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Can Artificial Intelligence Patents Survive Alice?

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In 2019, David Kappos, the former Director of the USPTO, testified to the Senate Subcommittee on Intellectual Property that “current patent eligibility law is truly a mess.” He also noted that the law surrounding section “101 is having a significant negative impact on artificial intelligence patent applications.” Today, with AI making headlines almost daily, these issues take on even greater urgency.

35 U.S.C. §101 covers patent eligibility requirements and while the statute and related caselaw have existed for decades, the provision has had greater impact on patent cases since the Supreme Court’s 2014 *Alice* decision, which created a two-step test for evaluating patent eligibility. First, courts must determine if “the claims at issue are directed to a patent-ineligible concept,” such as an abstract idea. *Alice Corp. Pty. Ltd. v. CLS Bank Int’l*, 573 U.S. 208 (2014). Second, if the claims are directed to a patent-ineligible con-

cept, courts must “search for an ‘inventive concept’ — *i.e.*, an element or combination of elements that is sufficient to ensure that the patent in practice amounts to significantly more than a patent upon the ineligible concept itself.” *Id.* at 217-218 (cleaned up).

Since *Alice*, there has been a dramatic increase in the number of §101 decisions and motions. A search on Docket Navigator shows that in 2013, U.S. district courts held 20 patents ineligible under §101. In 2015, that number rose to 171. The increase is especially targeted at computer software and hardware patents. For example, 137 of the 171 ineligibility determinations in 2015 were related to such patents. The surge has continued with an average of 217 invalidity determinations per year between 2015 and 2022, compared with an annual average of 19 between 2008 and 2014.

At the same time, there has been a rise in applications for AI patents. *See generally*, Nicholas A. Pairolero, “Artificial Intelligence (AI) trends in US Patents,” USPTO, Jun. 29, 2022; Ahmed Elmallah, “Exponential Increases in Artificial Intelligence Patent Filings,” Bennett Jones, <https://bit.ly/3RuJ3h7>; “Patents signal: AI dominates patent filings in Q2 2023,” Medical Device Network, <https://bit.ly/3Rqky4C>. The USPTO has published a graph showing the increase in AI-related patent applications from 1976 to 2020, and the surge has continued since 2020. *See generally*, Kathi Vidal, “Director’s Blog: the latest from USPTO Leadership,” USPTO (Sept. 29, 2023), <https://bit.ly/3RpXAuj>; Nicholas A. Pairolero, “Artificial Intelligence (AI) trends in US Patents,” *supra*; Ahmed Elmallah, “Exponential Increases in Artificial Intelligence Patent Filings,” *supra*; “Patents signal: AI dominates patent filings in Q2 2023,” *supra*.

In light of these parallel trends, this article considers how courts have treated AI patents under §101 since *Alice*. The most important observation: AI patents are treated with skepticism and are regularly invalidated under *Alice* as abstract ideas. They tend

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to be invalidated for one or more of the following reasons: 1) including too little detail in their claim language, using phrases like “neural networks,” “machine learning,” or even “AI” itself instead of describing how the claimed AI feature works; 2) describing AI as emulating human behavior; or 3) performing math on general purpose computers. This article will discuss how AI patents are analyzed under each step of the *Alice* framework and apply the caselaw to a hypothetical set of claims.

ALICE STEP ONE:

CATEGORIES OF

ABSTRACT AI CLAIMS

Courts frequently strike down AI patent claims under *Alice* step 1, partly because AI patents often seek to have computers mimic activities humans could perform and partly because AI patents are often directed to intangible software. *See*, “What is artificial intelligence (AI)?,” IBM.com, <https://ibm.co/3TonQrD>; Kristen Osenga, “Changing the Story: Artificial Intelligence and Patent Eligibility,” JustSecurity.org, <https://bit.ly/41o72D7>. AI patent claims are typically found abstract at *Alice* step 1 if they fall into one of three categories.

1. Applying AI Concepts Without Any Detail

AI-related patent claims are often found abstract if they generically recite AI, machine learning, neural networks, or similar processes without providing any details that explain how the recited AI features or algorithms actually function. This is demonstrated in *Angel Technologies Group LLC v. Facebook Inc.*, where the court invalidated several patent claims directed to identifying people in photos. The claims described applying AI algorithms to identify a named user within image data. But the court concluded that all these patents “disclose[d] about artificial intelligence is that it [would] be used which is the very essence of an abstract idea.” 2022 WL 3093232 at *4 (C.D. Cal. Jun. 30, 2022). Because the patents failed to provide any details about how the AI algorithms worked or how they were implemented, the court rejected them as directed to an abstract idea. *See, id.* at *3-4.

