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A Brief Review on Machine Learning and Its Various Techniques

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ABSTRACT- The word "learning" in ML (Machine Learning) refers to the process through which computers analyze current data and learn new skills and knowledge from it. ML systems use algorithms to look for patterns in datasets that include unstructured and structured data, numerical and textual data, and even rich media like pictures, audio, and video. Because ML algorithms are computationally intensive, they need specialized infrastructure in order to operate at large sizes. The three fundamental kinds of ML are supervised ML, unsupervised ML, and reinforcement ML, which are discussed in this article. The supervised learning method is described, and it demonstrates how to utilize supervised ML by splitting data into training and testing, and how training all prior data aids in the discovery of the predictor. Unsupervised ML, which helps to divide categories into different clusters or groupings, is then addressed in this article utilizing techniques such as k-means and idea component analysis. Finally, this article looks into reinforcement ML, which uses the right behavior to maximize rewards.

KEYWORDS- Algorithms, Data, ML, Supervised, Train.

I. INTRODUCTION

AI (Artificial Intelligence) is defined as the study of intelligent agents capable of seeing and acting in the same manner as humans do. AI is divided into two philosophical categories: weak AI and strong artificial intelligence. Weak AI refers to computers that act intelligently, while strong AI refers to machines that are really intelligent and can think [1]. In today's applications, most AI researchers are focused on applying weak AI to automate difficult jobs. ML methods are frequently used to learn from data and create weak Artificial Intelligence. ML is the scientific study of mathematical algorithms and models that can learn from data and produce desired results on a particular job [2].

ML is intended to generate complex rules based on data. As a consequence, ML may be used to automate a broad variety of activities, especially when humans are unable to develop a set of instructions to automate the required manual processes [3]. Deep learning is a form of ML that focuses on learning data representations through many layers of processing and mathematical methods. The connections between artificial intelligence, ML, and deep learning are shown in Figure 1. ML is a branch of Artificial intelligence, whereas deep learning is a subdivision of ML [4]. ML is a method of teaching computers how to better handle data. After viewing the data, you may find yourself unable to understand the extract or pattern information. ML is applied in this instance. Because of the abundance of datasets available, ML is becoming increasingly popular [5]. ML is used to harvest important data in a number of areas, from health to the military. ML aims to extract knowledge from data. Many experiments have been conducted to train computers to learn on their own. Many programmers and mathematicians utilize a number of methods to address this issue. A handful of them are shown in Figure 2.

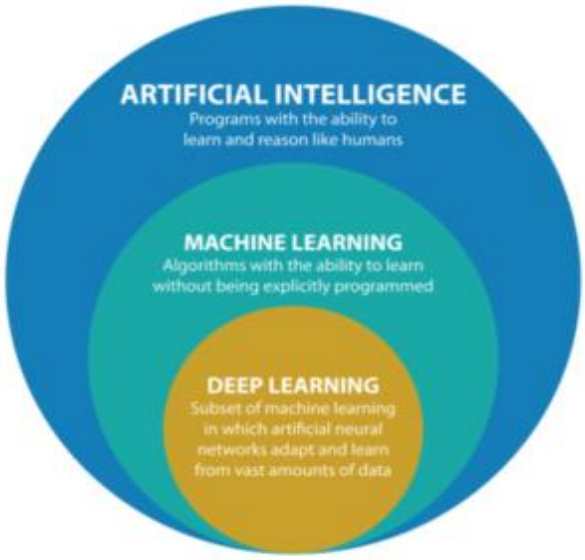

Figure 1**:** The relations between Artificial intelligence, ML, and Deep Learning

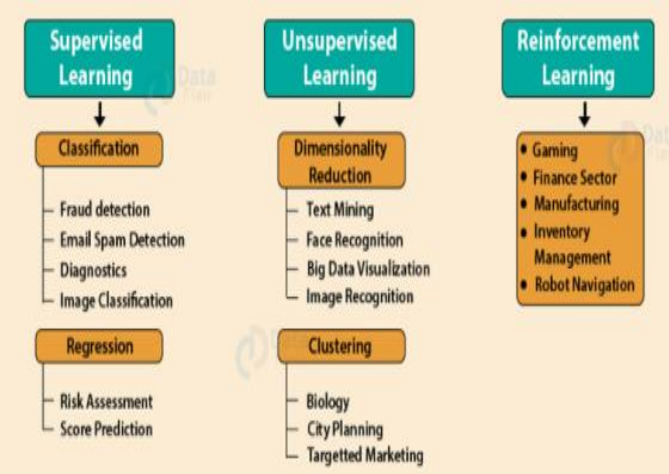

Figure 2: The Basic of ML and its Types which is Further Classified into Different Algorithms.

