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PANITCH TRAINING ACADEMY
Insights From Leaders In IP Law

Training Academy Session # 34

Patenting AI Innovations: Navigating Patentability Criteria and Effective Drafting Strategies

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September 17, 2025

Administrative Notes

- We're recording. A replay link will be emailed to registrants and will be available on our website by end of tomorrow.

- Audience Participation is encouraged. If we do not get to your question, we will follow up with you directly, and feel free to contact us at anytime.

Session Overview

1. What do we mean when we say Artificial Intelligence (A.I.)?
2. Trends in AI Applications
3. Inventorship
4. Invention Disclosure
5. Subject Matter Eligibility
6. Enablement
7. Claim Drafting
8. International Considerations
9. Uses and Best Practices

What is Artificial Intelligence

"It is the science and engineering of making intelligent machines, especially intelligent computer programs. It is related to the similar task of using computers to understand human intelligence, but AI does not have to confine itself to methods that are biologically observable." – John McCarthy

Artificial Intelligence Definition

"At its simplest form, artificial intelligence is a field, which combines computer science and robust datasets, to enable problem-solving. It also encompasses sub-fields of machine learning and deep learning, which are frequently mentioned in conjunction with artificial intelligence. These disciplines are comprised of AI algorithms which seek to create expert systems which make predictions or classifications based on input data"

From: https://www.ibm.com/topics/artificial-intelligence

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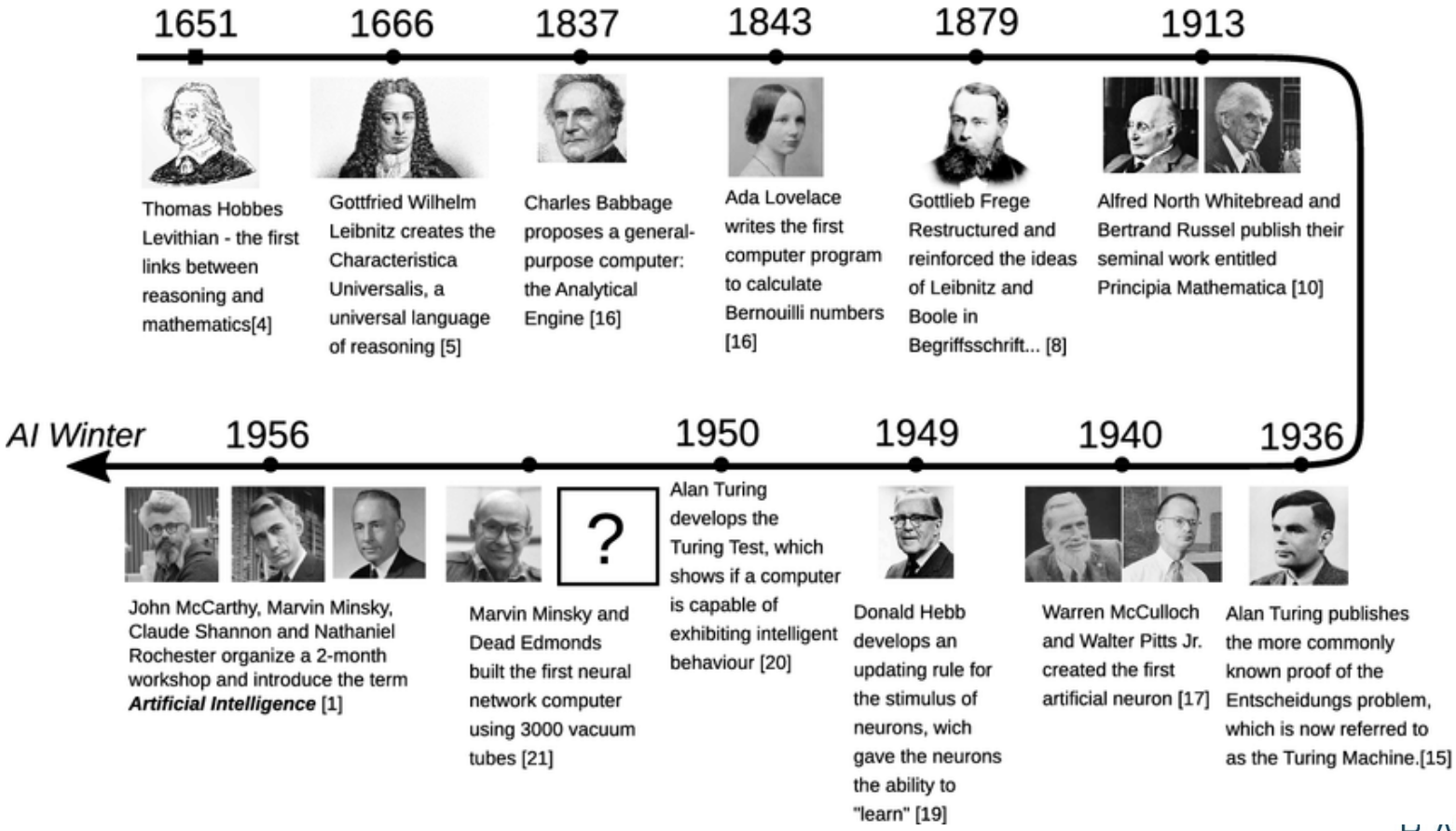
History of Artificial Intelligence