Similarly, in *Hyper Search, LLC v. Facebook, Inc.*, although the claims specified a “neural network module” and described in simple terms how that neural network functioned, “HyperSearch’s claim relie[d] on technology that was well-known at the time and fail[ed] to explain how its claimed idea recites an improvement in computer technology.” 2018 WL 6617143 at *8-9 (D. Del. Dec. 17, 2018). Ultimately, the court

held the patent claims abstract because they were generally “directed to providing information based on feedback” — a concept “as old as the saying, ‘know your audience.’” *Id.* (quoting *OpenTV, Inc. v. Netflix Inc.*, 76 F. Supp. 3d 886, 893 (N.D. Cal. 2014)).

And in *FacetoFace Biometrics, Inc. v. Apple, Inc.*, a court rejected claims directed to detecting human facial expressions and generating an associated “emoticon.” No. 4:22 CV 429 CDP, 2023 WL 2561758 (E.D. Mo. Mar. 17, 2023). The court concluded that “[a]lthough the specification describes a biometric security mechanism that detects biometric patterns and compares them to a user profile model using a variety of potential algorithms and machine learning techniques, these embodiment” were not recited in the claims. *Id.* at *8. Instead, the claims omitted those details and were “devoid of specific instructions or algorithms.” *Id.*

So, it is apparent that to survive step one courts require more than the mere invocation of “AI,” “neural networks,” or “machine learning” and instead require more specifics and explanation of any recited AI features. Also, any such specifics must be recited in the claims and not just described in the specification.

2. Emulating Human Activities

Courts also hold that patent claims are abstract where the AI algorithm performs a process that a human could perform (either mentally or on pen and paper).

For example, in *Blue Spike, LLC v. Google Inc.*, the patent claims sought to cover various types of online content recognition. 2015 WL 5260506 at *1, 6 (N.D. Cal. Sept. 8, 2015). The court rejected the claims as “merely discuss[ing] using routine computer components and methods ... with, in certain circumstances, greater efficiency than a human mind could achieve.” *Id.* at *6. Further, “to the extent the asserted claims do encompass comparisons that a human is not readily capable of undertaking — an argument belied by the specification — they nevertheless also cover and preempt a wide range of comparisons that humans can and, indeed, have undertaken from time immemorial.” *Id.* Interestingly, the court suggests that the patents might have been saved if the claims were limited to implementations that humans are *incapable* of, such as any requiring data-reduction techniques where “accuracy (down to even a single bit) ... [was] essential.” *Id.*

The court in *IBM Corp. v. Zillow Group, Inc.*, which revolved around a machine learning system, also found the claims were abstract because “These processes can be performed with a pen and paper,

albeit not with the speed of a computer, and they are focused on the intangible of information. The claim language is entirely result-oriented, specifying what data enters and leaves the proverbial ‘black box,’ but revealing nothing about the inner workings of the box itself.” 2022 WL 704137 at *12 (W.D. Wash. 2022).

And the court in *Quad City Pat., LLC v. Zoosk, Inc.*, reached the same conclusion for claims about facilitating service transactions and providing a service marketplace. The court found the claims were “directed to the abstract idea of a service marketplace that uses standardized terms” because “detecting participant ‘speech, language, emotion, social intelligence, character and characteristics’ is routinely performed by humans when conducting face-to-face transactions ... [and] [m]ore importantly, the claims do not recite any novel computer implementation of such analysis.” 498 F. Supp. 3d 1178, 1185 (N.D. Cal. 2020).

AI patent claims fail where, at their heart, they are directed toward computers thinking and solving problems like humans. Courts do not give any credit for how much faster or more efficient a computer might be at that kind of thinking — the question is simply whether a human, without a computer, could perform the same process.

3. Claiming Math and Pure Algorithms

AI claims also fail where they just perform mathematical functions or step-by-step algorithms, even when recited with specific details.

In *Health Discovery Corporation v. Intel Corporation*, for example, the patents’ claims were directed to performing feature ranking, selection, and reduction using an SVM to facilitate an RFE process on a large dataset. 577 F. Supp. 3d 570, 584-585 (W.D. Tex. 2021). The court held that “the claims here merely produce[d] data with improved quality relative to that produced by conventional mathematical methods,” and so that “*Alice’s* first step [was] satisfied because the claims [were] directed to the abstract mathematical concept of SVM-RFE.” *See, id.*

The court in *Recentive Analytics, Inc., v. Fox Corporation* similarly recognized that “[i]t can be true that machine learning techniques generate data in a manner distinct from the human mind, while still being true that machine learning algorithms use known mathematical techniques to do so.” No. CV 22-1545-GBW, 2023 WL 6122495 at *5 (D. Del. Sept. 19, 2023). The court held that the patent claims, which were directed toward optimizing event schedules, were abstract because they “[did] not involve improving

a prior art machine learning technique but, rather, only relate[d] to the application of machine learning techniques to a manual process.” *Id.* at *6.

