Research and Reviews: Journal of Engineering and Technology
e-ISSN: 2347-226X
p-ISSN: 2319-9857

Machine Learning: An Overview of its Relationship to Data Mining and Other Fields

Steven Siehan*

Department of Management and International Business, Bloomsburg University of Pennsylvania, Pennsylvania, USA

Commentary

Received: 20-Feb-2023, Manuscript No. JET-23- 92806; **Editor assigned:** 23-Feb-2023, Pre QC No. JET-23-92806 (PQ); **Reviewed**: 09-Mar-2023, QC No. JET-23-92806; **Revised:** 16-Mar-2023, Manuscript No. JET-23-92806 (R); **Published:** 27-Mar-2023, DOI: 10.4172/2319-9857.12.1.004.

***For Correspondence:**
Steven Siehan, Department of Management and International Business, Bloomsburg University of Pennsylvania, Pennsylvania, USA

E-mail: sixf@edu.cn

Citation: Siehan S, Machine Learning: An Overview of its Relationship to Data Mining and Other Fields. 2023;12:004.

ABOUT THE STUDY

The study of methods that "learn," or methods that use data to improve performance on a particular set of tasks, is known as Machine Learning (ML). It is considered a subfield of artificial intelligence. A subset of machine learning is closely related to computational statistics, which focuses on making predictions using computers. However, not all machine learning is statistical learning. Machine learning algorithms are used in a wide variety of applications, such as in medicine, email filtering, speech recognition, agriculture, and computer vision, where it is difficult or unfeasible to develop conventional algorithms to perform the necessary tasks. A subset of machine learning is closely related to statistical learning. The study of mathematical optimization provides machine learning with theory, methods, and application areas. Unsupervised learning-based exploratory data analysis is the focus of the related field of study known as data mining.

Machine learning programs can carry out tasks without being explicitly learn the programmed do so. Algorithms can be programmed into the various computers to instruct them on how to carry out each step necessary to solve a problem for simple tasks; the computer does not require any training. It can be difficult for a human to manually create the necessary algorithms for more complex tasks. The field of machine learning employs a variety of methods to teach computers to complete tasks for which there is no fully satisfactory algorithm. In practice, it may prove to be more efficient to assist the machine in developing its own algorithm as opposed to having human programmers specify each necessary step. One strategy is to label some of the correct answers as valid when there are a lot of possible answers.

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The computer can then use this as training data to enhance the algorithm(s) it employs to determine correct answers. The MNIST dataset of handwritten digits, for instance, has frequently been used to train a system for digital character recognition.

Relationships to other fields

Data mining: Data mining employs numerous machine learning methods, each with distinct objectives; however, data mining techniques are also used in "unsupervised learning" or as a pre-processing step in machine learning to boost learner accuracy. The fundamental assumptions made by these two research communities are a major source of confusion: in AI, execution is typically assessed as for the capacity to recreate known information, while in information revelation and information mining the key undertaking is the disclosure of already obscure information. An uninformed (unsupervised) method will easily outperform other supervised methods when evaluated against known knowledge, whereas supervised methods cannot be utilized in a typical KDD (Knowledge Discovery in Databases) task due to the lack of training data.

Optimization: Optimization is also closely related to machine learning; On a training set of examples, many learning problems are formulated as the minimization of the some loss to function. Tradegy is the works express the disparity between the forecasts of the model being prepared and the real issue instances.

Speculation: The distinction among enhancement and AI emerges from the objective of speculation; Machine to the learning focuses on minimizing loss on unseen samples, whereas optimization algorithms can minimize loss on a training set. Portraying the speculation of different learning calculations is a functioning subject of ebb and flow research, particularly for profound learning calculations.