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REVIEW

Research and Analysis of Machine Learning Algorithm in Artificial Intelligence

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ABSTRACT

This article firstly explains the concepts of artificial intelligence and algorithm separately, then determines the research status of artificial intelligence and machine learning in the background of the increasing popularity of artificial intelligence, and finally briefly describes the machine learning algorithm in the field of artificial intelligence, as well as puts forward appropriate development prospects, in order to provide theoretical reference for industry insider.

1. Introduction

With the continuous development of science and technology, artificial intelligence technology has been widely used in various fields with great effects. As the core technology of artificial intelligence, the initial research goal of machine learning is to enable computer systems to have the ability to "learn" just like humans, and to lay the foundation for the realization of artificial intelligence. With the unremitting efforts of growing experts and scholars, the development of artificial intelligence technology can be described as progress with each passing day. In some complicated but ordinary fields, machines can gradually replace manual work and exert extremely efficient work.

2. An Overview of Artificial Intelligence and Machine Learning algorithm

2.1 Concept of Artificial Intelligence

In the year of 1950, Allen Matheson Turing, the father of modern computer science, named a test with his own name. The test will randomly ask questions to the testees using some devices when the tester is separated from the testees. If more than 30% of all testees cannot determine whether the tester is a person or a machine, then it shows that the machine is intelligent. This is exactly the famous Turing test, which also has its shortcomings: it takes humans--which have much uncertainty because of influence of subjective consciousness--as the actual test standard of the entire test, so the test results of the Turing test will be

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lack of some imprecision [1]

With the continuous development of information technology, the definition of artificial intelligence also develops continuously. Professor Nielsen of the United States believes: "Artificial intelligence is a discipline about knowledge--how to express, obtain and use knowledge."; Professor Winston, who is also from the United States, believes: " Artificial intelligence is to study how to enable computers to do intelligent work that could only be done by humans in the past." These two definitions of artificial intelligence can show basic ideas and contents of it to a certain extent: to study the characteristics of human intelligence activities and construct artificial systems with certain intelligence, in other words, a basic theory, method and technology to study how to use computer technology to simulate human intelligent behavior[2].

2.2 Concept of Algorithm

The academics have not yet reached a unification on the concept of the algorithm, among which philosophers mostly study algorithms just in terms of the learning algorithm. These philosophers believe that the algorithm has a strong correlation with human cognition, but they rarely study algorithm [3]. To summarize the research results of today's academics, there are following four views on the definition of the algorithm:

① Algorithm is the method to determine a certain process route.

② Take the algorithm as a program. After determining a problem, the program will tell us to perform steps continuously, and analyze the problem, finally get the corresponding result.

③ The third view is similar to the second one, both of which take the algorithm as a program. There are some differences in details: for the third view, the program can always tell us how to deal with a series of rules systematically.

④ Algorithms are limited rules that present a series of operations to solve specific types of problems. And algorithm has the characteristics of finiteness, certainty, input, output and effectiveness [3].

2.3 Machine learning algorithm

As the core technology of artificial intelligence, the initial research goal of a machine learning algorithm is to enable computer systems to have the ability to "learn" just like humans and to complete tasks that humans do now. To achieve this goal, learning will be an indispensable part. Without learning, artificial intelligence cannot complete tasks that humans do now, neither can it keep up with the pace of human development. In other words, learning is the basis for the continuous development of artificial intelligence [4]

Compared with traditional algorithm, learning algorithm emphasizes the attribute of "learning", which means the algorithm can develop itself, find new laws, and even improve the logic and behavior of algorithm program through "learning". In today's academics, a large number of scholars believe that a computer system cannot be called an intelligent system if it is not able to learn.

Nowadays, the machine learning algorithm is usually divided into three types: supervised learning, unsupervised learning, and reinforcement learning. Supervised learning means that learning algorithm works out prediction models from the labeled training data, so as to effectively predict unknown situations in the future; Unsupervised learning means that learning algorithm performs the exploration of data structures and extracts meaningful information or results [5] without the guidance of known variables or reward functions; Reinforcement learning is mainly used as a trial and error method, which is able to help learning algorithm improve prediction effect of prediction models through interaction with the environment. Compared with traditional algorithm, computer systems can accomplish different things by using the same learning algorithm, and the operation process is simpler and more convenient, even a single learning algorithm can derive countless different programs by itself. To achieve the same effect, the traditional algorithm requires more process.

3. Research status of artificial intelligence and machine learning algorithm

3.1 Research status of artificial intelligence

Since its birth in the 1950s, the annual investment of scientific research in the field of artificial intelligence has also increased year by year with strong support from global governments. As a first-class power in the century and a major R & D country, many public funds in the United States have entered into the field of artificial intelligence under the guidance of government departments, and artificial intelligence has gained rapid development. In order to further speed up the R & D of artificial intelligence, the United States released the report of "2019 R & D Strategic Planning of National Artificial Intelligence "in June 2019. The report not only effectively updates the first edition of " R & D Strategic Planning of National Artificial Intelligence" issued by the US government in 2016, but also proposes research goals for problems like human-machine collaboration methods, artificial intelligence safety, ethics,

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legal and social impacts, which lays a planning foundation for the development of country artificial intelligence.