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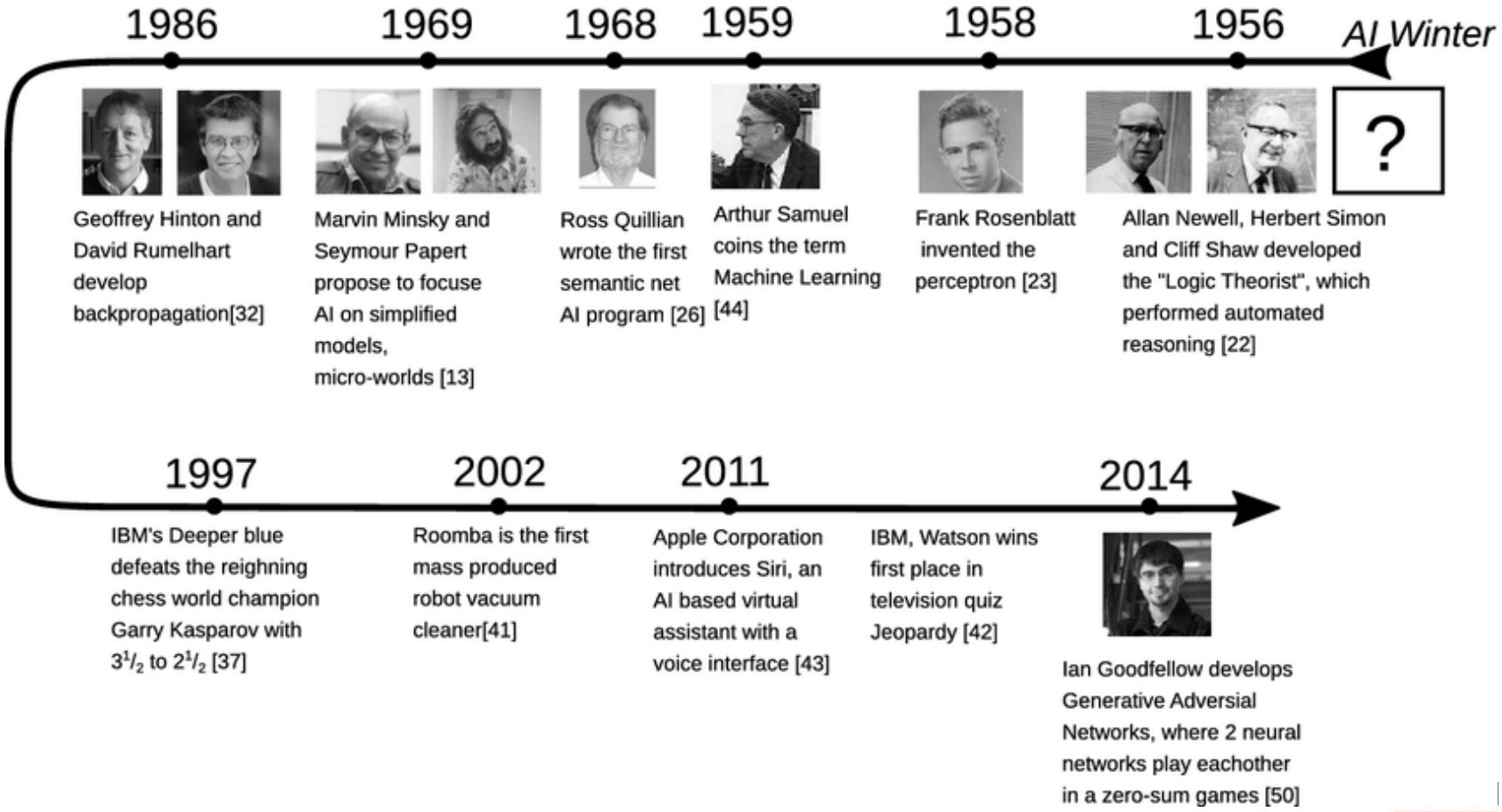
History of Artificial Intelligence



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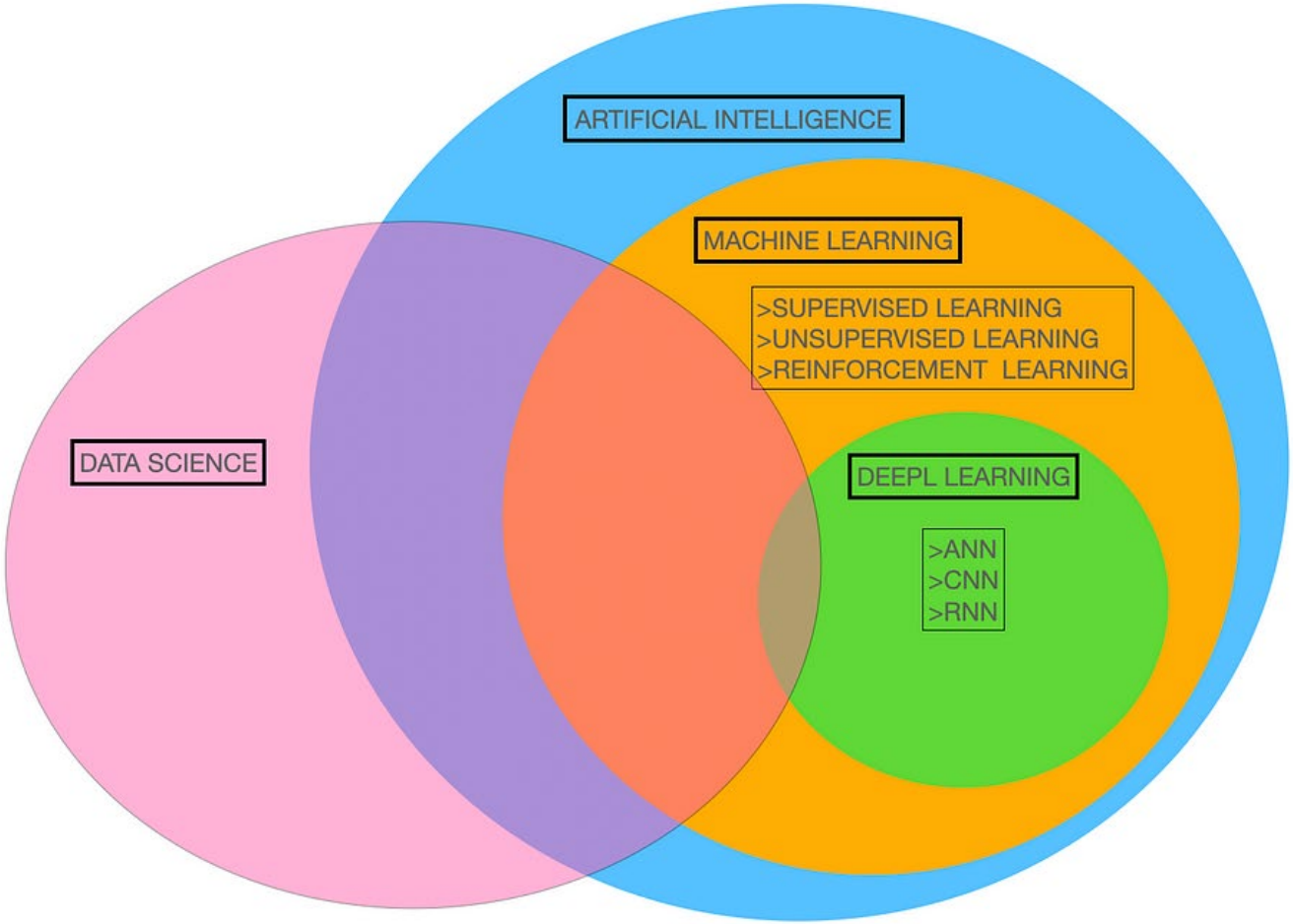
What Do We Mean When We Say AI?



