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A Brief Study on Machine Learning

S.Jenila[1*], D. Ananthi[2]

[1,2]PG and Research Department of Computer Science, National College, Tiruchirappalli, Tamil Nadu, India

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***Abstract*—** The technology is the knowledge of science put into practical use to solve some problems. The impact of technology in modern life is immeasurable. The most indispensable technology which is helpful in all aspects of life is the Machine Learning (ML). It is the most recent approach to digital transformation which has benefits as well as risks to mankind. It helps us to process with large data in minimum time. This paper includes the difference of Machine learning and Artificial Intelligence. It also provides the description about the machine learning, methods, process types, algorithms, various applications and challenges towards healthcare, business, fraud detection, social media and other internet activities.

***Keywords*—** Machine Learning, Artificial Intelligence, algorithm, process

I. INTRODUCTION

Technology is the application of science which helps to ease our day by day work in many aspects. The improved use of technology makes us to completely depend on it for all. So it **is very essential that we must learn how to use the** technology for the benefits of our life. The world is developed much on technology and we need to be up-to-date. Because the technology works today may not work tomorrow. Technology has been improved in many fields such as communication, business, scientific, education, transport etc.,

Machine learning is the latest approach to digital transformation, making our computing processes more efficient, cost-effective, and reliable. Machine learning is the application of Artificial Intelligence (AI). Machine learning is a branch of artificial intelligence method which uses data analysis mainly prediction analysis to create the model. It is based on the idea that systems can learn from data, patterns and can make decisions with minimal human interference.

Machine learning is the process to create algorithms to accept input, using statistical data to produce the desired output. It mainly focuses on the statistical analysis which helps in decision making for many aspects. The Machine Learning systems should require the following basic steps as shown in the figure 1. It needs some data to be collected from different sources. The data which were gathered must be of raw data that are to be of specified and structured data. Such processed data can be fed into the algorithm. The data will be used to function as per the algorithm. Then the predictive model of the system can be obtained from it. The predictive model can be improved by adjusting the function of algorithm to achieve a better model.

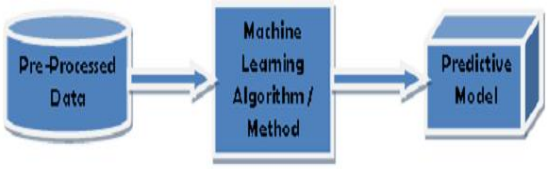

Fig.1 Machine Learning Process

II. MACHINE LEARNING PROCESS STAGES

The development of machine learning system begins with gathering related data for the process. Then it is followed by selecting the algorithm and other relevant activities. The steps to be considered are:

1. Data Analysis – It is the important stage in the machine learning process. The proper data only will produce the perfect model of the system. The data analysis includes the process of gathering data which is of the form of raw data. And then it should be analyzed to filter the perfect and correct data for using in the algorithm. This process is represented as the pre-processing data.

2. Selection of algorithm methods – There are some basic methods and algorithms available for the development of machine learning system. The best methods which suits for the present model is selected. The algorithms can be selected based on continuous, discrete or comparable values.

3. Predictive model – Selecting proper algorithm only can produce the desired system with predictive output. The accurate algorithm leads to better prediction and decision making system. As the data is fed to the algorithm the

machine can learn and use their operations to improve the performance of the system.

III. COMPARISON OF MACHINE LEARNING AND ARTIFICIAL INTELLIGENCE

Even though the technical definitions of Machine Learning and Artificial Intelligence are different, it is hard to break up both in the effective. The following table 1 shows some of their characteristics.

Table 1:Comparison of machine learning and artificial intelligence

Characteristics	Machine Learning	Artificial Intelligence
Definition	It is a part of Artificial Intelligence.	The science and engineering of making intelligent machines.
Data	It is the method of data analysis[2] such as statistical analysis.	It works by combining large amount of data.
Method	It enables the computers to self-mode of learning without explicitly programmed.	It is the simulation of human intelligence process by machines.
Working	It mainly focuses to learn without being programmed.	Training machines, to perform human tasks.
Operation	It is exposed to new data to test the constant functioning and understanding.	It involves in the usage of huge volume of data to perform the functions.

IV. METHODS OF MACHINE LEARNING

The main methods[2] in machine learning are Supervised learning, Unsupervised learning and Reinforcement learning.

