Patenting AI-related inventions

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UNITED STATES
PATENT AND TRADEMARK OFFICE
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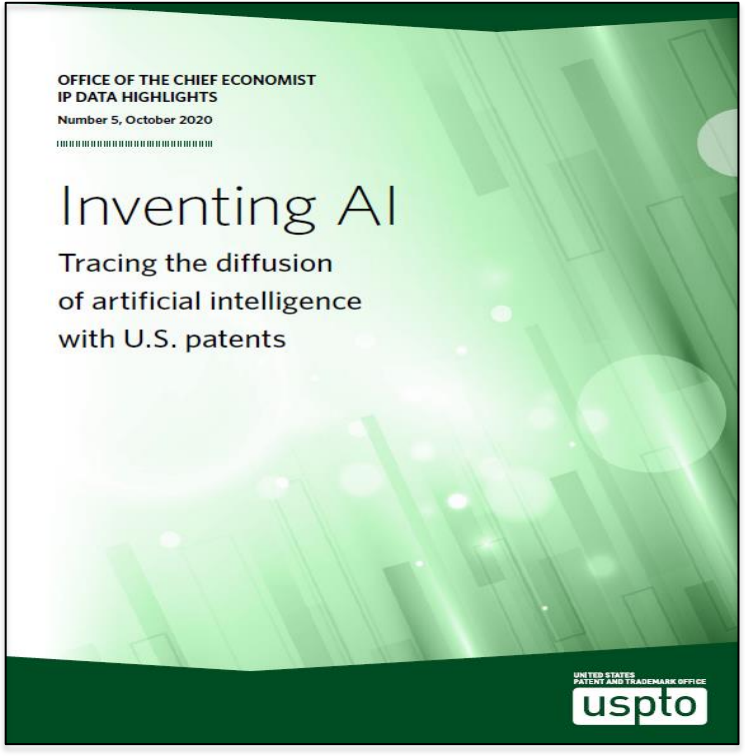
AI overview

- No universally recognized definition
  - Generally understood as computer functionality that mimics cognitive functions associated with the human mind (e.g., the ability to reason, generalize, discover meaning, and learn from past experience)
- AI is increasingly becoming an important tool across a diverse spectrum of technologies and businesses
- AI uses
  - Voice-powered personal assistants like Siri and Alexa
  - Autonomous vehicles
  - Forecasting models predicting weather patterns
  - Precision agriculture that detects disease, pests, and poor plant nutrition on farms
  - Fraud detection in banking
  - Cybersecurity