So, yes, courts do demand more specifics and details for AI patent claims, but those specifics and details still may not save the claims if they recite a mathematical process or algorithm.

***ALICE* STEP TWO:**

PITFALLS OF USING GENERIC OR GENERAL PURPOSE COMPUTERS

When AI patent claims fail at *Alice* step 1, they are rarely rescued in step 2. Typically, courts do not recognize an inventive concept in AI-related patents because their claims either recite: 1) general purpose computers performing typical computer functions; or 2) AI tools or types in the abstract, without demonstrating an improvement in the field.

At *Alice* step 2, courts do not find an inventive concept where claims recite general purpose computers performing typical computer functions like analyzing, storing, and processing data. *eResearchTechnology* described the issue succinctly in invalidating a patent claim reciting a predictive algorithm, finding the claims “merely recite common, well-known steps” such as “‘providing’ or ‘obtaining’ data” which “do not contain any additional inventive steps because they describe ‘routine data gathering techniques.’” *eResearchTechnology*, 186 F. Supp. 3d. at 474. Similarly, “[e]mploying a database to store data does not add inventiveness.” *Id.* at 475.

In *Quad City*, the court invalidated AI-related claims that applied AI to predict and simulate participant behavior. 498 F. Supp. 3d 1178. The court concluded that the claims did not recite any technical implementation, and instead claimed generic functional results including “discover[ing] at least one transactional attribute, simulating the marketplace, analyzing ... signals, predicting behavior, optimizing profits, and so on.” *Id.* at 1188. The court concluded that there was no inventive concept since the petitioner “does not allege, and the specification provides no evidence, that any of these steps require anything more than a generic computer implementation.” *Id.*

Courts also invalidate AI-related patent claims that merely recite AI tools or types, like “machine learning” and “neural networks,” without demonstrating any improvement in that tool. For example, in *Hyper Search, LLC v. Facebook, Inc.*, one patent’s claims covered information output based on user feed-

back, using a neural network. 2018 WL 6617143, at *10 (D. Del. Dec. 17, 2018). The specification failed to assert that there was anything unique or novel about the claimed neural network, and instead claimed a broad swath of technology. The court found that the specification admitted that the “neural networks were well-known in the art, and the inventors stated that the alleged invention is not limited to neural networks but rather to ‘any artificial intelligence agent.’” *Id.* Without more, the court concluded, there could be no inventive concept. *Id.* Thus, courts will not consider bald use of terms like “neural network” and “artificial intelligence” an inventive concept, particularly if the intrinsic record admits their conventionality.

In the same vein, the court in *Neochloris, Inc. v. Emerson Process Management LLLP* invalidated the claims because the patent neither described what a claimed “neural network module” is nor what makes it inventive. *Neochloris, Inc. v. Emerson Process Management LLLP*, 140 F.Supp.3d 763, 773 (N.D. Ill. 2015). The claims in *Neochloris* covered a process for monitoring water treatment facilities using neural networks to analyze sensor data and detect process failures. The *Neochloris* claims had multiple shortcomings. First, the allegedly inventive concept of using “highly sophisticated techniques such as encryption/decryption of data, artificial neural networks, expert systems, optimization, pattern recognition, search functions, and advanced statistical functions” was described only in the specification, not the claims.” *Id.* at 772. Second, not even the specification described how the disclosed neural network module worked or how it would be an improvement in the field. *Id.* at 773 (“Indeed, it is not even clear what ‘an artificial neural network module’ refers to besides a central processing unit — a basic computer’s brain. And nowhere does *Neochloris* assert that it invented an interface that optimizes water management or created a new form of searching, statistical analysis, pattern recognition, or data encryption”). The court in *Recentive Analytics* also invalidated patent claims that recited the use of machine learning to optimize event schedules but, as the court explained, the patentee undisputedly “did not invent machine learning. The inventive concept that [patentee] identifies is merely the abstract idea — applying machine learning to optimization of network maps and event schedules” which is not a sufficient inventive concept. *Recentive Analytics*, 2023 WL 6122495, at *12.

Patent claims that cover general purpose computers performing common computer functions do not represent an “inventive concept.” Likewise, claims that obliquely reference or simply invoke known AI-related tools will not constitute an inventive concept.

CLAIMS THAT SURVIVED

ALICE SCRUTINY

Though AI patents appear disfavored under *Alice*, patents fare better if they are tied to specific applications or associate the claims to more physical or hardware environments, while describing the innovative aspects of the claimed technology. For example, in *Ocado Innovation, Ltd. et al. v. AutoStore AS, et al.*, patent claims related to optimizing a robotic warehouse system survived a motion to dismiss because the elements described may be innovative. 561 F. Supp. 3d. 36, 55 (D. N.H. 2021). The court specifically noted that the specification contained “detailed potential configurations.” *Id.* at 48. The court also reasoned that the “control system described in the [patent]” could not be “performed ‘entirely’ in the human mind and is thus not persuaded by [defendant’s] analogies to human activities.” *Id.* at 49.