From: https://towardsai.net/p/l/generative-ai-gans

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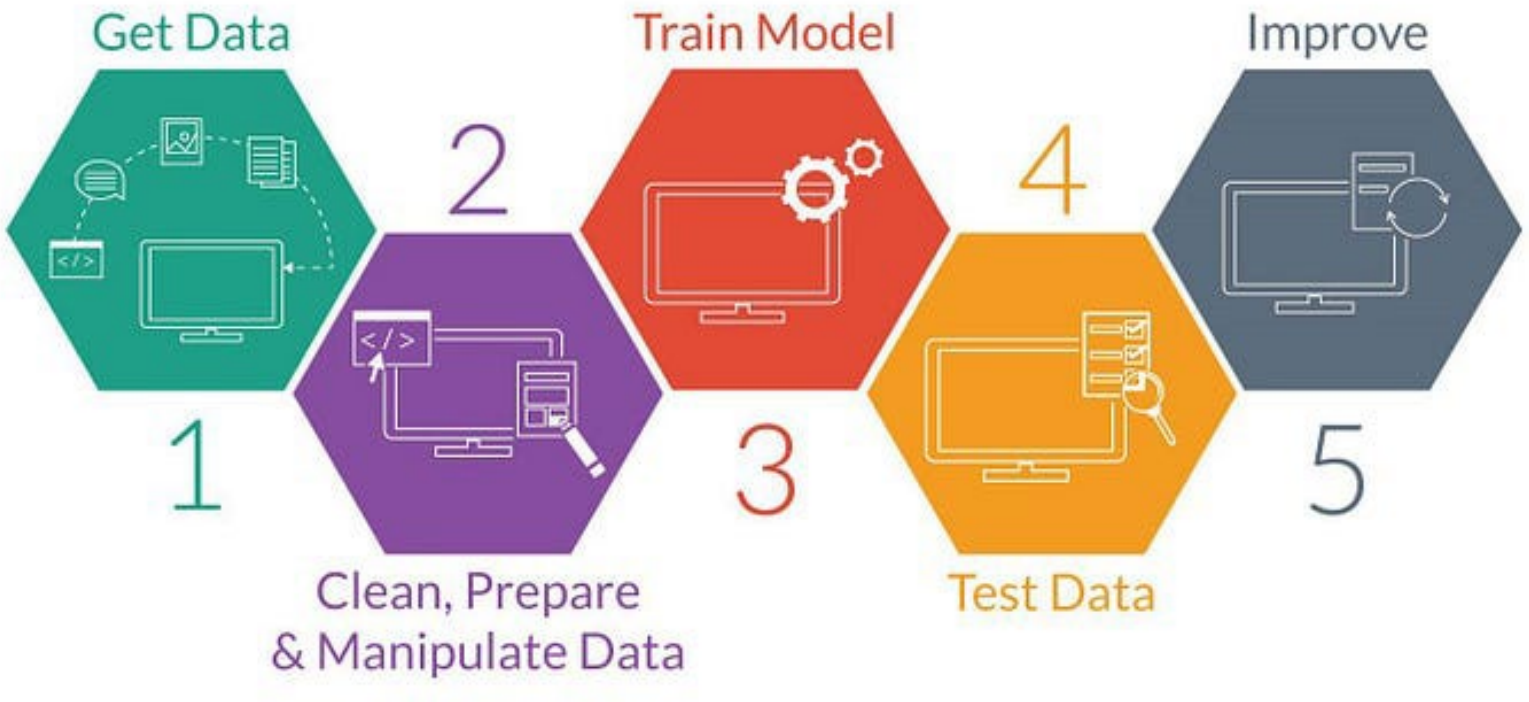
How Do We Train AI?



From: https://towardsai.net/p/l/generative-ai-gans

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How A.I. Models Work

- AI systems process input data through defined architectures (e.g., neural networks)
  - **Input data** (text, images, audio) converted into numerical vectors
- Training adjusts model parameters using large datasets to minimize error
- Inference applies trained models to new data, producing outputs
  - **Neural networks** process vectors through layers of weighted connections
    - Each layer extracts increasingly **abstract features** (e.g., words → meaning)
    - Output: prediction, classification, or generated content
- Performance depends on data quality, algorithm design, and hardware integration
- Patent relevance: **training, architecture, and inference pipeline** can all be claimed

How ChatGPT Works

- ChatGPT = Chat Generative Pre-trained Transformer
  - Chat – model designed to interact with users in a conversational way
  - Generative – model designed to generate new text
  - Pre-trained – model trained on data
  - Transformer – neural network architecture the model is built on
    - **Tokenizer**: Converts text into discrete tokens.
    - **Embedding Layer**: Transforms tokens and their positions into vector representations.
    - **Transformer Layers**: Consist of alternating self-attention and feed-forward layers to process and transform the vector representations.
    - **Un-Embedding Layer**: Converts the final vector representations back into a probability distribution over possible tokens.
  - Example: How to interpret "On Friday, the judge issued a sentence.
    - "the" suggests the judge is acting a noun not a verb
    - "judge" suggests that "sentence" is a legal penalty, not a grammatical sentence
    - "issued" also suggests that "sentence" is the legal concept
    - thus when interpreting the word "sentence," the model should pay attention to "judge" and "issued"