AI Patenting Trends

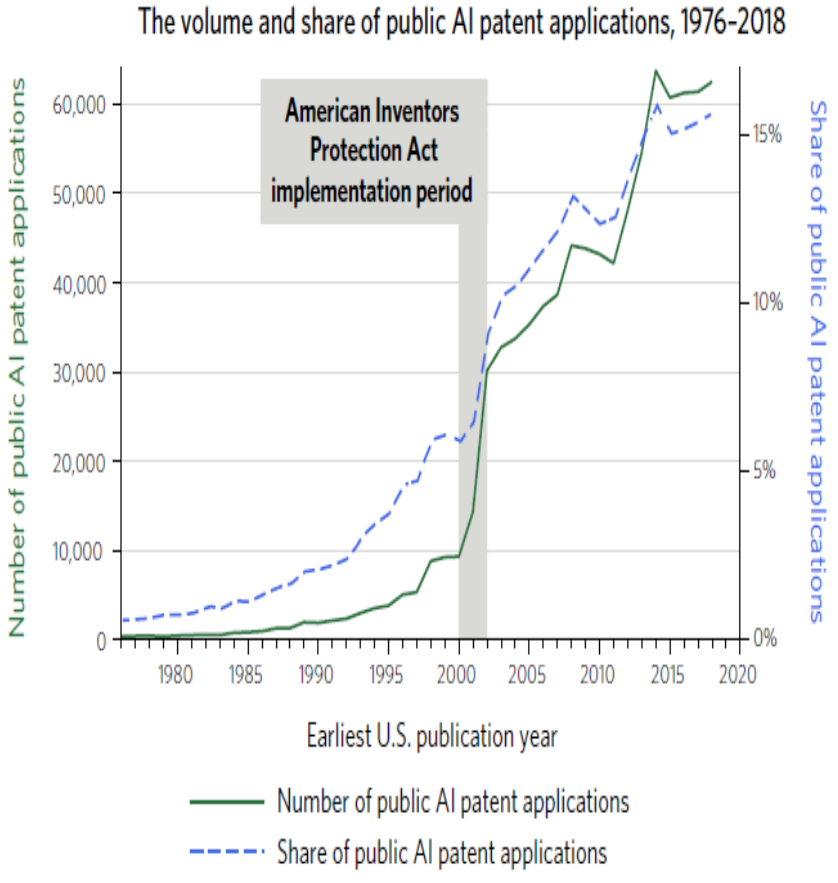
USPTO report on Inventing AI

- Published October 20, 2020
- Key Findings:
  - AI is increasingly important for invention, diffusing broadly across technologies, inventor-patentees, organizations, and geography



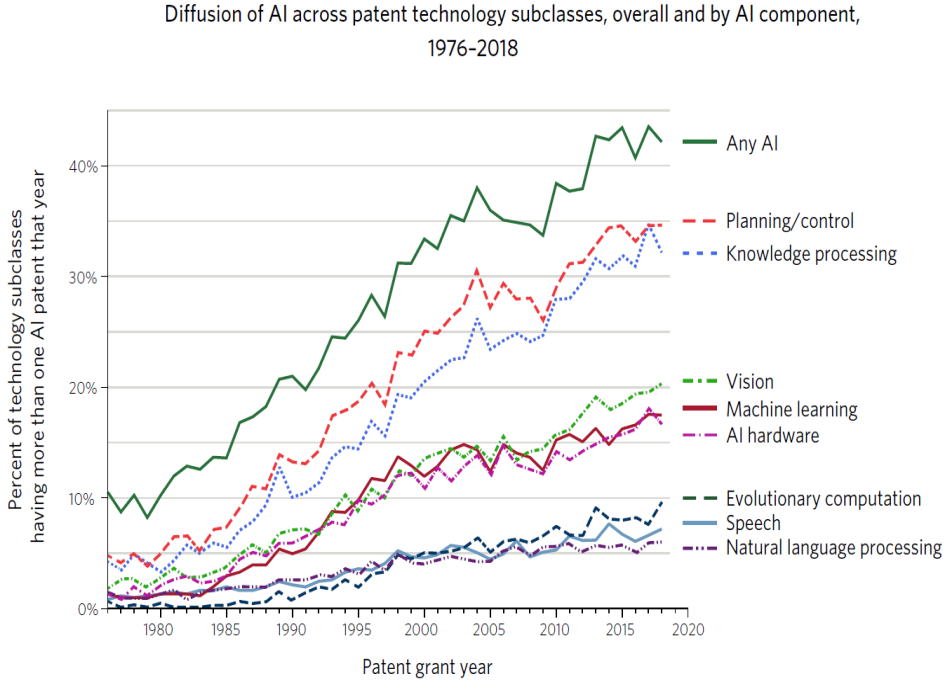
USPTO report on Inventing AI (cont.)

- AI patent application filings
  - Number of AI patent applications received annually by USPTO more than doubled from 30,000 to 60,000 from 2002 to 2018; share of all patent applications that contain AI grew from 9% to nearly 16%



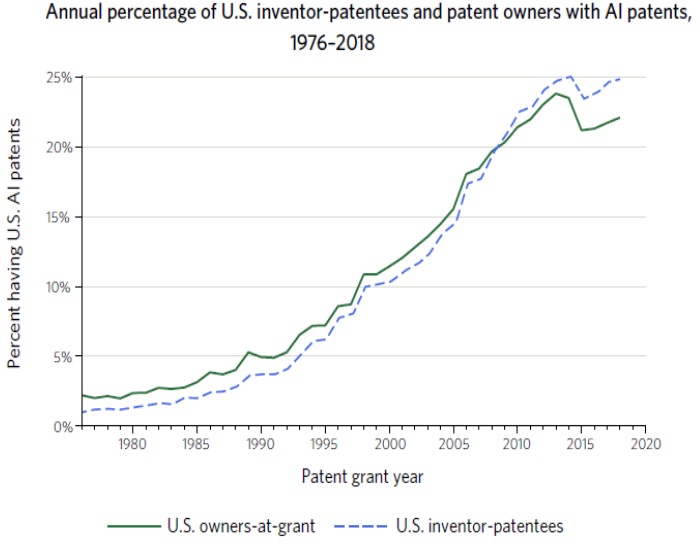
USPTO report on Inventing AI (cont.)