Machine learning patent claims have also survived a motion to dismiss. In *Palo Alto Research Center v. Facebook Inc.*, claims were directed to a device that delivers personally defined context-based content to a user by using machine learning. The court focused on how the specification explained how its machine learning system improved over the prior art, since previous “mobile devices ‘[were] not capable of learning and understanding the behavior of their users’ and thus were unable to ‘determine when and how best to provide their users with information or suitable entertainment content.’” 2021 WL 1583906 at *7 (C.D. Cal. Mar. 16, 2021).

HYPOTHETICAL PATENT CLAIMS

To illustrate the bounds of §101 caselaw on AI patent claims, consider as a hypothetical, a mobile payments company that wants to patent technology using AI to streamline the customer checkout process. The company’s technology uses cameras to capture images of customers, and then uses machine learning to identify individuals and associate those individuals with a database of customer banking information. Customers can then leave the store with their goods without going to a register, since the system would automatically charge their accounts.

The company drafts a claim on its checkout system that reads:

A method implemented within a computer system including a plurality of computing devices connected via a communications network, the method associating customers of the computer system with banking information accessible to the computer system, the method comprising:

[a] monitoring sensor feed data provided by one or more cameras of the computer system to detect a plurality of human facial features;

[b] automatically identifying a registered customer based on sensor feed data;

[c] wherein automatically identifying a registered customer comprises using a machine learning technique to compare sensor feed data to a database of registered customers; and

[d] associating the registered customer identified through machine learning with a customer account containing that customer's banking information.

Based on current §101 caselaw, this claim would likely be rejected as an abstract idea without an inventive concept. The claim mentions “machine learning” without giving any more detail.

In the same patent, the company drafts a second claim that provides more detail on the machine learning algorithm:

A method comprising:

[a] collecting a plurality of images of human and non-human faces at different angles and in different environments;

[b] dividing each image into a plurality of square regions;

[c] detecting whether each region corresponds to a facial feature by applying a plurality of feature classifiers and determining whether the result exceeds minimum threshold level,

wherein, if the region corresponds to a facial feature, performing additional steps of:

[d] computing a plurality of contrast ratios between vertical subregions along each region;

[e] computing hue ratio between horizontal subregions along each region;

[f] assigning a weight to each region based on convolution of contrast and hue ratios, producing a ratio signature;

[g] computing a sum of weighted values of each region's ratio signature;

[h] attributing a summed value to a particular human face;

[i] increasing accuracy by repeating steps [a] through [h] with additional images.

While detailed, this claim probably does not fare any better under current caselaw utilizing the *Alice* test. Under *Alice* step 1, a court would likely find the claim to cover an abstract mathematical process. Under *Alice* step 2, a court would not find an inventive concept because, though the claim includes various details about the algorithm, the process is not tied to any inventive technology.

A hypothetical claim that likely would pass muster under *Alice* is one that combines elements of the two hypothetical claims above. The first claim recites a concrete application and technological environment that cannot be replicated by the human mind or pen and paper — *i.e.*, a computer checkout system with sensor feeds and databases of customer information — but lacks detail about the purported “machine learning” technique. The second claim provides detail about the “machine learning” technique but is un tethered to any concrete system or application, and recites computations that could, in theory, be performed by a human. But the combination of the two claims resolves their respective shortcomings. Thus, a likely valid patent claim could start with the first claim, but rather than merely reciting “machine learning,” the claim could then recite the steps [a] through [i] in the second claim. The case for a finding of §101 validity would be bolstered too if the patent specification contends that the machine learning algorithm and its usage represents an improvement on fields of facial recognition and electronic commerce systems.

CONCLUSION

Under the current *Alice* framework, those attempting to patent AI innovations face an uphill battle. But, as the caselaw demonstrates, inventors and patent drafters can take steps to reduce the risk of AI patent claims being invalidated as abstract ideas. First, inventors should avoid rote recitations of “artificial intelligence,” “machine learning,” or “neural networks” as black box abstractions in their claims. Rather, they should provide unambiguous details about how the claimed algorithms work. Second, inventors should ensure their AI patent claims are clearly directed to an end application or to something tangible; otherwise, the patent claims risk rejection as a human activity (like, say, just reciting math). While these steps certainly do not guarantee that an AI patent claim will overcome an invalidity challenge under §101, they do help avoid some of the pitfalls courts have identified.