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Supporting Technologies

- **Vector databases**: store semantic vectors for fast similarity search
  - Store data as high-dimensional vectors encoding semantic meaning
    - Example vector for word “cat”: [0.23, –0.11, 0.89, …]
    - Similar vectors cluster semantically related items (e.g., cat ≈ kitten)
  - Support similarity search to quickly find nearest neighbors in data
  - Enable semantic retrieval across text, images, audio, or other modalities

- **Retrieval-Augmented Generation (RAG)**: enriches AI prompts with external knowledge
  - Converts user query into a vector using embedding models
  - Searches vector database for semantically related external content
  - Retrieved information embedded into prompt for the language model
  - Enhances accuracy by grounding answers in relevant documents/data
    - Example: Asking policy question retrieves relevant employee handbook section

Supporting Technologies

- **Mixture of Experts (MoE)**: activates only specialized sub-networks per task
- **MCP (Model Context Protocol)**: standardizes connections to external services
  - Standardizes how applications share context with large language models
  - MCP server acts as a single integration point for data/services
  - Connects to databases, code repositories, email servers, and APIs
  - Removes need for custom connectors for every external tool
  - Simplifies developer workflow, accelerates deployment of AI applications

- Patent relevance: **integration of these tools** may establish novelty and utility

Key Emerging AI Technologies

Agentic AI
Autonomously reasons, plans, acts, observes
Continuous goal-driven decision loops
Examples: travel booking, log anomaly detection

Large Reasoning Models (LRMs)
Specialized LLMs optimized for reasoning
Solve problems step by step
Use reinforcement learning on verifiable tasks

Artificial Super Intelligence (ASI)
Hypothetical intelligence beyond AGI
Could solve global challenges—or pose risks

Mixture of Experts (MoE)
Divide LLMs into specialized subnetworks
Activate only needed experts per task
Efficient scaling with reduced compute load

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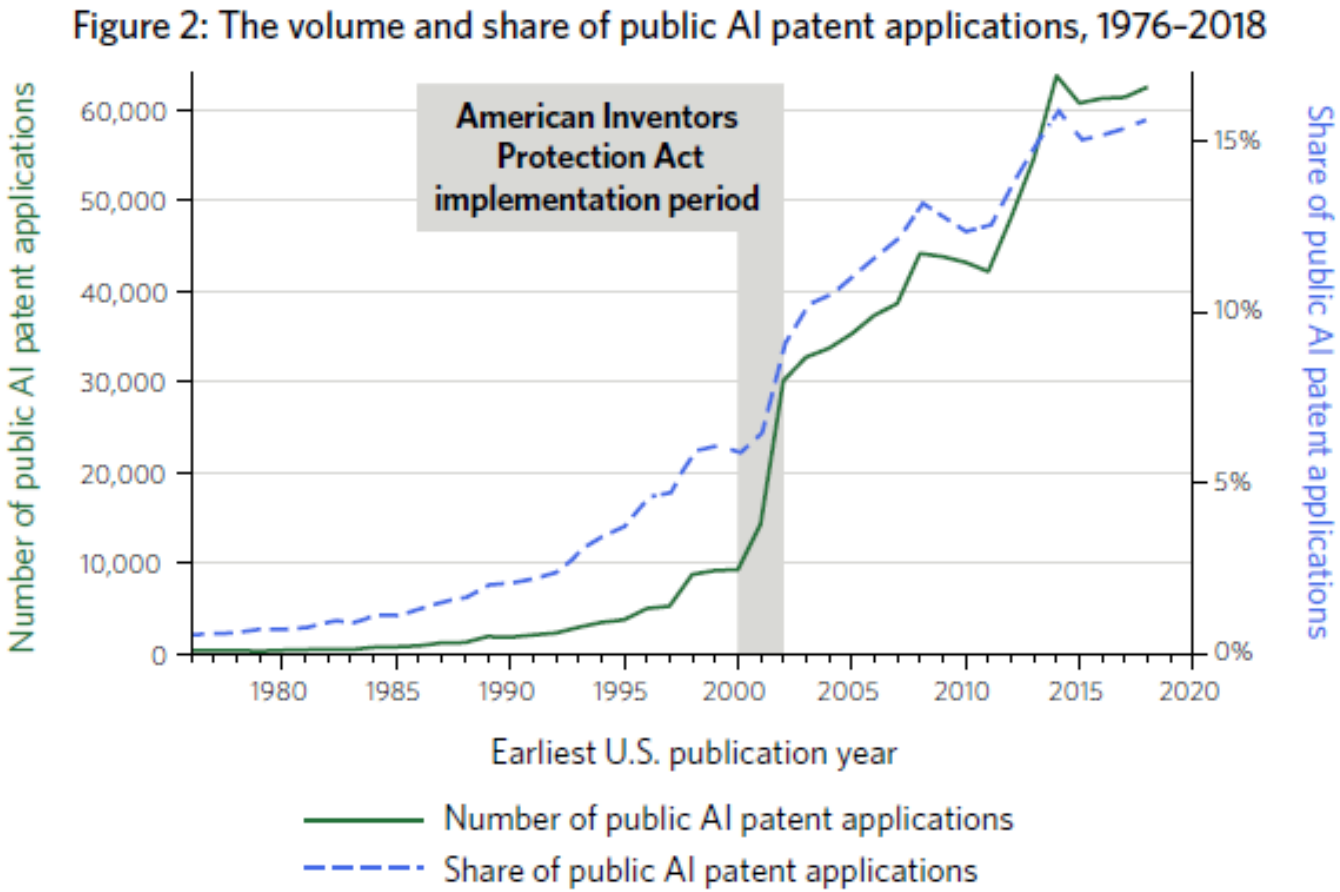
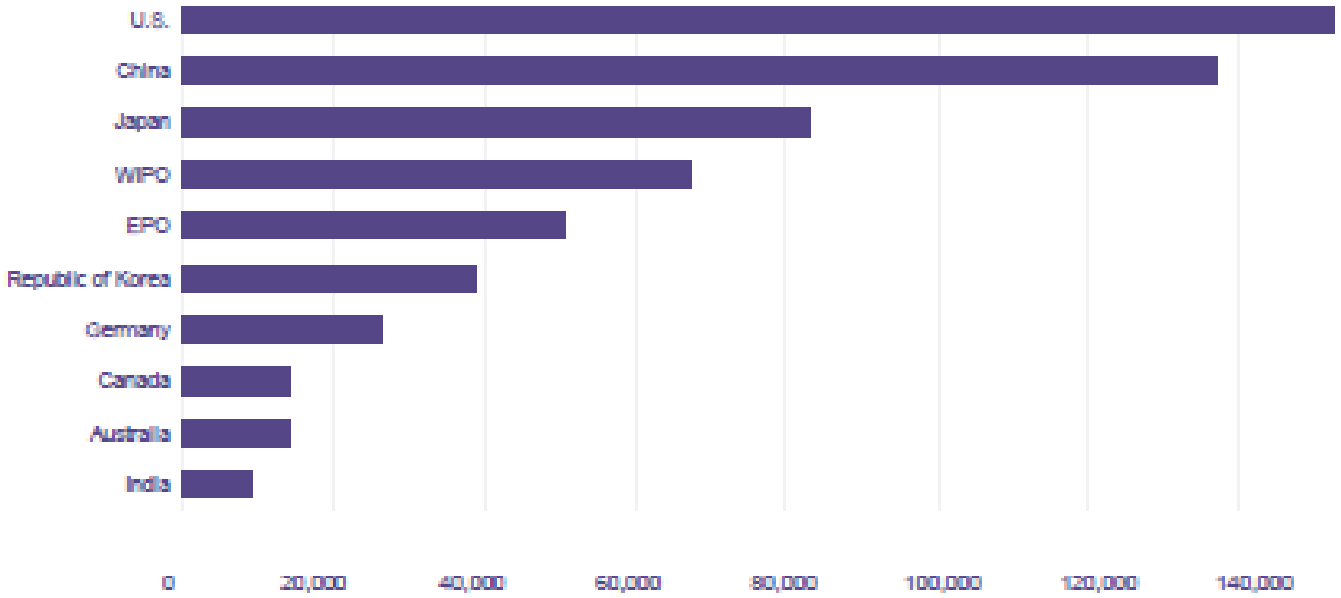
Trends in AI Patent Applications



