

Machine Learning and Its Applications

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Abstract - Learning is a very important behavior of a human being and now we are making machines to also adopt the same. In this paper we will study about what machine learning is and what are the algorithms that come under it. In the last we will see the different applications of machine learning.

Keywords-machine learning; algorithms; classification; supervised; unsupervised, reinforcement.

I. INTRODUCTION

Learning is a key process in human behavior which comes as a result of experience and practice. Learning also makes a human being intelligent. In the same way to make a machine intelligent we have to make them learn. Machine learning is a fundamental way to make a machine smart enough to take its own decisions.

II. MACHINE LEARNING

Machine learning will make the systems to acquire new knowledge, information that can be implemented to achieve a desired result. Since 1950s scientist have taken a lot of efforts in the domain of ML. Due to tremendous efforts a lot of advancements have been done in the field of machine learning.

Computers can learn patterns using historic data using Machine learning. Machines can also classify the datasets into different categories. Machine learning algorithms can broadly be divided into three categories:

A. Supervised Learning

Supervised learning is a learning task where machines maps input to an output based upon the examples of input output pairs. In supervised learning we are given input dataset where there are examples of input output pairs. Machine learns from those examples and produces an inferred function that can be used to map the new inputs with outputs. Supervised Learning function can be written as

$$Y=f(X)$$

Here X is input and Y is Output. It is called supervised learning because here training data acts as a teacher which is supervising the learning process.

Supervised Learning Problems can be further classified into:

- **Classification:** It is used when output is divided into categories like: red, black.
- **Regression:** It is used when output is a real value such as weight, marks.

B. Unsupervised Learning

In unsupervised learning there is no teacher. In this training is done on the dataset where there is no classification and

labeling. Here machines group the unsorted information's according to the similarities, differences, patterns without prior knowledge.

Example if we are given pictures of dogs and cats. No training is provided to differentiate between a dog and a cat. So our machine will group them according to the similarities or patterns. In the final result all the cats will be grouped together and dogs in another group.

Unsupervised can be classified into two categories:

- **Clustering:** In these clusters of data is made according to inherent behavior. Like making groups according to customers shopping behavior.
- **Association:** In this we want to discover the association rules that discover the large portion of data. Like customers that buy bread also buys butter.

C. Reinforcement learning

It is a learning in which decisions are made sequentially. In the output depends upon current state input and next input depends upon the previous output. In this software agents are trained in such a way that they can maximize the rewards like in chess game. Learning decision is dependent in reinforcement learning.

In reinforcement learning machine is exposed to an environment where using trial and error it continuously trains itself.

III. APPLICATIONS OF MACHINE LEARNING

Applications of machine learning are in high demand. Some of the examples of application are:

- Image recognition
- Self Driving cars
- Virtual assistant
- Google translator
- Fraud detection
- Video Surveillance

IV. CONCLUSION AND FUTURE WORK

In this paper we have seen the basic concept of what machine learning. In this paper we have also included types of machine learning and how they are different. This paper also includes the applications where we can use machine

learning. There is a lot that can be done in machine learning.
Google is spending a lot in developing

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