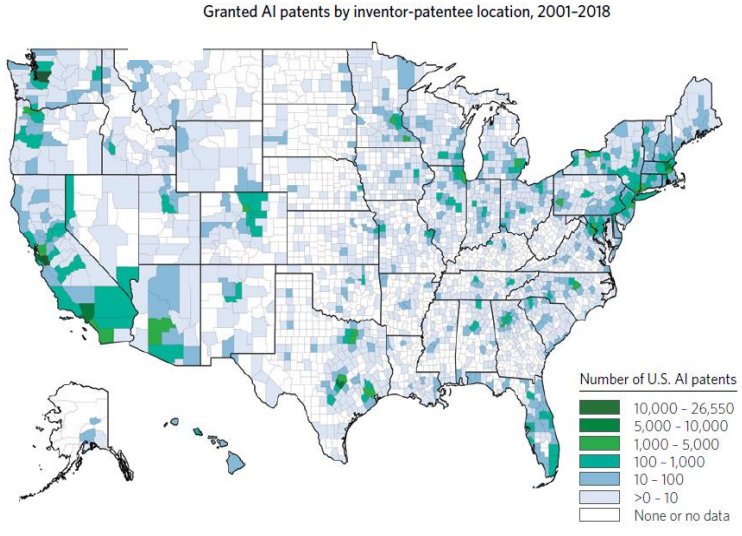
- Diffusion of AI across technologies
  - Patents containing AI spread to more than 42% of all patent technology subclasses by 2018.



USPTO report on Inventing AI (cont.)

- 25% of all unique inventor-patentees in 2018 used AI technologies in their granted patents
- AI inventor-patentees tend to be concentrated in larger cities and established technology hubs





AI Patentability

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Patents: AI-related issues

- Inventorship
- Claim interpretation
- Subject-matter eligibility
- Disclosure requirements
- Definiteness
- Prior art and other AI considerations

Inventorship—DABUS

- Two U.S. patent applications were filed naming an AI machine, "DABUS," as the inventor.
- The USPTO issued a Notice to File Missing Parts because the inventor was not identified by his or her legal name.
- A petition under 37 CFR 1.181 was filed requesting the Director to vacate the Notice to File Missing Parts because DABUS purportedly independently created the inventions.
- The USPTO denied the petition finding that current patent statutes, case law, and USPTO regulations and rules limit inventorship to natural persons.
- Petitioner brought an action challenging the USPTO's decision in the United States District Court for the Eastern District of Virginia. Case No: 1:20cv903.

Thaler v. Hirshfeld – EDVA Decision: An AI cannot be an inventor

- Thaler and the USPTO filed cross-motions for summary judgment. The USPTO argued that in the Patent Act, Congress explicitly defined the term "inventor" to be an "individual," which must be a natural person.
- On September 2, 2021 Judge Brinkema granted the USPTO's motion for summary judgment and found that the statute is clear that an "inventor" must be a natural person and an AI cannot be an inventor.
- Judge Brinkema also referenced the USPTO's AI Report and noted that many commentators disagreed with Thaler's view that AI machines should be recognized as inventors.
- Thaler appealed this decision to the United States Court of Appeals for the Federal Circuit. Case No. 2021-2347.

Inventorship—practical considerations

- A natural person MUST contribute to the conception of the invention to qualify as an inventor (or joint inventor)
  - The use of AI as a tool does not preclude naming the natural person as an inventor
  - Different ways in which a natural person may contribute to the conception of an invention
    - Designing the architecture of the AI system
    - Choosing the specific data to provide to the AI system
    - Developing the algorithm to permit the AI system to process that data
    - Each contribution is fact-specific and is evaluated on a case-by-case basis

AI claim language

- Patent applications related to AI often include computer-implemented inventions disclosed and claimed in terms of their functionality.
  - A claim term is functional when it recites a feature by what it does rather than what it is
    - Functional claiming often involves the recitation of some structure followed by its function
    - Another way to claim functions is through means-plus-function elements (35 U.S.C. 112(f)), which only recite a function and rely on the specification to describe the structure, material, or act that performs the entire claimed function

