

**USPTO's Request for Comments on Patenting Artificial Intelligence Inventions in the
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1. Inventions that utilize AI, as well as inventions that are developed by AI, have commonly been referred to as “AI inventions.” What are elements of an AI invention? For example: The problem to be addressed (e.g., application of AI); the structure of the database on which the AI will be trained and will act; the training of the algorithm on the data; the algorithm itself; the results of the AI invention through an automated process; the policies/weights to be applied to the data that affects the outcome of the results; and/or other elements.

Current set of activities in the AI space are referred to as artificial narrow intelligence machines or limited memory machines that involves training the machine to perform a single task intelligently with the problem statement, input data and implementation details provided by a natural person.

Elements of such inventions that contribute to the technical character of the invention and support achieving the technical purpose of the invention may include:

- a) Training related elements involved in reduced time for training, reduced data for training, effective methods of training*
- b) Input data process related elements such as data cleansing to achieve reduced time for cleansing or reduced processing steps*
- c) Post processing / inference related techniques*
- d) Novel architecture elements*
- e) Hyperparameter adaptation elements*
- f) Algorithms for machine learning, expert systems, optimizations, etc.*
- g) Connecting elements (to define a AI system)*

2. What are the different ways that a natural person can contribute to conception of an AI invention and be eligible to be a named inventor? For example: Designing the algorithm and/ or weighting adaptations; structuring the data on which the algorithm runs; running the AI algorithm on the data and obtaining the results.

Element of human creativity is an inseparable component in the elements of AI Inventions. The Purpose and Goals of AI Invention are provided by humans, and crafting these properly could involve creativity that endows originality to the end result. The day when AI defines its own purpose is when the question of natural person eligible to be named Inventor will be questioned.

The elements of AI inventions mentioned in point 1 above are achieved by a natural person and hence makes the natural person eligible to be named inventor.

3. Do current patent laws and regulations regarding inventorship need to be revised to take into account inventions where an entity or entities other than a natural person contributed to the conception of an invention?

- *35 U.S.C. § 100 : The term "inventor" means the individual or, if a joint invention, the individuals collectively who invented or discovered the subject matter of the invention.*
- *However, 35 U.S.C. § 102 : A "person" shall be entitled to a patent unless..... The Statute has used 'person' instead of 'individual'.*

Irrespective of whether an AI system is considered for inventorship, the 'person' in 35 U.S.C. § 102 may have to be defined, particularly to add clarity on whether "person" encompasses other than "natural person".

Additional considerations are needed on the following aspects when reviewing current patent laws and regulations:

- *Practical feasibility of linking other than natural person contributing to the invention to own the invention. Further, if other than natural person is the sole inventor, necessity for a natural person to be a co-inventor to facilitate assignment of rights and other statutory requirements need to be considered.*
- *Change may be needed in the patent filing process, the forms/declarations to be executed by the inventor, the details requested of the inventors.*

- *Existing provisions in the law for ‘continuing applications’ may need to be re-imagined to address the complexities of linking parent AI inventions with their subsequent creations which may be from different domains.*

4. Should an entity or entities other than a natural person, or company to which a natural person assigns an invention, be able to own a patent on the AI invention? For example: Should a company who trains the artificial intelligence process that creates the invention be able to be an owner?

A company can be an Assignee for contributions towards the invention. However, having an AI system as a sole inventor, without a natural person as a co-inventor can create challenges in processing of legal requirements pertaining to assignment of ownership, declaration, oath, Information Disclosure Statement (IDS), etc.

5. Are there any patent eligibility considerations unique to AI inventions?

Any invention passing Novelty, Inventive Step, Utility requirements and Prong-2 of the Patent Eligibility test should be considered eligible. A separate eligibility test for AI inventions would create more challenges for the Patent Office with reference to identifying the proper Art Unit and analyzing the eligibility. There is a possibility of misuse of the concept of AI to get inventions under the Art Unit of AI to pass the eligibility test. Vice-Versa may also hold true.

6. Are there any disclosure-related considerations unique to AI inventions? For example, under current practice, written description support for computer-implemented inventions generally require sufficient disclosure of an algorithm to perform a claimed function, such that a person of ordinary skill in the art can reasonably conclude that the inventor had possession of the claimed invention. Does there need to be a change in the level of detail an applicant must provide in order to comply with the written description requirement, particularly for deep learning systems that may have a large number of hidden layers with weights that evolve during the learning/training process without human intervention or knowledge?

Any reasoning, inferencing performed by the AI needs to be sufficiently explicit and parameters that were used for the inferencing need to be disclosed without which enablement or assessing patentability, technical advancement, 'significantly more' will be a challenge.