At present, with the support of advanced technologies such as information technology and computer technology, two key technical breakthroughs have emerged in the field of artificial intelligence, namely cloud robot technology and human brain bionic computing technology. As cloud robot technology related aspects have gradually matured, there are much more relevant existing researches of cloud robot technology than that of human brain bionic computing technology. With the rapid development and popularization of high-tech technologies such as science and technology, computer networks, cloud computing, and big data, the costs of R & D and production of robot technology have decreased year by year, also it is possible for robots to do cloud control and cloud computing as well as obtain and screen network data through big data technology. At this stage, the main research aspects of cloud robot technology are building a networked robot system platform, an open system robot architecture, robot network platform algorithm, image processing system development, and cloud robot related network infrastructure construction.[6]

In China, Baidu is the company with the deepest research in the field of artificial intelligence. As an Internet company, Baidu's most significant research achievement in recent years is the Deep Speech 2 speech recognition system, which has not only been recognized by the world but also successfully been chosen by MIT Technology Review as one of 2016 Top Ten Progressive Technologies. As an Internet company, Alibaba has developed an intelligent customer service system based on the actual needs of its own e-commerce platform, which effectively deals with current restriction problem on the sharp rise in customer service demand for e-commerce platforms, and promotes basic customer service tasks such as automatic voice transfer, emotion recognition and keyword recognition to be replaced by intelligent customer service. This intelligent customer service system not only effectively reduces the workload of manual customers, but also reduces the company's labor demand costs, generates more economic benefits, and lays the foundation for further development. Tencent has also achieved certain achievements in the field of artificial intelligence, among which the most advanced artificial intelligence technology is the face recognition technology developed by "Tencent Youtu". This technology is at the leading level even in the whole world, it also provides strong image and pattern recognition technology support for Tencent subordinate industries such as QQ, Tenpay, Webank, etc. In addition to the above three major companies, other companies such as iFLYTEK and AISpeech have also achieved great R & D achievements in the field of artificial intelligence, and applied these achievements to industrial development. [7]

4. Classic learning algorithm in artificial intelligence

4.1 regression algorithm

The so-called regression algorithm is an algorithm that attempts to explore the relationship among variables by measuring the error. In the field of artificial intelligence, it means a regression algorithm when people say "regression". The common regression algorithm includes the least square method, logistic regression, stepwise regression, multivariate adaptive regression splines, local scatter smoothing estimation, etc.

4.2 Instance-based Algorithm

An instance-based algorithm is often used to build game problem models. In the actual application process, after the model is established, it is often necessary to select a batch of sample data, then the computer system will analyze and compare new data with sample data according to certain similarity characteristics, and find the best matching data from new data. Therefore, the instance-based algorithm is also called memory-based learning. Common instance-based algorithms include KNN, learning vector quantization, self-organizing mapping algorithms, etc.

4.3 Regularization algorithm

Generally speaking, the regularization algorithm can be regarded as an extension of the regression algorithm. This algorithm will adjust algorithm reasonably according to the complexity of it. In the adjustment process, the regularization algorithm usually rewards simple models, and punishes complex algorithm correspondingly. Common regularization algorithm includes Ridge Regression-LASSO-and resilient network.

4.4 Decision-Tree Learning Algorithm

In the actual application process, the decision-tree algorithm will reward the tree-structure decision model according to data attributes. This decision model is often used to solve classification and regression problems. The common decision-tree algorithm includes regression trees, ID3, C4.5, CHAID, Decision Stump, random forest, multivariate adaptive regression splines and gradient boosting machines.

4.5 Bayesian method

Bayesian method algorithm is a kind of algorithm de-

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veloped on the basis of Bayesian positioning, which is often used to solve classification and regression problems. Common Bayesian method algorithm includes the Bayesian naive algorithm, averaged one-dependence estimator and BBN.

4.6 Kernel-based algorithm

Among all kernel-based algorithms, the support vector machine algorithm is the most famous. In practical applications, the kernel-based algorithm will map input data to a higher-order vector space, in which data is processed. In high-order vector space, some classification or regression problems can be better solved and data resolution can be improved. The common kernel-based algorithm includes support vector machines, radial basis functions, and linear discriminant analysis.

4.7 Clustering algorithm

In application, the clustering algorithm will classify and summarize all input data in a layered manner according to the central point process, then find out internal structures of data and determine the biggest common point, based on which input data will be classified. The common clustering algorithm includes the k-Means algorithm and the expectation maximization algorithm.

4.8 Association rules algorithm

Computer systems can choose rules that can explain the relationship among variables through association rules learning, then find out relevant ones from a large amount of data. Common association rules algorithm includes the Apriori algorithm and the Eclat algorithm.

4.8 Artificial Neural Network

In application, an artificial neural network algorithm will simulate biological neural networks and solve classification and regression problems. Nowadays, as the focus of academic research, an artificial neural network algorithm has covered hundreds of different types of algorithms, among which deep learning algorithm is the most commonly used one. Common used artificial neural network algorithm includes perceptron neural network, reverse transfer, Hopfield network, self-organizing mapping and learning vector quantization. As an important algorithm category derived from the development process of artificial neural network algorithms, deep learning algorithm has now received extensive attention from home and abroad and experienced in-depth research and development. However, most of today's deep learning algorithms are semi-supervised learning algorithms, which are mostly used to process large data sets with a small amount of unidentified data. [8]

5. Conclusion

With the rapid development of computer technology and information technology, artificial intelligence technology has also been deeply researched and popularized. Although existing artificial intelligence technology has learning ability to some extent, it is difficult to meet the ever-changing social demand due to limitations of theory, algorithm and technology. Therefore, it is necessary for academics from home and abroad to further study and develop artificial intelligence, to promote the further improvement of machine learning algorithms in the field of artificial intelligence, to ensure the effective growth of the learning ability of artificial intelligence technology, to meet social demand, and to contribute more to social development.

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