With the exponential growth of data, a system that can manage this enormous amount of data is required. ML methods such as Deep Learning enable the correct creation of predictions for the overwhelming majority of data. ML has transformed how we interpret information and the insights we may get from it. Figure 3 depicts a high-level summary of how ML works [6].

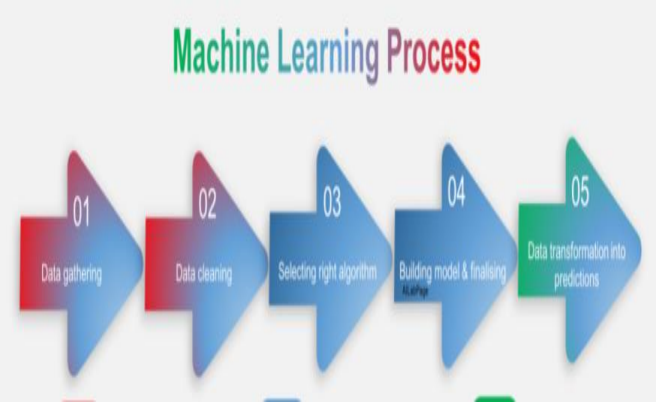

Figure 3: The Overview of the Working of ML

A. Supervised Ml

Supervised ML algorithms are those that need external help. The input dataset is segregated from the training and testing datasets [7]. In the train dataset, there are certain output variables that need to be graded or forecasted. All algorithms that do classification or prediction learn patterns from training datasets and then apply them to test datasets. The process of supervised ML algorithms is shown in Figure 4. Three of the most well-known supervised ML algorithms are covered in this article.

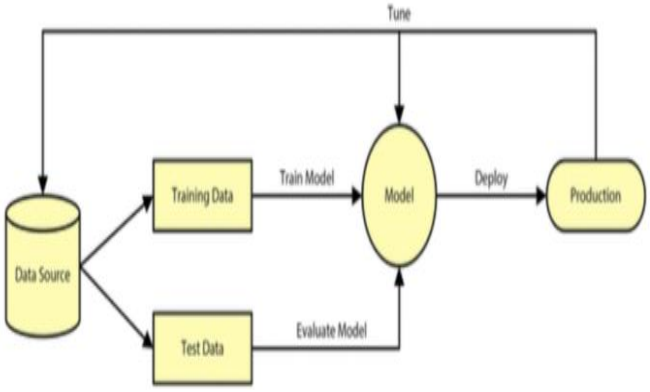

Figure 4: The Workflow of Supervised ML Algorithms.

1) Decision Tree

Trees that categorize attributes by arranging them according to their values are known as decision trees. Classification is the most common use of the decision tree. Each tree is made up of Branches and Nodes. Each node represents an attribute in a category that has to be identified, and each branch indicates a value that the node will take. Figure 5 depicts an example of a decision tree as well as decision tree pseudocodes [8].

The text categorization industry is the primary focus of Nave Bayes. It is mostly used for the purposes of clustering and classification. The conditional probability is used in the underlying architecture of Naive Bayes. It generates trees depending on the likelihood of their occurring. Bayesian Network is another name for these trees [9].

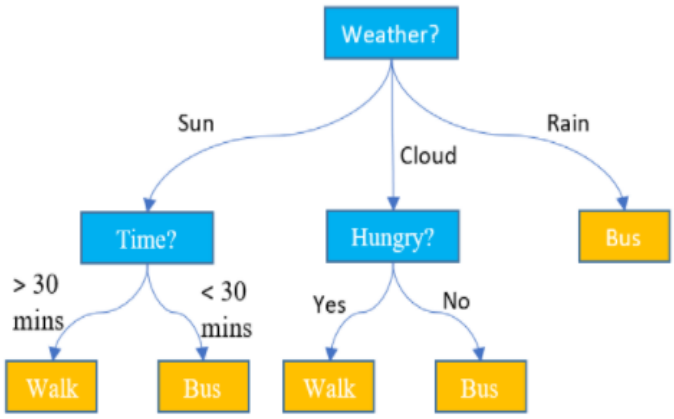

Figure 5: The Example of the Decision Tree Algorithm

B. Unsupervised Ml

The data is just used to train a few features using the unsupervised learning methods. When new data is presented, it recognizes the data's class using previously learnt characteristics. It's mostly utilized for feature reduction and clustering. Figure 6 shows an example of an unsupervised learning process in which the identical fruits are categorized into the same category [10].