Trends in AI Patent Applications

Figure 5.2. Overall number of patent applications by patent office

The greatest number of patent applications are filed in the patent offices of U.S. and China, followed by Japan, while WIPO and the EPO are also often used



From: https://www.wipo.int/tech_trends/en/artificial_intelligence/story.html

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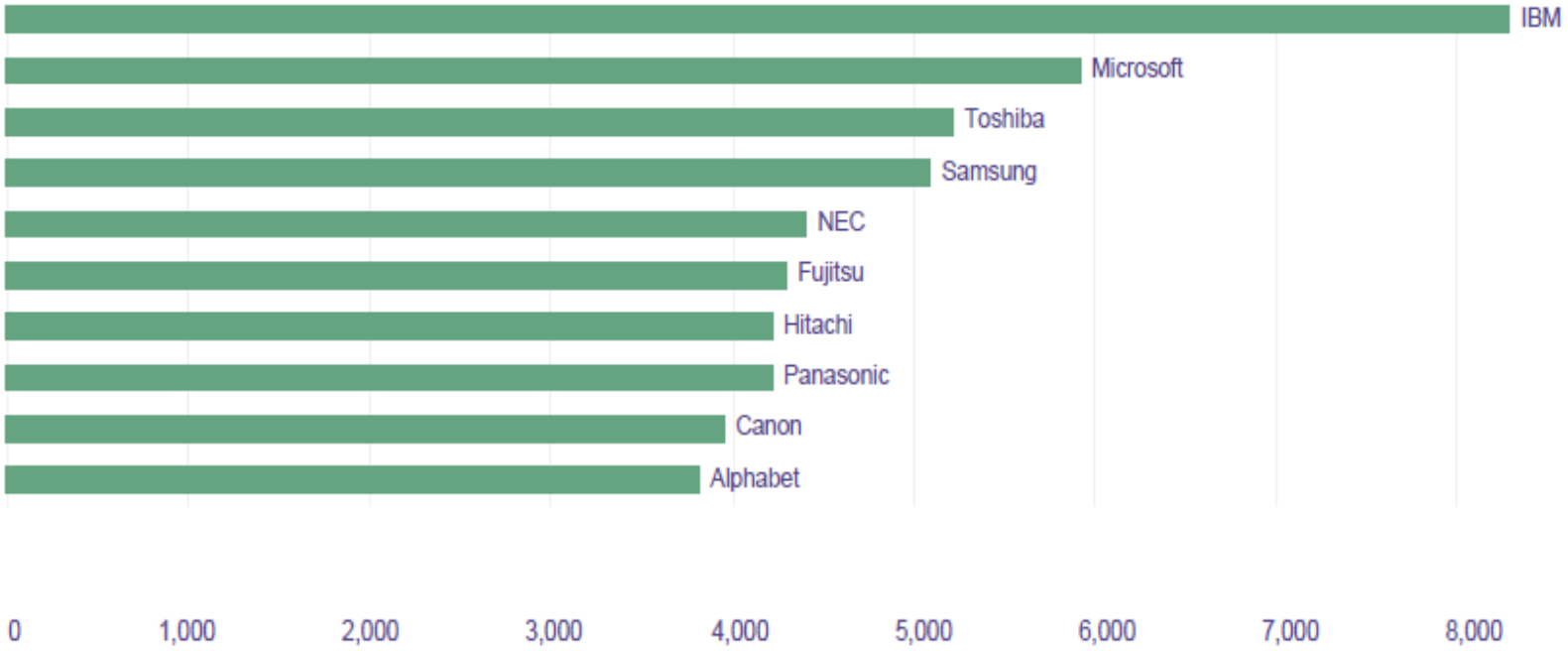
Trends in AI Patent Applications

