

Machine Learning algorithms and its applications:A survey

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ABSTRACT

Currently, the voluminous amount of data is around us. Analyzing such voluminous data would help us to fetch beneficial information from it. Machine learning is a part of artificial intelligence which is an eye-catcher in the digital world. Machine learning can be applied for designing algorithms to trace the binding amongst data. Machine learning is done by training the machine to react to different data inputs. A lot of practices have been done to enhance the efficiency of machine learning algorithms. Continual efforts, growth, progressive refinement, and improvement in machine learning have enabled the successful production of thousands of expert systems which are presently being used commonly in business and industries. It has been used in different areas like marketing, traffic alert, fraud detection, self-driving car, Medical diagnosis, speech & face identification, and many more. In this paper, the author would like to showcase different machine learning algorithms along with their applications.

KEYWORDS: Machine learning, support vector machine, decision tree, classification

1. INTRODUCTION

Machine Learning is a subfield of artificial intelligence which aims at machine learning from their acquaintance and making a forecast based on its observation. The terminology "artificial intelligence" applies to machines capable of performing actions such as "study" and "analytics" [1]. Machine learning is a part of Artificial Intelligence that pushes forward the possibility that, by offering admittance to the right information, machines can learn without anyone else how to tackle an explicit issue. Because of the enormous size of data, manual prediction is complex to people. To beat this issue, train the machine to foresee the future without anyone else with the assistance of training and test datasets.

The learning procedure is an important aspect of Machines. The basic level involves two types of machine learning: inductive, and deductive. Deductive learning makes use of presently available information and fetches new information from the aged one. Concepts and generalizations are introduced first to learners, followed by specific examples and activities to support learning. Inductive machine learning methods prepare computer programs by fetching rules and template out of huge information.

Inductive reasoning aims at developing a theory ML come into the picture when the academic

information is incapable and requires the ideal number of remarks and conclusions [2]. Fig. 1 explains the deductive and inductive approaches of learning.

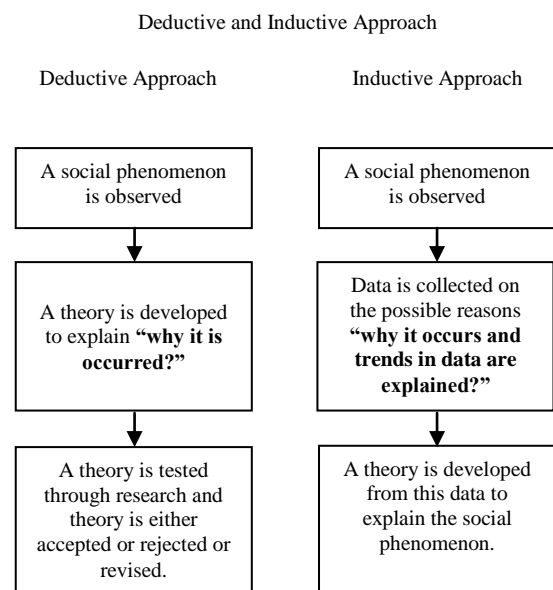


Fig.1. Approaches of Machine Learning

2. LITERATURE SURVEY

Nouman Azam and Jing Tao Yao in 2014 illustrated the problem of finding relevant threshold values for the regions which can be simplified by tracing links amongst threshold and their influence on regions [3].

Behshad Hosseinifard et al. in 2013 classified depression and general patients by a study of EEG signal. It included linear discriminant, KNN, logistic regression and also suggested better among the three [4]. Shruthi U et al. in 2019 executed a comparison of ML classification algorithms for finding out the plant disease which suggested SVM used by numerous authors where CNN classifier detected more count of disease [5]. Bujar Raufi et al. in 2018 aimed for the achievement of hate speech and outrageous language detection and prevention using ANN. The result gave high classifier accuracy and applicability [6].

Rekha Nagar, Yudhvir Singh in 2019 mainly focused on using machine learning for forecasting in areas such as stock price, tourism demand, and supply chain demand [11].

3. MACHINE LEARNING ALGORITHMS

Machine learning algorithms are programs learning from data and improving the experience. The machine learning algorithm is listed as shown in Fig.2.

3.1. Supervised Learning [1]:

Supervised Learning is the procedure of an algorithm studying from the education dataset like as a

The teacher supervising the learning technique. The set of rules iteratively does predictions on the Education statistics and is revised through the instructor. The getting to know halts when the algorithm profits an Applicable degree of attainment. Some supervised learning algorithms can be mentioned as linear regression, logistic regression, artificial neural networks (ANN), decision tree, SVM.

