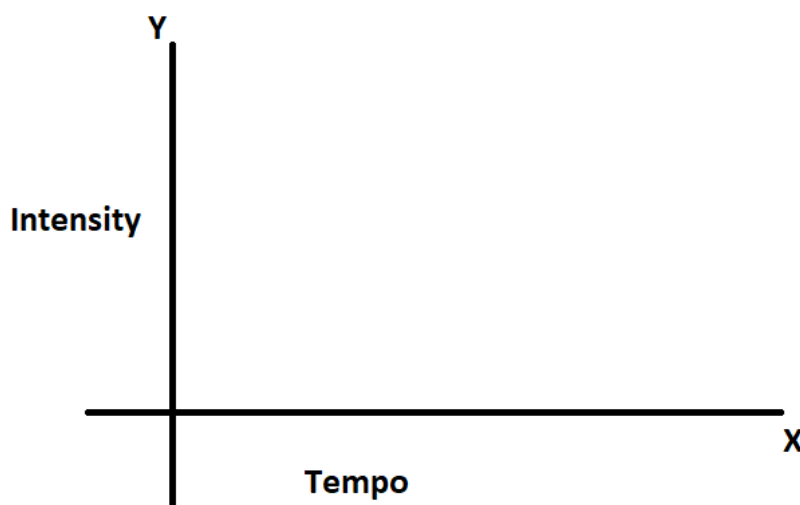


We all know humans learn from their past experience. The mistakes which we have done in past we won't repeat them again. Machines follow the instructions which humans give them, but what if machines also learn from their past experience if such training is given to them by humans. So basically this is machine learning. It is not just about learning but also about understanding and reasoning. So here you can say machine learning is the general term for when computers learn from data. Machine learning is a subset of artificial intelligence that uses computer algorithms to analyze data and make intelligent decisions based on what it has learned without being explicitly programmed.

Let us see an example to get more clarity.

Consider a person who loves listening to music. Songs are mostly defined based on their intensity and tempo. Let us plot a graph of intensity vs tempo.

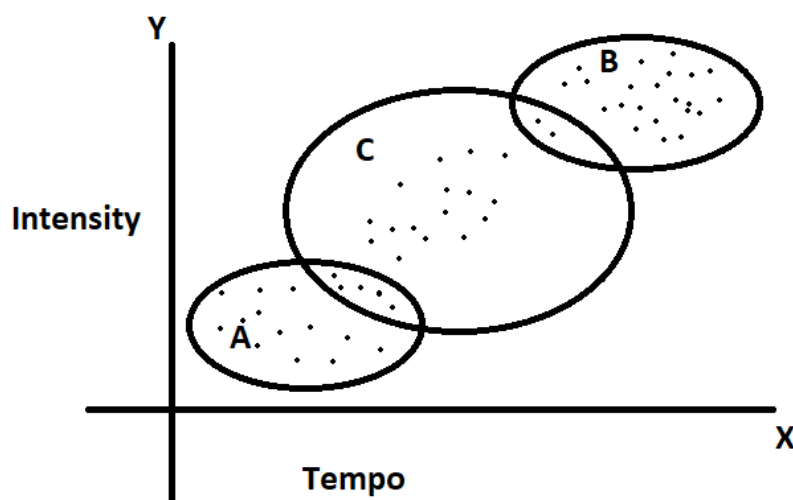


So as you can see here on y axis we have intensity and on x axis we have tempo.

The person loves listening to music which has less intensity and less tempo. So all the dots which are in a light and relaxing area are the dots with less intensity and less tempo. Consider it

as A. The songs having very high intensity and tempo are disliked by the person. Consider it as B. The area C consists of the dots which have medium intensity and tempo. Whichever songs fall in the A and B category it is easy to predict that the person will like that song or not. But the songs which fall into the C category, it is difficult to predict. This is where machine learning comes into picture.

If we see the majority dots fall in A category. So we can predict that the person will like this song. This is also a basic algorithm of machine learning known as K-Nearest Neighbour algorithm.



The prediction will be precise if:

More data > Better Model > Higher accuracy

There are a lot of different ways or algorithms that machines can learn. These algorithms can be grouped into supervised, unsupervised and reinforcement algorithms.

Supervised learning:

The data that you feed to a machine learning algorithm can be input-output pairs or just inputs. Supervised learning algorithms require input-output pairs, that is they require output.

Consider an example: suppose your friend has given you 1 million coins which include 1 rupee, 1 euro and 1 dirham coin. Suppose 1 rupee coin weighs 3 gram, 1 euro coin weighs 4 gram and 1 dirham coin weighs 5 gram. So here