Figure 4.1. Top 30 patent applicants by number of patent families

Companies represent 26 of the top 30 AI patent applicants worldwide



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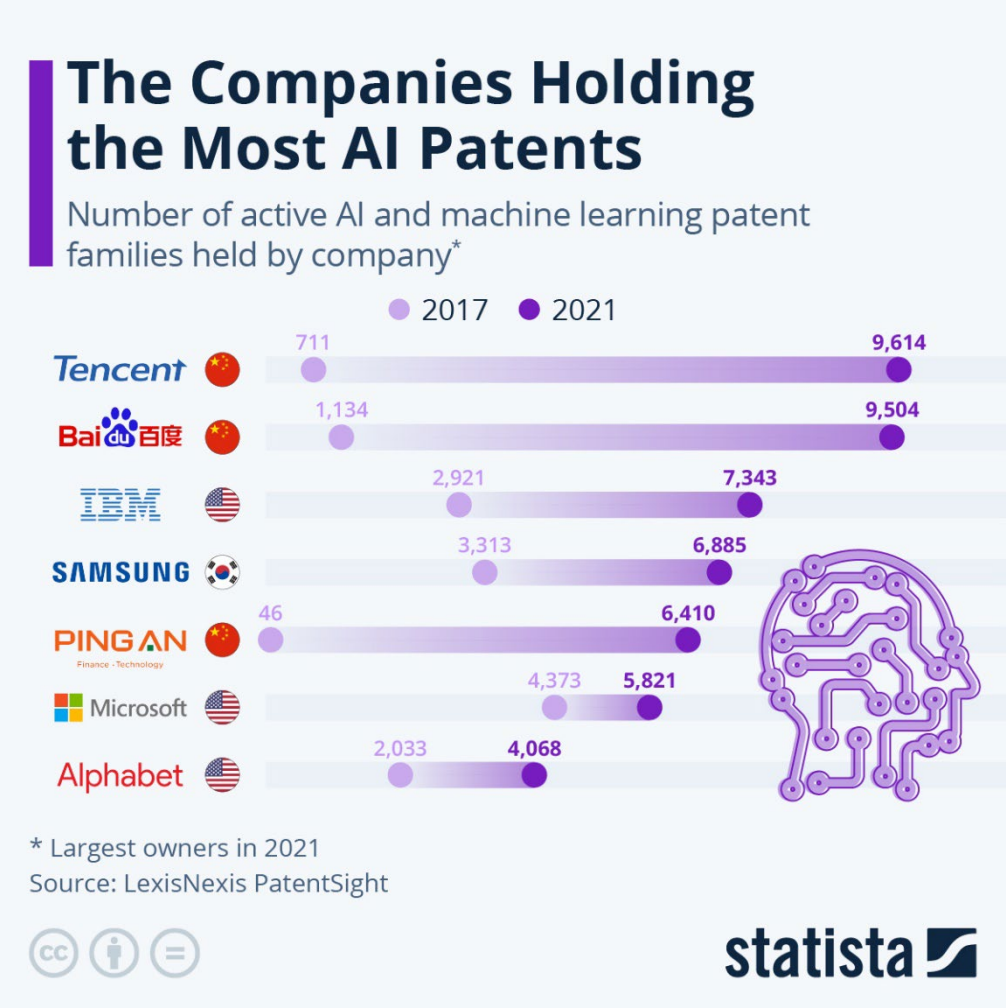
Trends in AI Patent Applications



A.I. and Inventorship

- 35 U.S.C. § 100(f)
  - "The term "inventor" means the individual or, if a joint invention, the individuals collectively who invented or discovered the subject matter of the invention."
- 35 U.S.C. § 100(g)
  - "The terms "joint inventor" and "coinventor" mean any 1 of the individuals who invented or discovered the subject matter of a joint invention."
- 35 U.S.C. § 115(b)(2)
  - Required Statements.—An oath or declaration under subsection (a) shall contain statements that— . . . (2) such individual believes himself or herself to be the original inventor or an original joint inventor of a claimed invention in the application
- *Mohamad v. Palestinian Auth.*, 566 U.S. 449, 454 (2012)
  - As a noun, "individual" ordinarily means "[a] human being, a person."
- Dictionary Act
  - The Dictionary Act instructs that "[i]n determining the meaning of any Act of Congress, unless the context indicates otherwise ... the wor[d] 'person' ... include[s] corporations, companies, associations, firms, partnerships, societies, and joint stock companies, *as well as* individuals." 1 U.S.C. § 1 (emphasis added).

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A.I. and Inventorship

- *Are A.I. Inventions Patentable?*
  - *YES – So long as there is significant HUMAN contribution*
  - *USPTO Inventorship Guidance for AI-Assisted Inventions:*
    - *https://www.federalregister.gov/documents/2024/02/13/2024-02623/inventorship-guidance-for-ai-assisted-inventions*
- *What Qualifies as a Significant Contribution?*
  - *Pannu v. Iolab Corp., 155 F.3d 1344 (Fed. Cir. 1998)*
  - *Construction of a prompt to elicit a particular solution from the AI system*
  - *Manipulation of AI System output, e.g., experimentation*
  - *Designing, building, or training an AI system in view of a specific problem to elicit a particular solution*
- *What Does NOT Qualify as a Significant Contribution?*
  - *Merely recognizing a problem and presenting that problem to an AI system*
  - *Reducing an invention to practice alone is not a significant contribution that rises to the level of inventorship.[55] Therefore, a natural person who merely recognizes and appreciates the output of an AI system as an invention, particularly when the properties and utility of the output are apparent to those of ordinary skill, is not necessarily an inventor.*
  - *Maintaining "intellectual domination" over an AI system does not, without more, make a person an inventor*

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Practical Tips for Invention Disclosure Stage

- ***ASK ABOUT A.I. INVOLVEMENT***
  - Duty of Reasonable Inquiry: confirm human contributions meet inventorship standards
  - Look at format and syntax of disclosure
- If A.I. was used:
  - Off-the-shelf A.I. model?
  - Inventor generated A.I. model?
  - What prompts were used?
- Clearly record how human inventors conceived or contributed
- Align contributions with Pannu inventorship factors
- Demonstrate meaningful human direction, oversight, and judgment
- Duty of Disclosure: reveal AI's role if material to patentability

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A.I. and Subject Matter Eligibility

