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# Machine Learning in Patent Law: How Genetic Breeding Algorithms Challenge Modern Patent Law Regimes

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**Abstract :** Artificial intelligence (AI) is an interdisciplinary field of computer science with the aim of creating intelligent machine behavior. Early approaches to AI have been configured to operate in very constrained environments where the behavior of the AI system was previously determined by formal rules. Knowledge was presented as a set of rules that allowed the AI system to determine the results for specific problems; as a structure of if-else rules that could be traversed to find a solution to a particular problem or question. However, such rule-based systems typically have not been able to generalize beyond the knowledge provided. All over the world and especially in IT-heavy industries such as the United States, the European Union, Singapore, and China, machine learning has developed to be an immense asset, and its applications are becoming more and more significant. It has to be examined how such products of machine learning models can and should be protected by IP law and for the purpose of this paper patent law specifically, since it is the IP law regime closest to technical inventions and computing methods in technical applications. Genetic breeding models are currently less popular than recursive neural network method and deep learning, but this approach can be more easily described by referring to the evolution of natural organisms, and with increasing computational power; the genetic breeding method as a subset of the evolutionary algorithms models is expected to be regaining popularity. The research method focuses on patentability (according to the world's most significant patent law regimes such as China, Singapore, the European Union, and the United States) of AI inventions and machine learning. Questions of the technical nature of the problem to be solved, the inventive step as such, and the question of the state of the art and the associated obviousness of the solution arise in the current patenting processes. Most importantly, and the key focus of this paper is the problem of patenting inventions that themselves are developed through machine learning. The inventor of a patent application must be a natural person or a group of persons according to the current legal situation in most patent law regimes. In order to be considered an 'inventor', a person must actually have developed part of the inventive concept. The mere application of machine learning or an AI algorithm to a particular problem should not be construed as the algorithm that contributes to a part of the inventive concept. However, when machine learning or the AI algorithm has contributed to a part of the inventive concept, there is currently a lack of clarity regarding the ownership of artificially created inventions. Since not only all European patent law regimes but also the Chinese and Singaporean patent law approaches include identical terms, this paper ultimately offers a comparative analysis of the most relevant patent law regimes.

**Keywords :** algorithms, inventor, genetic breeding models, machine learning, patentability
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