AN INTRODUCTION TO MACHINE LEARNING

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Abstract: Machine learning, briefly defined as enabling computers to make successful predictions using past experiences, has recently exhibited an impressive development with the help of rapid increase in the storage and processing strength of computers. Along with many other features and advantages, machine learning methods are continuously being widely employed in various sectors such as bioinformatics. The difficulties and cost of biological analyses have led to the development of sophisticated and complex machine learning approaches and models for application area. We will review the fundamental concepts of machine learning such as introduction to machine learning, unsupervised, supervised learning and reinforcement learning.

Introduction

Machine Learning is the concept that have been around for quite a few decades now and have been implemented or thought to be implemented many times, to make the machines do possibly everything and anything that the humans can do without being instructed. Machine learning enables computers to find valuable and to the point information by using algorithms that repeatedly learn from data and its features instead of being simply programmed about where exactly to look for a piece of information. Machine learning is a type of artificial intelligence that a makes software applications to become more accurate at predicting and declaring outcomes without being explicitly programmed to do so. Machine learning algorithms use historical data as input to predict new output values.

New developments in certain domains like mathematics and computer engineering (e.g. statistics) and availability of easy-to-use, often freely available (software applications) tools offer great potential to transform the manufacturing domain and their grasp on the increased manufacturing data repositories sustainably. One of the most crucial developments is in the area of machine learning (incl. data mining, artificial intelligence, knowledge discovery from databases, etc.). However, the field of machine learning is very vast and many different algorithms, theories, and methods are available to explore and learn. For many manufacturing practitioners of data like data scientist, this represents a barrier regarding the adoption of these powerful tools and thus may hinder the utilization of the vast amounts of data increasingly being available very easily.

Importance

Machine learning is important because it gives enterprises a view of trends in customer behavior and business operational patterns, as well as supports the development of new technology. Many of today's leading companies, such as Netflix, Google and Amazon, make machine learning a central part of their operations. Machine learning has become a significant competitive differentiator for many companies. To overcome some of today's major challenges of complex databases, machine learning techniques are used. data-driven approaches are able to find highly complex and non-linear patterns in data of different types and sources and transform raw data to features spaces, so-called models, which are then applied for prediction, detection, classification, regression, or forecasting.

Types of Machine learning algorithms:

There are three major categories of Machine Learning algorithms:

Supervised Learning: In this form of machine learning, data scientists and data analysts supply algorithms with labeled training data and define the variables they want the algorithm to assess for associations. Both the input as well as the output of the algorithm is pre-specified. One of the consistent missions of supervised learning system is to make the computer learn a classification system; therefore, it is commonly used to solve classification problems. Like, the machine could be trained to classify a spam e-mail from a valid e-mail, already being used by yahoo for mail spam filtering. Nearest neighbor, Naïve Bayes, Decision Trees, Linear Regression, Logistic Regression, Support Vector Machines and Neural Networks are a few of the most general algorithms that are included under this category.

Unsupervised Learning: is where the machine is provided with certain unlabeled and unclassified input dataset and the unsupervised learning algorithm produces a function to identify various hidden structures and features in the given dataset as per the observed patterns, shared characteristics and differences that exist between data without any previous guidance. There is no possible evaluation of the level of precision of the structure as identified by the machine. This form of machine learning involves certain algorithms that train on data that is unlabelled. The algorithm scans through data sets looking for any significant association. The data these machine learning algorithms train on as well as the predictions or endorsements which they produce as output are predetermined. One of the most significant focus of unsupervised learning algorithms could be clustering and association problems. A few of the commonly used unsupervised learning algorithms are k-means algorithm for clustering and Apriori algorithm for association problems.

Reinforcement Learning: In this form of machine learning the machine is exposed to a certain environment where all the

necessary decisions are made on a trial and error basis and it learns from its past experiences and own actions. For each and every right decision, the machine receives a feedback in the form of a reward from the environment which acts like a reinforcement signal and hence the information of the rewarded state-action pair is kept as a reserve. Later on the machine iterates the rewarded behavior whenever thrown with a same looking problem. Data scientists and analysts commonly use reinforcement learning to instruct a machine to complete a multiple step process for which there are clearly specified protocols. Data scientists create an algorithm to complete a given task and assign it positive or negative cues as it works out how to complete a task. But for most of the part, the algorithm takes its own decisions on what steps to rely on along the way. Reinforcement learning algorithms have their usage in domains where strategic decision making is the key to success like Self Driving vehicles. Few of the most commonly used reinforcement learning algorithms are Q-Learning and Markov Decision processes.

Conclusion

Machine Learning can be Supervised or Unsupervised. If we have lesser amount and clearly labeled data for training and processing, choose Supervised Learning. Unsupervised Learning would commonly give better performance and results for huge data sets. If we have a huge data set available easily, opt for deep learning techniques. We also have learned Reinforcement Learning. This paper surveys research based on machine learning introduction. In Today's date each and every person is using machine learning knowingly or unknowingly. From getting suggestions about various movies to updating photos on social networking sites, we are constantly using machine learning in our day to day life. This paper gives an introduction to most of the popular technologies nowadays that is machine learning.

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