

Course name: Machine Learning Basics for Developers

Overview:

Making complex computer systems to identify problems and learn about the solution all by itself has been one of the greatest achievements of mankind. “Machine Learning” a term coined in the early 1950s is all about enabling a system to make predictions or decisions based on a mathematical model. In this course, you will learn about Machine Learning (ML) and the various aspects associated with it. This course will help you comprehend the fundamentals of ML along with some real-time examples. We will be also discussing the importance of Machine Learning in modern times of writing efficient computer programs. This course will later focus on the different types of Machine Learning and you can acquaint yourself with the different applications in the real world associated with ML.

Learning objectives:

By the end of this course, you will be able to:

- Understand what Machine Learning is
- The types of Machine Learning
- Why ML is important
- Real-world use-cases of ML

Introduction:

Before jumping into understanding what Machine Learning is, let us understand what Data Science is. Data Science is the bigger umbrella in terms of deriving meaning and valuable information from unstructured data using various scientific methods, processes, and algorithms. Data Science deals with large datasets and involves processes such as preparing the data, cleansing, or analyzing it. The role of a data scientist is to collect data from different sources and inculcate various algorithms to extract some vital information.

One such practice of using the algorithms for extracting data from the datasets is Machine Learning (ML). It helps in learning about the data and helps to predict future trends for a similar scenario. It is also closely related to a mathematical term called 'predictive analysis'. Machine Learning fits into the broader term of Data Science and offers potential solutions across all the domains.

Know more about Machine Learning:

Machine Learning is a concept that empowers a computer system so that a valuable outcome can be derived for a similar problem statement. Instead of writing the solution code each time, we only provide data and problem statements to the computer and it can give us a solution by establishing recurrence. Some of the processes involve looking for patterns in the data, making better decisions focused on the future and allowing the systems to learn without any intervention of humans.

Example

One best example of ML could be the algorithms used by the most popular social media application Facebook for analyzing behavioral information. The app uses the ML algorithm for predicting the interests of the users and based on the behavioral and predictive analysis, it recommends articles/blogs or even pop notifications on the news feed that the user is reading. A similar approach is also seen by other e-commerce industries such as Flipkart, Amazon, Myntra, etc, and also some entertainment giants such as Netflix on the basis of past behavioral patterns.

How can ML be brought into action

The process of bringing Machine Learning algorithms into practice includes some pertinent steps. It begins with understanding the domain and setting up some dedicated goals. It then further moves towards the process of selecting the data, integrating it, cleaning, and then

preprocessing it. Then, the part comes with the implementation of the learning models and the interpretation of the results. The later stage is combining and organizing the gathered knowledge from the above process. Machine learning involves computers discovering how they can perform tasks without being explicitly programmed to do so we can use this refined data to tell the computer as to how can it solve the problem by coming up with its own set of algorithms.

Machine Learning v/s Traditional Approach:

The traditional approach is more like a manual process wherein the coder used to create the program, implement the logic in the code, and formulate the codes manually. In contrast, Machine Learning helps to automatically formulate the code rules from the collected data or information.

Machine Learning is an automated process unlike the traditional approach and helps in speeding the user insight and reducing the decision bias. This model can be used to predict the future of the business provided one has the past input/output data.

Types of Machine Learning:

There are different ways to put the idea of the iterative improvement that the ML offers. However, four main categories are largely used:

1. Supervised Learning

This is one of the most popular and commonly used models in the field of ML. One of the reasons is that this model is quite simple and easy to comprehend and implement. This model helps to provide specific targets for any given set of inputs once enough training is provided. This learning algorithm helps in finding the errors by comparing the outputs with the correct and intended output.

Some of the areas where you can find supervised learning is spam classification, advertisement popularity, face recognition, etc.

2. Unsupervised Learning

Unsupervised learning on the other side of supervised learning is based on the fundamentals of unlabeled data training of the computer. This type of ML compels the algorithms to take a set of data that contains only inputs, and identify structure in the data, by grouping or clustering of data points. Here, the system explores the data and draws inferences from the datasets in order to define the hidden structures of the unlabeled data.

Examples of Unsupervised learning include buying habits that helps business to market the target audience, grouping the user logs and issues, etc. Google Ads also use this concept for relevant ad marketing campaigns or their customers.

3. Semi-supervised Learning

This type of learning is somewhere halfway between supervised learning and unsupervised learning. It helps in classifying the unlabeled data from a set of labeled data. Certain features such as input-output proximity symmetry, sizable unlabeled dataset, low dimensional nature of the problem are some of the characteristics that must be present to effectively solve the problem using the semi-supervised learning model.

Some of the examples of semi-supervised learning include classification of web content, protein sequence classification in protein homology, speech analysis, etc.

4. Reinforcement Learning

Reinforcement learning is the preparation of ML models to make a series of decisions. This type of learning rewards from a sequence of actions and also discovers the errors. The usage of this learning is to improve performance by identifying the ideal behavioral patterns within a certain

context. In the absence of a training dataset, a system is bound to learn from its experience in reinforcement learning.

Some of the uses of reinforcement learning in the real world include usage in various robotic applications, video games, management of resources, etc.

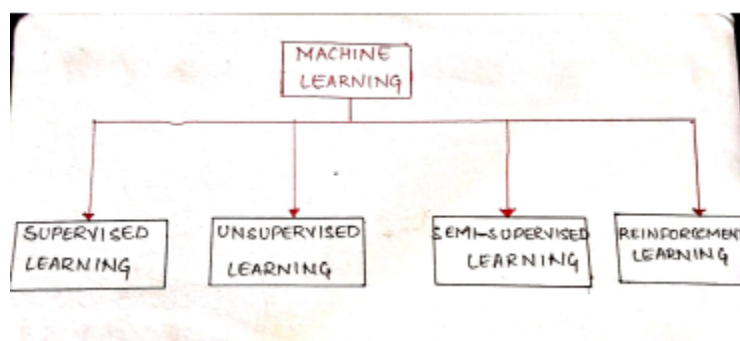


Figure 1.1 Types of Machine Learning

Assessment:

1. Which one is not the algorithm technique in Machine Learning?
 - a. Unsupervised Learning
 - b. Reinforcement Learning
 - c. Passive Learning
 - d. Supervised Learning
2. Which one is the feature of ideal machine learning method?
 - a. Quick and accurate
 - b. Scalable
 - c. Both a and b
 - d. None of the above
3. Supervised learning requires
 - a. Output attribute
 - b. Input attribute

- c. Both categorical input and output attribute
- d. categorical input attributes

References:-

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- <https://elitedatascience.com/learn-machine-learning#why>
- <https://www.guru99.com/machine-learning-tutorial.html#2>