However, for AI inventions where a large number of hidden layers that evolve during training/learning, the requirement of 'person with ordinary skill in the art' should not be enforced upon since all the layers may not be explicitly detailed in the specification, else most of the AI inventions may end up with 112 rejections based on prevailing guidelines. The complexity of the hidden layers revolve around whether the requirements necessary for claiming the invention is already a prior art disclosed in the public domain versus exclusive trained sets made available and proprietary to the Applicant.

7. How can patent applications for AI inventions best comply with the enablement requirement, particularly given the degree of unpredictability of certain AI systems?

At the time of filing the patent application, clear and sufficient description is required to be provided so as to enable any person skilled in the art to work the invention without which there may be ambiguity in terms of enablement and 112 rejections may be anticipated.

However, consideration of the challenges listed in point 5 and 6 above are needed to address the enablement requirement.

8. Does AI impact the level of a person of ordinary skill in the art? If so, how? For example: Should assessment of the level of ordinary skill in the art reflect the capability possessed by AI?

One of the important challenges would be to establish the motivation for the invention if the inventor is not a natural person. For example, if an AI system creates inventions with no input (problem statement) from a human being, and no change in input data used (considering different inventions created by DABUS), it is difficult to establish a motivation for the invention.

Further, assessing 'who' qualifies as a person of ordinary skill in the art and to ascertain if the invention is non-obvious to the POSITA will impact the assessment of AI inventions.

9. Are there any prior art considerations unique to AI inventions?

Assessing prior art would be a challenge in view of point 8.0 above.

Considering AI inventions referred in point 1 above are typically a black box with lack of visibility with regards to reasoning and inferencing details, it would be a challenge to assess AI inventions in view of the prior art. For instance, in computer vision inventions, features may be explained to an extent, however in Natural Language Processing inventions, it is difficult to explain even the embeddings used.

10. Are there any new forms of intellectual property protections that are needed for AI inventions, such as data protection?

If the AI inventions are created with no human intervention, data protection and possibility of data exclusivity would be of key consideration.

What data is sourced by the AI system, the legal implications of using the data, check for open source / proprietary data compliance are required to be addressed.

From GDPR and enablement perspective, following details are needed to be provided:

- *Subset of data from the huge volume of data that was actually used.*
- *Validation of the output considering it is entirely automated with no human intervention - without which there may be legal implications also.*
- *Checking data being used by the AI system to ensure there is no corruption or misrepresentation or incorrect reasoning happening at the input or processing stage.*
- *Ensuring GDPR principles (transparency, minimization and retention, privacy, security, etc.) are not violated*

- *Controlling data used by AI system or when one AI system interacts with another AI system with no human intervention - predicting how the AI systems would behave and why.*

11. Are there any other issues pertinent to patenting AI inventions that we should examine?

Considerations are needed on the following aspects

- *Liabilities, Accountability, Implications beyond Patent law (Copyright, GDPR, Corporations Act, civil laws).*
- *Since there is no human intervention, checking if the invention created is infringing a patentee's right to 'make', 'use' a portion of or completely a granted method or system as part of its invention.*
- *Possibility of harm to society if AI inventions are undirected (no human intervention).*
- *Possibility of monopoly situations considering a scenario where one AI invention created by a human being creates multiple inventions.*
- *AI is not foolproof and some decisions made by AI may be wrong for reasons such as incorrect algorithm, incorrect interpretation of the algorithm; inappropriate data set, data set contaminated by bias; or decision making influenced by say malfeasance. In such scenarios, relying on AI systems for business decisions, medical decisions, etc. may be a challenge that needs to be addressed keeping in mind current laws and regulations.*

12. Are there any relevant policies or practices from other major patent agencies that may help inform USPTO's policies and practices regarding patenting of AI inventions?

- *Currently there seems to be no global consensus on AI inventions and existing guidelines are directed at AI inventions discussed in point 1 above.*

- *From the DABUS scenario, at least UK and EPO are yet to publish any updated guidelines. Current EPO guidelines for examination of AI inventions is not different from those provided for computational models and algorithms - contribution to the technical character of the invention continues to be the deciding factor for eligibility.*
- *JPO has published case examples of AI related technologies and Revised guidelines on computer software-related inventions pertinent to examination of AI-related inventions where some key requirements include disclosing example correlations that the AI-related invention might make, disclosing test results or validation of the AI model. It also seems like having novel input data and output data may be enough to establish an inventive step.*
- *Singapore patent office has issued guidelines for review of AI applications. Unlike other jurisdictions, however, the guidelines have been issued to identify AI related applications and fast-track its prosecution.*