AI-related inventions–BRI and POSITA

- During examination, claims are given their broadest reasonable interpretation ("BRI") consistent with the specification as it would be interpreted by one of ordinary skill in the art
- The person of ordinary skill in the art (POSITA) is a hypothetical person who is presumed to have known the relevant art at the time of the invention
- Factors considered in determining the level of ordinary skill in the art (*In re GPAC Inc*., 57 F.3d 1573, 1579 (Fed. Cir. 1995)):
  - Type of problems encountered in the art
  - Prior art solutions to those problems
  - Rapidity with which innovations are made
  - Sophistication of the technology
  - Educational level of active workers in the field
- AI, like any other tool available to a skilled artisan, has the potential to raise the level of ordinary skill in the particular filed

AI-related inventions—subject matter eligibility

- AI-related inventions are treated like any other computer-implemented inventions
- AI-related claims are subject matter eligible under 35 U.S.C § 101 if they:
  - Fall within one of the four statutory categories (step 1) and
  - Are not directed to or provide significantly more than a judicial exception (step 2)
- AI-related claims may raise issues relating to the abstract idea exception
- Strategies for drafting claims to overcome the abstract idea exception:
  - Recite steps that cannot be performed mentally
  - Integrate the potential abstract idea into a practical application of the AI
  - Recite features that contribute to the identified improvement
  - Describe architectural features in the claims

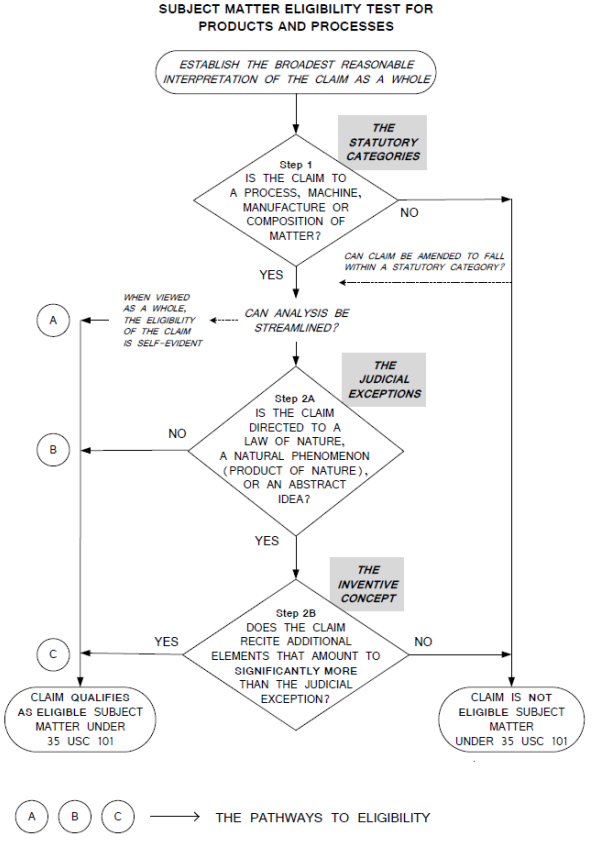
Subject matter eligibility analysis (2019 PEG)

USPTO instructs examiners to:

FIRST Review the disclosure to identify what applicant considers as the invention.

STEP 1 Determine if the claim falls into a statutory category.

STEP 2 Evaluate the claim to determine if it qualifies as patent-eligible subject matter (Steps 2A & 2B).



AI-claim compliance with 35 U.S.C. 112

- USPTO guidance on examining computer-implemented functional claim elements for compliance with 35 U.S.C. 112 is helpful in evaluating AI-related patent applications. *See* MPEP 2161, 2173.05(g), 2181
  - Computer-implemented functional claim language, like any claim language, must be evaluated for sufficient disclosure under the written description and enablement requirements of 35 U.S.C. 112(a)
  - A functional limitation must also be evaluated and considered for what it fairly conveys to a person of ordinary skill in the pertinent art in the context in which it is used to satisfy the definiteness requirement under 35 U.S.C. 112(b)

AI-related applications–disclosure requirements

- Written description:
  - AI-related applications that include computer-implemented functional claims should provide a sufficiently detailed disclosure to show that the inventor had possession of the full scope of the claimed invention
    - This may require description of the hardware, as well as the software, due to the interrelationship and interdependence of computer hardware and software
    - The specification should disclose any algorithm (e.g., detailed steps or procedures, formulas, diagrams, and/or flowcharts) required to perform the claimed function, along with the computer or processing hardware that executes the algorithm
  - The written description requirement is not satisfied by showing that one skilled in the art could theoretically write a program to achieve the claimed function; rather, the specification itself must explain how the inventor intends to achieve the claimed function

Disclosure requirements (contd.)

