

# MACHINE LEARNING – A SHORT OVERVIEW

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The term machine learning was coined in 1959 by Arthur Samuel, an IBM employee and pioneer in the field of computer gaming and artificial intelligence. Also, the synonym self-teaching computers were used in this time period.

## What is Machine Learning?

Machine learning (ML) is a branch of artificial intelligence (AI) that enables computers to “self-learn” from training data and improve over time, without being explicitly programmed. Machine learning algorithms are able to detect patterns in data and learn from them, in order to make their own predictions. In short, machine learning algorithms and models learn through experience.

While artificial intelligence and machine learning are often used interchangeably, they are two different concepts. AI is the broader concept – machines making decisions, learning new skills, and solving problems in a similar way to humans – whereas machine learning is a subset of AI that enables intelligent systems to autonomously learn new things from data.

Machine learning can be put to work on massive amounts of data and can perform much more accurately than humans. It can help you save time and money on tasks and analyses, like solving customer pain points to improve customer satisfaction, support ticket automation, and data mining from internal sources and all over the internet.

## Types of Machine Learning

To understand how machine learning works, you’ll need to explore different machine learning methods and algorithms.

There are around 5 most commonly used types of machine learning.

### 1. Supervised Learning

Supervised learning algorithms and supervised learning models make predictions based on labelled training data. Each training sample includes an input and a desired output. A supervised learning algorithm analyses this sample data and makes an inference – basically, an educated guess when determining the labels for unseen data.

For example, if you want to automatically detect spam, you would need to feed a machine learning algorithm example of emails that you want classified as spam and others that are important, and should not be considered spam.

#### 1.1 Classification in supervised machine learning

There are a number of classification algorithms used in supervised learning, with Support Vector Machines (SVM) and Naive Bayes among the most common.

In classification tasks, the output value is a category with a finite number of options.

For Example: To predict positive, neutral or negative feedback of a service.

## 1.2 Regression in supervised machine learning

In regression tasks, the expected result is a continuous number. This model is used to predict quantities, such as the probability an event will happen, meaning the output may have any number value within a certain range.

## 2 Unsupervised Learning

Unsupervised learning algorithms uncover insights and relationships in unlabelled data. In this case, models are fed input data but the desired outcomes are unknown, so they have to make inferences based on circumstantial evidence, without any guidance or training. The models are not trained with the “right answer,” so they must find patterns on their own.

One of the most common types of unsupervised learning is clustering, which consists of grouping similar data. This method is mostly used for exploratory analysis and can help you detect hidden patterns or trends.

## 3 Semi-Supervised Learning

In semi-supervised learning, training data is split into two. A small amount of labelled data and a larger set of unlabelled data.

In this case, the model uses labelled data as an input to make inferences about the unlabelled data, providing more accurate results than regular supervised-learning models.

## 4 Reinforcement Learning

Reinforcement learning (RL) is concerned with how a software agent (or computer program) ought to act in a situation to maximize the reward. In short, reinforced machine learning models attempt to determine the best possible path they should take in a given situation. They do this through trial and error. Since there is no training data, machines learn from their own mistakes and choose the actions that lead to the best solution or maximum reward.

This machine learning method is mostly used in robotics and gaming. Video games demonstrate a clear relationship between actions and results, and can measure success by keeping score. Therefore, they're a great way to improve reinforcement learning algorithms.

## 5 Deep Learning

Deep learning models can be supervised, semi-supervised, or unsupervised (or a combination of any or all of the three). They're advanced machine learning algorithms used by tech giants, like Google, Microsoft, and Amazon to run entire systems and power things, like self-driving cars and smart assistants.

Deep learning is based on Artificial Neural Networks (ANN), a type of computer system that emulates the way the human brain works. Deep learning algorithms or neural networks are built with multiple layers of interconnected neurons, allowing multiple systems to work together. Deep learning is common in image recognition, speech recognition, and Natural Language Processing (NLP). Deep learning models usually perform better than other machine learning algorithms for complex problems and massive sets of data. However, they generally require millions upon millions of pieces of training data, so it takes quite a lot of time to train them simultaneously, and step-by-step.

## Applications and use cases of Machine Learning

Machine learning applications and use cases are nearly endless.

Machine learning in finance, healthcare, hospitality, government, and beyond, is already in regular use. Businesses are beginning to see the benefits of using machine learning tools to improve their processes, gain valuable insights from unstructured data, and automate tasks that would otherwise require hours of tedious, manual work (which usually produces much less accurate results).

Here are some common machine learning use cases and applications that might spark some ideas:

- Social Media Monitoring- Mainly used for Bot filtering etc. and Sensitive information censoring
- Customer Service & Customer Satisfaction – To filter feedback and have a concise idea to tackle negative feedback and improve the service.
- Image Recognition – Mainly used in Google Lens for the masses and in the commercial sector for package identification in warehouses etc.
- Virtual Assistants – Commonly used everywhere around the world and improving day by day.
- Product Recommendations – Ads in Instagram and Websites use Machine Learning and predict what we have searched and present us recommendations
- Stock Market Trading – There are prediction algorithms to warn or alert a steep rise or decline according to the market factors which are used by many banking institutions.
- Medical Diagnosis – Many hospitals are adopting machine learning methods to diagnose to provide a better service and improve the patient's health.

The field of Machine Learning is a vast subject which is improving and expanding every day and is having a positive impact on the world.