- *Step 2A, Prong One – Does the Claim Recite a Judicial Exception?*
  - *NOT ABSTRACT*
    - *Specific Hardware recitations*
      - *Application-Specific Integrated Circuit (ASIC) comprising neurons and synaptic circuits*
  - *ABSTRACT*
    - *Mental processes practically performed in the human mind by observation, evaluation, judgment, and opinion*
    - *Mathematical operation for converting a signal from one domain to another using a specific transform function*
- *Step 2A, Prong Two – Does the Claim Integrate Judicial Exception into a Practical Application?*
  - *PRACTICAL APPLICATION*
    - *Use of the AI output to achieve a particular solution to a technical problem*
    - *Make sure the claims recite the improvement*
    - *Recite a particular treatment*
  - *NO PRACTICAL APPLICATION*
    - *Generic "apply it" language*
- *Step 2B – If Claim is Directed to Judicial Exception, Does Claim Include Additional Elements That Amount to Significantly More than the Judicial Exception*
- *USPTO AI Patent Eligibility Examples 47-49*
  - *Anomaly Detection*
  - *Speech Separation*
  - *Fibrosis Treatment*

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A.I. and Subject Matter Eligibility – EXAMPLE 47

Claim 1 – Directed to an ASIC implementing neurons and connections.

Claim 2:

A method of using an artificial neural network (ANN) comprising:
(a) receiving, at a computer, continuous training data;
(b) discretizing, by the computer, the continuous training data to generate input data;
(c) training, by the computer, the ANN based on the input data and a selected training algorithm to generate a trained ANN, wherein the selected training algorithm includes a backpropagation algorithm and a gradient descent algorithm;
(d) detecting one or more anomalies in a data set using the trained ANN;
(e) analyzing the one or more detected anomalies using the trained ANN to generate anomaly data; and
(f) outputting the anomaly data from the trained ANN.

- Claim 1 – specific hardware; no real question
- Claim 2 – ineligible
  - Steps (b), (d), (e) = "mental process"
  - Step (c) = "mathematical concepts"
  - Steps (a), (f) = "mere data gathering and output" – insignificant pre-/post-solution activities

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A.I. and Subject Matter Eligibility – EXAMPLE 47

Claim 3:

A method of using an artificial neural network (ANN) to detect malicious network packets comprising:
(a) training, by a computer, the ANN based on input data and a selected training algorithm to generate a trained ANN, wherein the selected training algorithm includes a backpropagation algorithm and a gradient descent algorithm;
(b) detecting one or more anomalies in network traffic using the trained ANN;
(c) determining at least one detected anomaly is associated with one or more malicious network packets;
(d) detecting a source address associated with the one or more malicious network packets in real time;
(e) dropping the one or more malicious network packets in real time; and
(f) blocking future traffic from the source address.

- Claim 3 – eligible
  - Steps (a)-(c) considered abstract ideas
  - Steps (d)-(f) cannot be practically performed in the human mind and also reflect a technological improvement – remediation of malicious packets in a network
  - Goes beyond training and applying a neural network

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A.I. and Subject Matter Eligibility – EXAMPLE 47

- SUMMARY:
  - ASIC hardware ANN → eligible
  - Generic algorithm + anomaly output → ineligible
  - Improved security → eligible
  - Lesson: hardware + improvements matter

A.I. and Subject Matter Eligibility – EXAMPLE 48

Claim 1:

A speech separation method comprising:
(a) receiving a mixed speech signal x comprising speech from multiple different sources sn, where n ∈ {1, . . . N};
(b) converting the mixed speech signal x into a spectrogram in a time-frequency domain using a short time Fourier transform and obtaining feature representation X, wherein X corresponds to the spectrogram of the mixed speech signal x and temporal features extracted from the mixed speech signal x; and
(c) using a deep neural network (DNN) to determine embedding vectors V using the formula V = fθ(X), where fθ(X) is a global function of the mixed speech signal x.

- Claim 1 – ineligible
  - Neural network used to implement abstract idea – applying judicial exception using a computer

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A.I. and Subject Matter Eligibility – EXAMPLE 48

Claim 2:

The speech separation method of claim 1 further comprising:
(d) partitioning the embedding vectors V into clusters corresponding to the different sources sn;
(e) applying binary masks to the clusters to create masked clusters;
(f) synthesizing speech waveforms from the masked clusters, wherein each speech waveform corresponds to a different source sn;
(g) combining the speech waveforms to generate a mixed speech signal x' by stitching together the speech waveforms corresponding to the different sources sn, excluding the speech waveform from a target source ss such that the mixed speech signal x' includes speech waveforms from the different sources sn and excludes the speech waveform from the target source ss; and
(h) transmitting the mixed speech signal x' for storage to a remote location. global function of the mixed speech signal x.

- Claim 2 – eligible
  - Steps (d)-(e) = mathematical concepts
  - Steps (f)-(h) – cannot be practically performed in the human mind
  - Steps (f) and (g) – more than insignificant post-solution activity; reflect technological improvement

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A.I. and Subject Matter Eligibility – EXAMPLE 48

Claim 3:

A non-transitory computer-readable storage medium having computer-executable instructions stored thereon, which when executed by one or more processors, cause the one or more processors to perform operations comprising:
(a) receiving a mixed speech signal x comprising speech from multiple different sources sn, where n ∈ {1, . . . N}, at a deep neural network (DNN) trained on source separation;
(b) using the DNN to convert a time-frequency representation of the mixed speech signal x into embeddings in a feature space as a function of the mixed speech signal x;
(c) clustering the embeddings using a k-means clustering algorithm;
(d) applying binary masks to the clusters to obtain masked clusters;
(e) converting the masked clusters into a time domain to obtain N separated speech signals corresponding to the different sources sn; and
(f) extracting spectral features from a target source sd of the N separated speech signals and generating a sequence of words from the spectral features to produce a transcript of the speech signal corresponding to the target source sd.