A. Supervised learning

In supervised machine learning the machine is trained with some set of data values. These data values are represented as the labeled examples. Then, if a new data is given to the system, it must be able to categorize based on the past learning from the data. It is applied for the system which has the historical data which predicts likely for the future activities. The machine should produce correct predictive output because of the supervised constrained learning and sufficient training. Example: Spam filtering in E-mails.

B. Unsupervised learning

It is the process in which no historical data is used. Only the raw data values are given to the system for processing. It gives the output data in the form of organized manner. The unsupervised learning produces output which has a new defined pattern. The machine can produce the new structured value of output from observation of structures and relationships among the data. Examples: Products and photo recommendations.

C. Reinforcement learning

The reinforcement learning systems take the data and operate by some predictions. Then it gets the feedback either it is correct or not in various different situations. Then it starts learning from the feedback, it received from the system based on the past actions. It helps the system to improve the efficiency by constant functioning and learning. Example: Games played by machine and human.

V. BASIC MACHINE LEARNING ALGORITHMS

Algorithm is the technique used in computers to perform any task for solving a problem by following some set of procedures. The algorithms[3] used in machine learning are based on the type of machine learning which is opted for the system. It has been categorized as:

Classification – The classification algorithms are used in the supervised learning process. It can categorize the observed data values into classes. It is designed with identifying the independence in the given set of data. The various features in a class are observed and the properties which are not relevant to the selected features are segregated and grouped. The features which have the dependency in the properties can be grouped together. Example: Naïve Bayes Algorithm.

Regression – The regression algorithms use the past data. The output is quantitative, based on the data collected from previous information. From that data, the machine learns and it deals with the given new set of data. The machine can then be able to predict the values and produces the output for the current activities.

Clustering – This algorithm can be applied in unsupervised learning process. The observed data are grouped into groups called clusters and then used in the system. The data in the cluster should have some parameters to be common. It also needs some observation data for the new value given to the machine. Example: K-means algorithm.

VI. APPLICATIONS

1. Financial services

The businesses which are mainly based on financial transactions and Banks use the strategy of Machine learning in cyber fraud detection[1]. This application is important to

identify the proper data and the fraudulent data. It helps the inventors in identifying the right clients and the wrong ones. Example: Paypal.

2. Health care

The main application in healthcare[5] is in the discovery of new drugs. The drugs can be manufactured if the correct combination of various drug work well. The machine learning process helps to identify various drugs in less amount of time. The individual's treatment based health records are maintained in the system. When he/she comes for the diagnostics of other problem, based on the records and learning from it helps the medical analysts in easy assessment of the disease. The latest wearable devices for patient's health assessment are also available.

3. Marketing and sales

Machine learning application helps much in the marketing and commercial field. Primarily the sales can be increased because of this. The purchase of customers are keenly noted and based on it, the clients can be grouped. This helps the customers to select the product from the priority list of items. In some cases, the purchase and sales items are also categorized. When a new item is added, it can automatically assign it in the right category of items.

4. Transportation

The process of machine learning in transportation is a very vital one. It helps the car to analyze the route, traffic, and other obstacles while the system is functioning. It tends to maintain the speed, acceleration, movement of the vehicle, following the road rules by the constant and contiguous learning. Example: self-driving Google car[6]. It drives for many kilometers and enhances road safety.

VII. CHALLENGES

There are some problems encountered using this processes in fields such as social media, online shopping etc., The photos uploaded in the social media are gathered and the face recognition is made by the machine learning process. Next time while using, it will show some friend suggestions, to tag some friends etc.,

The machine learning process has the main functioning in the online purchasing of items. If we seek for some products, it will show some other more products which are related to it but disinterested for us. It gathers data[6] and analyzes it for the products viewed before by constant learning of the data. Sometimes when we use the websites surfing something, it will give the suggestion list for purchasing items which were already bought. This will disturb the work and distract the concentration of the people using it.

VIII. CONCLUSION

The technology advancement leads to many new useful applications in our daily life. Some of the Machine learning applications become unimaginable for humans in yielding some amazing outcomes to make our life very easy and handy. Man has taken a leap because of the improvement in Machine learning techniques. These developments are also helpful in analyzing and finding many unauthorized access of internet hacking. Unlike statistical and relevant data Machine learning takes the scope in all sorts of data which can contribute too many advanced improvements in the technology.

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