Machine Learning

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Abstract: This article provides information and comments on artificial intelligence, machine learning, algorithm design methods, optimization methods, and basic machine concepts.

Keywords: Machine learning, artificial intelligence, case study, algorithm selection, classification

Machine Learning is a comprehensive branch of applied mathematics that studies methods for constructing algorithms that can be used to study mathematical statistics, optimization, artificial intelligence, and empirical (applied laws) data. .

Image recognition, image analysis, computer viewing, processing, and text analysis are actively used as machine learning methods, but they are also unique in that they are not considered at all in Machine Learning. approaches, methods, and algorithms. These and other scientific fields can be broadly linked to intellectual analysis of data.

The following is a sample list of routes:

➢ Machine learning - theory, approaches and teaching methods:

➢ classification;

➢ clustering (clustering);

➢ regression (regression);

➢ forecasting.

➢ Pattern recognition:

➢ image analysis, recognition & understanding;

➢ computer vision;

➢ analysis, speech detection and comprehension (speach analysis, recognition & understanding);

➢ Intelligent data mining;

➢ knowledge discovery in databases;

➢ text processing and analysis, text comprehension (text mining);

Analysis of data on the Internet (web mining). Machine learning is a comprehensive part of artificial intelligence and mathematical statistics that studies ways to build algorithms that can be taught based on empirical data.

Machine Learning is a comprehensive branch of artificial intelligence that studies ways to build read-based algorithms. There are two types of education. Practical-legal training or inductive training is based on identifying general patterns from specific empirical data. Deductive learning involves the formalization of expert knowledge and its transfer to a computer as a knowledge base. Deductive learning usually refers to the field of expert systems, so the terms "machine learning" and "case study" can be considered synonymous.

Machine learning is a combination of mathematical statistics, optimization methods, and classical mathematical sciences, but has its own characteristics related to computational efficiency and retraining problems. As an alternative to classical statistical approaches, many inductive teaching methods have been developed. Many methods are closely related to data search and data retrieval (Data mining).

Machine learning is not only a mathematical but also a practical, engineering science. Pure theory, as a rule, does not immediately lead to the methods and algorithms used in practice. In order for them to work well, additional heuristic inventions need to be made to cover the inconsistencies that have arisen in the theory of assumptions with the conditions of real problems. Almost any research on machine learning would not be complete without experimentation with a model or real data confirming the practicality of the method.

Machine learning is the knowledge that computers have as people learn and move. Learn to improve yourself by presenting this information in the form of real-world observations from time to time.

As with any concept, depending on who you are talking to, Machine Learning may have a slightly different definition. Four practical definitions:

1. "The simplest form of machine learning is the practice of analyzing data, learning from it, and then using algorithms to make predictions about anything in the world." - Nvidia

2. "Machine learning is the science of working with computers without precise programming." - Stanford

3. "Machine learning is based on algorithms that can be learned from data without relying on rule-based programming." - McKinsey & Co.

4. Trying to answer the question of Machine Learning, how can we build computer systems that are automatically improved through experience, and what are the basic laws that govern all learning processes? - Carnegie Mellon University

Basic concepts of the machine

There are various algorithms for learning a machine. Hundreds of publications are published every day. They are usually grouped by learning method (controlled study, uncontrolled study, semi-examination) or agreements on its use form or function (e.g. classification, regression, decision tree, clustering), in-depth study). Regardless of the learning style or function, all combinations include:

➢ Suggestion (a classifier or computer-understood language)

➢ Rating (also known as objective / scoring function)

➢ Optimization (search method, usually best score classifier, off-the-shelf and custom optimization methods are used)

The main goal of Machine Learning algorithms is to generalize beforehand, that is, to successfully interpret information that has never been presented before.

There are many different ways to learn machines. The use of a simple decision tree cluster into layers of artificial nerve networks (the second allowed for in-depth study).

Although the focus is often on selecting the best learning algorithm, the researchers found that some of the most interesting questions could not be answered by the available resources.

Importantly, machine learning is not just about automation. If you think so, you will definitely miss the valuable insights and opportunities it offers you.

Learning machines are useful because with all the processing power, they can find samples of big data faster. Otherwise, these parts would have been missed by the people. Machine learning is a tool that can be used to improve problem solving. It can draw valid conclusions on a variety of issues, such as disease detection and finding solutions to global climate change.

Best practices for machine learning:

➢ The most important factor in successful computer training projects is undoubtedly the features used to describe the data. In addition, you need to have enough information to prepare the models.

➢ In many cases where the algorithms do not work well, this is due to problems with the training data.

➢ If possible, experimental data should be obtained. For example, data collected by sending different versions of an email to a random sample.

➢ Always set aside some of the training information for cross-checking. Thus, you can correctly check the selected classifier or the learning algorithm using new data.

➢ Machine learning (ML) is the study of computer algorithms that are automatically improved through this experience. The lower part of artificial intelligence is considered. Machine learning algorithms are based on model data, "learning data," to make predictions or make decisions without explicit programming. Used in a variety of applications, such as machine learning algorithms, filtering by email and viewing the computer, it is difficult or unwise to develop traditional algorithms to perform the required tasks.

➢ Computational statistics, which are closely related to part of machine learning, focus on prediction using these computers; but learning in the whole machine is not a statistical study. The study provides areas of methods, theory, and application to the field of mathematical optimization engineering. Uncontrolled learning through the analysis of exploratory data is an area of education that focuses on data mining. Predictive analysis is also called engineering in its application to business problems.

Machine learning involves figuring out how computers can perform tasks without being clearly programmed. This involves learning computers from the information provided to perform specific tasks. For simple tasks given to computers, it is possible to program algorithms that tell you how to perform all the steps required to solve a problem placed on a machine; no learning by computer is required. Manually creating the algorithms needed for advanced tasks can be difficult for a human. In

practice, it may be more effective to help human programmers develop their own algorithm than to define every step they need.

The machine learning discipline uses a variety of approaches to teach computers to perform tasks that do not have an algorithm that fully satisfies them. In cases where there are a large number of potential answers, one approach is to mark some of the correct answers as true. It can then be used as training data for the computer to improve the algorithm (s) it uses to determine the correct answers. For example, the MNIST handwritten set of numbers was often used to prepare the system for the task of identifying digital symbols.

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