- Claim 3 – eligible
  - Steps (a)-(d) = mathematical calculations
  - Steps (e) and (f) – not practically performed in the human mind and integrate the mathematical concepts into a practical application, resulting in a technological improvement

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A.I. and Subject Matter Eligibility – EXAMPLE 48

- SUMMARY:
  - Generic separation → ineligible
  - Improved separation or transcription → eligible
  - Lesson: technical performance matters

A.I. and Subject Matter Eligibility

- *Recentive Analytics v. Fox Corp* Case No. 2023-2437 (Fed. Cir. Apr. 18, 2025)
  - 1) Machine Learning Training (U.S. Patent Nos. 11,386,367 and 11,537,960) - methods and systems for optimizing the scheduling of live events, and
  - 2) Network Maps (U.S. Patent Nos. 10,911,811, 10,958,957) - methods and systems for optimizing network maps for determining which programs or content is displayed by a broadcaster's channels within certain geographic markets at particular time.
  - FINDING:
    - Iterative training and dynamic adjustments of machine learning models DO NOT represent technological improvement
    - Mere application of machine learning to a new field previously undertaken by a human resulting in improved efficiency and speed not enough

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A.I. and Enablement

- Do not rely solely on proprietary or vague AI descriptions
  - Disclose model architecture (e.g., CNN, RNN, transformer)
  - Describe training data: type, source, preprocessing steps
  - Provide performance metrics such as accuracy, latency, memory use
  - Explain how AI operates at a functional level without oversimplification or treating AI as a “black box”
- Explain how AI was used as a tool in the inventive process
  - Show how inventors directed, selected, or improved AI outputs
  - Avoid language suggesting AI conceived the invention independently
- Include Multiple Embodiments
- Explain technical improvement
- Examiners expect sufficient detail for enablement

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A.I. and Claim Drafting

- Avoid 'black box' AI claims — often rejected as abstract
  - Generic AI claims are often rejected as abstract ideas
  - E.g., 'a neural network that outputs results' without context
- Claim specific applications, technical improvements, hardware/software integration
  - Highlight improvements in speed, accuracy, or efficiency
  - Show advancements in training methods or data processing
  - Frame AI as improving technology, not just analyzing data
- Use varied claim types: system, method, computer-readable medium
  - Draft system, method, and computer-readable medium claims
  - Cover hardware/software integration and specific applications
  - Provide fallback dependent claims for narrower protection

International Considerations

- Europe - EPO
  - Requires 'technical character' for AI-related inventions
  - Claims must solve a technical problem with technical means
  - Purely abstract data processing often rejected as non-technical
  - Examples of eligible areas: image processing, control systems, medical diagnostics
  - Guidelines for Examination in the EPO - Section G-II, 3.3.1 (“Artificial Intelligence and Machine Learning”)
    - “The technical effect that a machine learning algorithm achieves may be readily apparent or established by explanations, mathematical proof, experimental data or the like. While mere allegations are not enough, comprehensive proof is not required, either. If the technical effect is dependent on particular characteristics of the training dataset used, those characteristics that are required to reproduce the technical effect must be disclosed unless the skilled person can determine them without undue burden using common general knowledge. However, in general, there is no need to disclose the specific training dataset itself (see also F-III, 3 and G-VII, 5.2)”.

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International Considerations

- South Korea – KIPO
  - AI inventions patentable if they present a concrete technical solution
  - Must disclose implementation details (algorithms, training data)
  - Computer program claims accepted if tied to hardware or specific application
  - Emphasis on practical utility and industrial applicability

- Japan - JPO
  - AI-related inventions must produce a 'creation of technical ideas using natural laws'
  - Applications should highlight specific problem solved by AI
  - Data processing alone is insufficient — must have technical effect
  - Favorable treatment for inventions improving hardware/software functionality

International Considerations

- China – CNIPA
  - Patentable if claims demonstrate a technical solution to a technical problem
  - Software-implemented AI claims require hardware tie-in
  - Detailed disclosure of algorithms, training process, and applications expected
  - Broad data analysis or business method claims are often rejected

- Israel - ILPO
  - AI-related inventions patentable if tied to a technical field
  - Emphasis on industrial applicability and technical contribution
  - Software inventions generally patentable if solving a technical problem
  - Practical examples: cybersecurity, medical diagnostics, communications

International Considerations

Jurisdiction	Eligibility Focus	Key Notes
EPO	Technical character	Requires solving technical problem with technical means
South Korea	Concrete technical solution	Implementation details and industrial utility required
Japan	Technical ideas under natural laws	Specific problem solved, technical effect needed
China	Technical solution to problem	Hardware tie-in, detailed disclosure expected
Israel	Technical field + industrial applicability	Software patentable if solving technical problem

A.I. and the Patent Practitioner

- A.I. Uses:
  - Invention Disclosure
    - recording phone calls
    - expanding upon given disclosure
  - Drafting
    - ingesting disclosure
    - claim drafting
    - written description drafting
  - OA Analysis
    - summary of rejections
    - summary of cited references
    - draft arguments with or without amendments
  - Claim amendments
  - Document Shells
  - Proofreading

A.I. and the Patent Practitioner

- Best Practices
  - Remember models are only as good as the data they are trained on
    - beware of hallucinations
  - Privacy Concerns
    - public models use all input data to train
      - avoid entering confidential data and documents
  - Utilize specific and detailed prompts
    - best to go step by step
    - general prompt inputs:
      - role of the AI – “Act as”
      - task
      - context – provide relevant documents
      - audience
      - format

Using AI as a Tool for Drafting – The Rules

- **Uses & Risks:** AI can expand access to information and efficiency but poses risks of errors, “hallucinations,” confidentiality breaches, and misuse.
- **Existing Rules Apply:** All USPTO submissions (patents, trademarks, PTAB, TTAB) must comply with duties of candor, good faith, and accuracy. Reliance on AI does not reduce practitioner responsibility.
- **Certification & Accountability:** Papers must be signed by a human certifying factual/legal accuracy; unchecked AI outputs are not a “reasonable inquiry.”
- **Confidentiality & Security:** Practitioners must safeguard client data, avoid unauthorized disclosures, and comply with export control and national security regulations.
- **Sanctions:** Misuse of AI may result in striking filings, disciplinary actions, termination of proceedings, or even criminal/civil liability.
- **Bottom Line:** USPTO affirms current rules are sufficient but stresses responsible, verified, and ethical AI use in legal practice.

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