3.1.1. Linear regression [7]:

Regression is creating a target value based on independent predictors. The application is in the forecast and finding the reason and conclusion of the relationship among variables. Simple linear regression is a type where the count of independent variables is one and has a linear relationship among the independent(x) and dependent(y) variables.

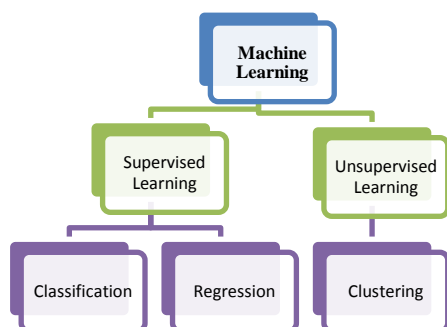


Fig.2. Machine Learning Algorithm

3.1.2. Logistic regression [1]:

Logistic regression is a statistical analytics methodology applied for the prediction of a data value based on previous observations of a data set. This methodology classifies incoming data on basis of historical data. Logistic regression can be used in data preparation activities. An example of it can betray whether a student will be enrolled in a particular college.

3.1.3. Artificial neural networks (ANN) [7]:

Artificial Neural networks are computational algorithms. ANNs are computational models having an inspiration for animal's central nervous systems. It is efficient to perform machine learning along with pattern recognition. They are represented as systems interconnections of "neurons" which do the calculations from inputs. It is an information processing methodology. Its working is similar to the human brain processing information. ANN involves a large number of connected processing units that work together to process information generating meaningful results from it.

3.1.4. Decision tree [1]:

Decision tree learning is predictive modeling used for machine learning. It makes use of a decision tree for Observations concerning an item (represented in the branches) to conclusions concerning the object's goal value (represented inside the leaves). Tree models while the goal variable takes a discrete set of values are known as classification trees. Decision trees while the goal variable takes non-stop values are called regression trees.

3.1.5. Support Vector Machine (SVM) [7]:

A is deep learning algorithm performing supervised learning for classification or regression. Support vector machines are used for sorting two data groups by like classification, An SVM has the requirement of labeled data which has to be trained. SVMs can work with handwritten characters.

3.2. Unsupervised Learning [9]:

Input data isn't always categorized and does now not have an acknowledged result. A version is created through inferring Structures to be had in the enter records. It may be used to extract widespread guidelines through a Mathematical system to reduce redundancy, or it may be to organize data by similarity. The Apriori algorithm, K-Means can be included under unsupervised learning.

3.2.1. Clustering [9]:

Clustering methodology includes the division of data into groups where data in every group has identical data than in others. It can be said as gathering of data on basis of similarity and dissimilarity. One can consider the example as making a group of customers concerning purchasing behavior.

3.2.1.1. K-means clustering [1]:

K-Means Clustering Algorithm is one of the important machine learning algorithms and used on regular basis for solving clustering issues. It comes under unsupervised learning. The benefit of it as one can think is it is computationally more capable than hierarchical clustering when variables are large. IT makes in implementation and interpretation of the clustering easier. The hazards can be thought of as diverse initial separations that give different final clusters which hinders the performance. Performance lowers when size and density in the clusters of input data differ. It is susceptible to outliers.

3.2.2. Association [7]:

An association rule is termed to be a learning problem. That is wherein you will be discovering the exact rules to describe the huge quantities of your statistics. Instance: people Who buy x are also the only ones who tend to buy. It is a rule-based machine learning and data mining technique that fetches essential family members among variables or in an information set. Association rule studying acknowledges protected correlations in databases by using the utility of interestingness to provide an association rule for novel findings.

3.2.2.1. Apriori [7]:

This algorithm is used for recurring item set mining and association rule learning over transactional databases. The procedure includes the identification of recurring items in the dataset and stretching it to bigger and bigger element sets. The recurring item sets that were found by Apriori are utilized further to find the association rules which flash all common trends used in the database. Generally utilized for the market basket analysis.

4. MACHINE LEARNING APPLICATIONS

Machine Learning is the most recent trend capturing worldwide business. There are many applications of machine learning, some of which are as shown in the Fig. 3.

4.1. Online Customer Support [8]:

When you are surfing online through the websites, customer support is available. All the websites may or may not have a representative to answer the questions, at that time Chabot comes into the picture. The Chabot fetches information from websites and displays it to customers. With the advancement in Chabot now the user queries could be understood better to provide better answers due to its machine learning algorithms.