- Enablement:
  - The specification must teach those skilled in the art how to make and use the full scope of the claimed invention without undue experimentation ("Wands" factors)
  - The scope of the claims must be commensurate with the scope of the enablement provided by the specification
    - Concerns regarding enablement may arise when a functional claim that does not invoke 35 U.S.C. 112(f) is not limited to any particular structure for performing the recited function
  - The amount of guidance or direction needed in the specification to enable the invention is inversely related to the state of the art and predictability in the art
    - While software-related inventions generally have a high level of predictability, this is not always the case with AI-related inventions

Disclosure requirements—example

- A disclosure with claims directed to the training of a neural network may satisfy the written description requirement by describing the training data and steps involved in the training process.
- A disclosure with claims directed to the training of a neural network may satisfy the enablement requirement by disclosing details of the training data set including the type of data and the specific structure/format of the data.

Definiteness

- When claims merely recite a description of a problem to be solved or a function or result achieved by the invention, the boundaries of the claim scope may be unclear
- Claims with computer-implemented functional limitations often invoke 35 U.S.C. 112(f)
- A computer-implemented 35 U.S.C. 112(f) claim limitation is indefinite when:
    - The specification does not disclose an algorithm to perform the claimed function
    - Algorithm disclosed in the specification is not sufficient to perform the claimed function
    - Determination of whether a claim term should be interpreted under 112(f) is inconclusive because of ambiguous words in the claim

AI-related inventions—patentability

- Features that may be patentable:
  - Training of an algorithm on data
  - Other architectural features (e.g., neural network structure, hidden layers, connections etc.)
  - Applications of the trained algorithm
- Improvements:
  - Curing the training data with fewer computational resources
  - Certain features that improve processing speed and network latency
  - Ability of a model to perform new and improved functions
- Note that this list is non-exhaustive

Other AI-related considerations

- Obviousness inquiry:
  - Fact-specific depending on what is invented and claimed
  - An AI technology type invention would likely be assessed relative to the core AI technological arts
  - An applied use of an AI technology to another domain would likely intersect both the AI technological arts and whatever domain the AI technology was applied to
- AI-related prior art:
  - An AI generated work will qualify as a printed publication if it is accessible to the public as discussed in MPEP 2128.
  - A publicly available reference that qualifies as prior art under 35 U.S.C. §§ 102 or 103 is presumed to be operable no matter who or by what means the reference was created

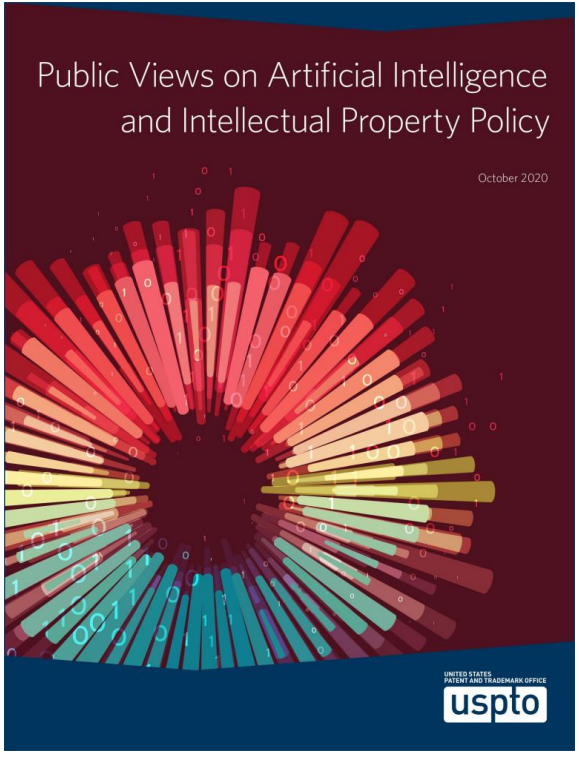
AI IP Policy Efforts and AI Tools

USPTO activities on AI policy

- Stakeholder engagements
  - AI IP Policy conference (January 2019)
  - Request for comments (RFC) on AI patent issues (August 2019)
  - RFC on other IP rights impacted by AI (e.g., copyright) (October 2019)
  - RFC on the impact of the current state of patent subject matter eligibility jurisprudence on investment and innovation (July 2021)
  - Joint conference with USCO on copyright law and ML (October 2021)

