “in some other meaningful way”), but did not expressly do so.

**Conclusion**
This case illustrates:

(1) the monitoring of machines was held to not be an abstract idea, in this context;
(2) the recitation of AI components such as “neural networks” in the claims did not seem to hurt for arguing any of the three categories of abstract ideas;
(3) complexity of algorithms implemented can help with the “mental processes” category of abstract ideas; and
(4) the PTAB might not always explicitly state how the rule for “practical application” applies, but seems to apply it consistently with the examples from the 2019 PEG.

The next four articles will build on this background, and will provide different examples of how the PTAB approaches reversing Examiner 101-rejections of machine-learning patents under the 2019 PEG. Stay tuned for the analysis and lessons of the next case, which includes methods for overcoming rejections based on the “mental processes” category of abstract ideas, on an application for a “probabilistic programming compiler” that performs the seemingly 101-vulnerable function of “generat[ing] data-parallel inference code.”

FOOTNOTES

[2] Accordingly, the USPTO must follow both the Federal Circuit’s case law that interprets Title 35 of the United States Code, and must follow the 2019 PEG. The 2019 PEG is not the same as the Federal Circuit’s standard – the 2019 PEG does not involve distinguishing case law (the USPTO, in its 2019 PEG, has declared the Federal Circuit’s case law to be too clouded to be practically applied by the Examiners. 84 Fed. Reg. 52.). The USPTO practically could not, and actually did not, synthesize the holdings of each of the Federal Circuit opinions regarding Section 101 into the standard of the 2019 PEG. Therefore, logically, the only way to ensure that the 2019 PEG does not impinge on the statutory rights (provided by 35 U.S.C.) of patent applicants, as interpreted by the Federal Circuit, is for the 2019 PEG to define the scope of the 101 judicial exceptions more narrowly than the Statutory requirement. However, assuming there are instances where the 2019 PEG defines the 101 judicial exceptions more broadly than the statutory standard (if the USPTO rejects claims that the Federal Circuit would not have), that patent applicant may have additional arguments for eligibility.
[4] Id.
[5] The USPTO also, on October 17 of 2019, issued an update to the 2019 PEG. The October update is consistent with the 2019 PEG, and merely provides clarification to some of the terms used in the 2019 PEG, and clarification as to the scope of the 2019 PEG. October 2019 Update: Subject Matter Eligibility (October 17, 2019).
[6] See “Frequently Asked Questions (FAQs) on the 2019 Revised Patent Subject Matter Eligibility Guidance (‘2019 PEG’),” C-6 (https://www.uspto.gov/sites/default/files/documents/faqs_on_2019peg_20190107.pdf) (“Any claim considered patent eligible under the current version of the MPEP and subsequent guidance should be considered patent eligible under the 2019 PEG. Because the claim at issue was considered eligible under the current version of the MPEP, the Examiner should not make a rejection under § 101 in
view of the 2019 PEG.


[9] Notably, the “mental process” category – and not the “certain methods of organizing human activity” category – is the one that focuses on the complexity of the process. Furthermore, as shown in the following paragraph, the “mental process” category was separately discussed by the PTAB, again mentioning the algorithms. Accordingly, the PTAB is likely not mentioning the algorithms for the purpose of describing the complexity of the method.

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