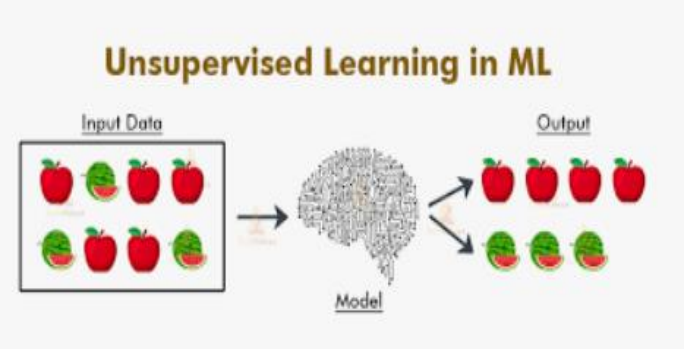

Figure 6: An Example of Unsupervised Learning

Below are the two major methods for clustering and dimensionality reduction approaches.

2) K-Means Clustering

Clustering, often known as grouping, is an unsupervised learning method that generates groups on its own. Items with comparable qualities are grouped together in a cluster. Because it generates k different groups, this method is termed k-means.

3) Principal Component Analysis

The dimension of the data is decreased in Principal Component Analysis, or PCA, to make calculations quicker and simpler. Let's look at an example of 2D data to see how PCA works. When plotted in a graph, the data will take up two axes.

C. Reinforcement Ml

Reinforcement learning is a subset of machine learning (ML). It's simply a matter of taking the necessary steps to maximise your profit in a given situation. It is used by a variety of software and computers to determine the best course of action or direction in a given situation. Reinforcement learning differs from supervised learning in that the response key is included in the training data, allowing the model to be conditioned with both correct and incorrect answers, whereas in supervised learning, there are no answers and the reinforcement agents decide how to complete the assignment. It will surely benefit from its experience in the absence of training data. Consider an agent and a reward, both of which are separated by a slew of roadblocks. The agent's duty is to discover the quickest path to the prize. The issue is further described in the next problem,

D. Literature Review

The following are some of the many researchers and studies on the subject of ML, as well as their varied techniques:
Yogesh Singh is a student. Machine-learning techniques are used to evaluate expert software development. In the contemporary age, ML is demonstrating the ability to make consistently correct predictions. From a training set of completed tasks, a ML algorithm "learns" how and where to approximate. Their review's primary aim and contribution is to make it simpler for other researchers to conduct similar expert estimate studies utilizing ML methods. They represent the most widely used ML methods for expert estimates in software development areas, such as neural networks, case-based inference, regression and classification trees, rule estimation, genetic algorithm, and genetic programming. Those who found that the results of different ML methods vary depending on the implementation regions in each study. Their findings demonstrate that all of these techniques are not just competitive with conventional estimators on a single dataset, but are also responsive to data that has been trained on them.
Jonathan Schmid is a student. In recent years, ML has become one of the most popular new technologies to enter the material science toolkit. Their statistical technique collections have already shown their capacity to substantially speed both applied and fundamental research. There's a lot of effort being done right now to enhance and apply ML to solid state devices. They offer a comprehensive overview as well as the latest current research on the subject. In the domain of materials science, they begin by addressing ML principles, descriptors, databases, and algorithms. They go on to talk about how to use ML to identify stable materials and forecast their crystal structure.

II. DISCUSSION

This paper discusses AI is defined as the study of intelligent agents capable of seeing and acting in the same manner as humans do. Artificial intelligence is separated into two philosophical categories: weak AI and strong AI. Strong AI refers to machines that are truly intelligent and can think, whereas weak AI refers to robots that act intelligently. Supervised ML, unsupervised ML, and reinforced ML are the three primary types of machine learning. The supervised learning technique is discussed, and it demonstrates how supervised machine learning is used by splitting data into training and testing, as well as how training all previous data aids in the discovery of the predictor. Then, utilizing algorithms like k-means and principal component analysis, this article covers unsupervised ML, which helps to split categories into distinct clusters or groups. Finally, this article covers reinforcement ML, which employs the appropriate action in order to maximize rewards.

III. CONCLUSION

This paper conclude that ML is method of teaching computers how to improved handle the data. After watching data, you may find yourself unable to understand the extract or pattern information. ML is applied in this instance. Because of richness of the datasets available, ML is becoming increasingly popular. After reading and analyzing the whole article, the conclusion is that there are three different kinds of algorithms that are used to discover various predictions from data, classifying the data into various categories, and maximizing the rewards by performing certain operations. These are all depending on

the kind of ML, which may be reinforcement, supervised, or unsupervised, ML. Because the healthcare sector has long utilized ML for a number of reasons, its prospective reach will encompass increasingly complex use cases.

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