4.2. Product Recommendations [8]:

It is observed that after shopping you get emails that showcase the suggestions for shopping. This acts as refinement in shopping which is provided by machine learning algorithms. It considers your previous purchases, added or liked items to cart, your choices during giving you suggestions related to shopping. To

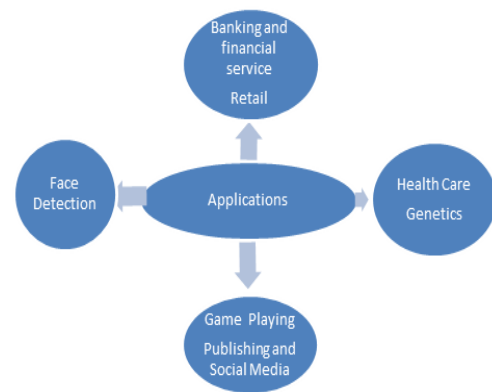


Fig.3.Applications of Machine Learning

give smart personalized recommendations, Alibaba has developed “E-commerce Brain”.

4.3. Retail [2]:

In the retail industry, big data technologies like Hadoop and Spark are used for solutions and fast realization of big data. Now the solution for real-time data analysis providing valued results needs an hour. The data is processed and automated cleverly to achieve goals for retail dragons like Amazon, Target, Alibaba, and Walmart.

4.4.Virtual Personal Assistants [8]:

The word assistant states that guider or assister for purpose. Machine learning is used in assisting action via smart devices. Examples of assistants are Google, Alexa, Siri where you just ask your query through speech and would fetch the result for the same immediately. These smart devices make our life easy.

4.5. Assistive and Medical Tech [9]:

Assistive robots are for human beings having disabilities and for senior citizens for sensing, processing information, and taking action with the guidance of appropriate tools. Through machine learning Smart Tissue Autonomous Robot (STAR) was created which stitched pig intestine. It is not a replacement for a doctor but a solution to perform critical methods in medical. Machine learning has medical applications in the form of foretelling prevention measures.

4.6. Playing Video Games Automatically [9]:

The pixels on a screen are analyzed and the machine learning algorithm is utilized to teach neural networks about playing the video game. The applications are of Google’s DeepMind, Google’sAlphaGo.

4.7. Search Engine Result Refining [2]:

Google, Yahoo, and other search engines make use of machine learning to enhance searching results. It keeps track whenever you execute any search regarding whether you explored the top result or just surfed the pages and did not open any of them. When you explore the first result displayed to you the search

engine assumes that it accords to your search. Just surfing suggests that the search was not appropriate to the query of the user. In this manner, the algorithm that is working improves search.

4.8. Videos Surveillance [2]:

It is hectic for a person to supervise many Video cameras. A difficult process to do and dull as well. The concept of schooling computer systems to perform these processes sensibly. The video surveillance system making use of AI helps to detect crime before happening. They trace abnormal behavior of criminals Deliver an alarm to human attendants that can in the long run help to avoid calamity. Such tracing helps to improve the surveillance services. This is possible because of machine learning at the back end.

4.9. Email Spam and Malware Filtering [9]:

There are several spam filtering approaches that email clients use. Multi-Layer Perception, C 4.5 Decision Tree induction are a number of the spam filtering Strategies which are powered by way of ML. It observes the malware piece of code which is the same as that of the previous with a minor difference so ML understands the coding pattern and provides protection against the malware.

5. CONCLUSION

Machine learning is a rapidly developing field in software engineering. It has many applications in essentially every other field of study and is now being executed financially because Machine learning can tackle issues excessively troublesome or tedious for people to address. To portray Machine learning as a rule term, assortment models are utilized to learn designs in data and make exact expectations dependent on the examples it notices. Presently, you realized that Machine Learning is a procedure of preparing machines to execute activities a human brain can do, though a bit quicker and better than a normal individual. It is known to us that machines can beat humans in games like Chess, AlphaGO, which are viewed as exceptionally difficult. You have seen that machines can be prepared to perform human work and can help people in carrying on with better lives. This paper talks about machine learning as a boon to humans. It explores the various techniques of machine learning along with their algorithms. Machine Learning is Supervised or Unsupervised. If data is lesser and unmistakably marked data for training, use Supervised Learning. Unsupervised Learning gives better execution and results for huge informational collections. Machine learning is playing a vital role in day-to-day life from entertainment to life savior.

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