weight=feature

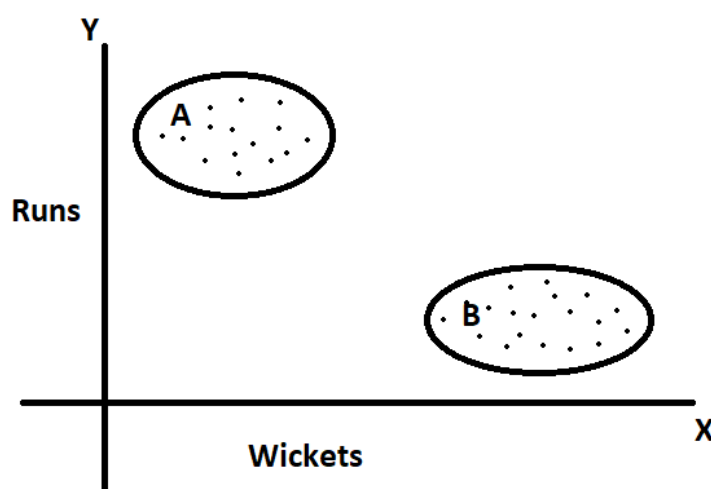
currency=label

Here machine learns which feature is associated with which label. So if you give any random coin to a machine which weighs 3 gram, the output will be 1 rupee. So supervised learning uses labeled data and the machine already knows the features and labels associated with it. The more samples you provide a supervised learning algorithm, the more precise it becomes in classifying the data.

Unsupervised learning:

Unsupervised learning requires only the input data and not the output. Consider an example:

Suppose you have a cricket chart with the names of the players with their runs and wickets. So when you feed the dataset to the machine, the machine will plot a graph.



So here you can see there are two clusters, cluster A and cluster B. Cluster A contains players with more runs and less

wickets and cluster B contains players with more wickets and less runs. So these two clusters can be interpreted as batsman and bowlers. Learning with unlabeled data is unsupervised learning since there was no prior label here. You provide the input but not labels and let the machine infer qualities.

Reinforcement learning

Reinforcement learning works on the principle of feedback. Suppose you give a dog's image to the machine and the machine returns the output as cat. So here you give negative feedback to the machine. Now the machine learns from feedback and next time gives proper output.

Difference between machine learning and deep learning:

The main difference between deep learning and machine learning is due to the way data is presented in the system. Machine learning algorithms almost always require structured data, while deep learning networks rely on layers of ANN (artificial neural networks).

Machine learning algorithms are designed to “learn” to act by understanding labeled data and then use it to produce new results with more datasets. However, when the results are incorrect there is a need to teach them.

Deep learning networks do not require human intervention, as multilevel layers in neural networks place data in a hierarchy of different concepts, which ultimately learn from their own mistakes. However, even they can be wrong if the data quality is not good enough.

Difference between machine learning and artificial intelligence:

Artificial intelligence is a technology which enables a machine to simulate human behavior. Machine learning is a subset of AI which allows a machine to automatically learn from past data without programming explicitly.

The goal of AI is to make a smart computer system like humans to solve complex problems. The goal of ML is to allow machines to learn from data so that they can give accurate output.

AI completely deals with Structured, semi-structured, and unstructured data. Machine learning deals with Structured and semi-structured data.

Machine learning applications:

There are many applications of machine learning. Let us see some of them:

Virtual personal assistants

Some of the popular examples of virtual personal assistants are google assistant, siri, alexa, etc. As the name suggests, they assist in finding information, when asked over voice. All you need to do is activate them and ask any questions which you like. Machine learning is an important part of these personal assistants as they collect and refine the information on the basis of your previous involvement with them.

Videos surveillance

The video surveillance systems nowadays are powered by AI that makes it possible to detect crime before they happen. They track unusual behaviour of people like standing motionless for a long time, stumbling, or napping on benches etc. And when

such activities are reported and counted to be true, they help to improve the surveillance services.

Online customer support

A number of websites nowadays offer the option to chat with customer support representatives while they are navigating within the site. However, not every website has a live executive to answer your queries. In most of the cases, you talk to a chatbot. These bots tend to extract information from the website and present it to the customers. Meanwhile, the chatbots advance with time. They tend to understand the user queries better and serve them with better answers, which is possible due to its machine learning algorithms.

Online Fraud Detection

Machine learning is proving its potential to make cyberspace a secure place and tracking monetary frauds online is one of its examples. For example: Paypal is using ML for protection against money laundering. The company uses a set of tools that helps them to compare millions of transactions taking place and distinguish between legitimate or illegitimate transactions taking place between the buyers and sellers.

These are only some of the applications, there are many more which are used.

Framework of machine learning:

A Machine Learning Framework is an interface, library or tool which allows developers to build machine learning models easily, without getting into the depth of the underlying algorithms.

TensorFlow

Google's Tensorflow is one of the most popular frameworks today. It is an open-source software library for numerical computation using data flow graphs.

Theano

Theano is wonderfully folded over Keras, an abnormal state neural systems library, that runs nearly in parallel with the Theano library. Keras' fundamental favorable position is that it is a moderate Python library for profound discovery that can keep running over Theano or Tensorflow.

Caffe

Caffe is another popular learning structure made with articulation, speed, and measured quality as the utmost priority. It is created by the Berkeley Vision and Learning Center (BVLC) and by network donors.

H2O

H2O is an open-source machine learning platform. It is an artificial intelligence tool which is business-oriented and helps in making a decision based on data and enables the user to draw insights. It is mostly used for predictive modeling, risk and fraud analysis, insurance analytics, advertising technology, healthcare, and customer intelligence.

These are some of them, there are many others as well.