USPTO AI IP Policy Report

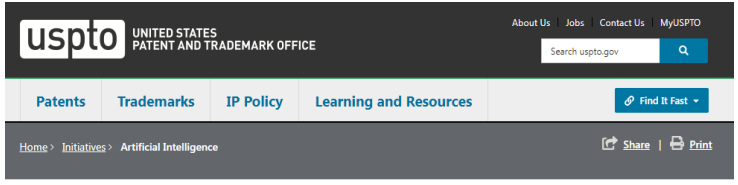
- Published October 6, 2020
- Some key findings:
  - AI has no universally recognized definition.
  - Existing US IP laws are calibrated correctly to address the evolution of AI.
  - Encouraged to keep a close eye on legal and scientific developments in AI to ensure the United States maintains its leadership in this critical technology.



AI tools in USPTO patent operations

- Improvement of quality and operational efficiency in patent examination through use of AI tools:
  - Patent AI search functionality
    - AI powered search feature of the Patent Examiner search tool that enables users to leverage AI to retrieve US Patents, US Patent publications, and foreign patent documents based on similarity.
  - Auto-classification Tool
    - AI-based system that suggests patent classifications for US patent applications and documents and further identifies specific symbols from these classifications that are associated with patent claims.

Website



Artificial Intelligence

"The broad scope of new products and services that build on AI technologies suggests that AI has the potential to fundamentally change how people perceive the world around them and live their daily lives. This is the essence of technological progress, and realizing these changes happens through innovation." —Inventing AI: Tracing the diffusion of artificial intelligence with U.S. patents

Engagement

Browse USPTO leadership's speeches, blogs, and events about AI and learn more about our approach.

> View engagements/events

Reports

Find our reports, Federal Register Notices (FRNs), and other important USPTO actions concerning AI policy.

> View reports and notices

Resources

Discover AI-related patent resources and learn about cross-government goals shared by USPTO with other federal entities.

> AI resources and goals

https://www.uspto.gov/initiatives/artificial-intelligence

Artificial intelligence resources

Find a collection of resources devoted to shaping the Administration's and federal government's approach to artificial intelligence (AI).

AI-related patent resources

A non-inclusive list of the current USPTO guidance and training material on patent subject matter eligibility and disclosure of computer-implemented inventions, along with related PTAB and petition decisions is listed below.

AI-related examination guidance

AI-related inventions can be viewed as a subset of computer-implemented inventions. Therefore, USPTO guidance regarding computer-implemented inventions can be a useful resource.

Subject matter eligibility

- MPEP 2106 provides general guidance on subject matter eligibility.
  - MPEP 2106.04(a) discusses the abstract idea exceptions.
- Current examiner training on subject matter eligibility.
- Subject Matter Eligibility Examples: Abstract Ideas - Example 39

Compliance with 35 U.S.C. 112

- MPEP 2161.01 provides guidance on disclosure requirements for computer-implemented functional claim limitations.
- MPEP 2181 provides general guidance for examining means plus function (35 U.S.C. 112(f)) limitations. MPEP 2181(II)(B) provides guidance on the description necessary to support a claim limitation that invokes 35 U.S.C. 112(f).
- MPEP 2173.05(g) discusses functional limitations that do not invoke 35 USC 112(f).
- Examiner training on Examining Computer-Implemented Functional Claim Limitations for Compliance with 35 U.S.C. 112.

Artificial Intelligence Patent Dataset (AIPD)

- The USPTO Office of the Chief Economist released the Artificial Intelligence Patent Dataset (AIPD)-identifying United States patents and pre-grant publications that include AI.

PTAB and USPTO petition decisions pertaining to AI

- PTAB Decision - Ex parte Hannun (formerly Ex parte Linden), 2018-003323 (April 1, 2019) [applying 2019 revised guidance].
- Petition Decision – In re Appl. No. 16/524,350 ("DABUS") (Inventorship limited to natural persons).

Thank you!

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