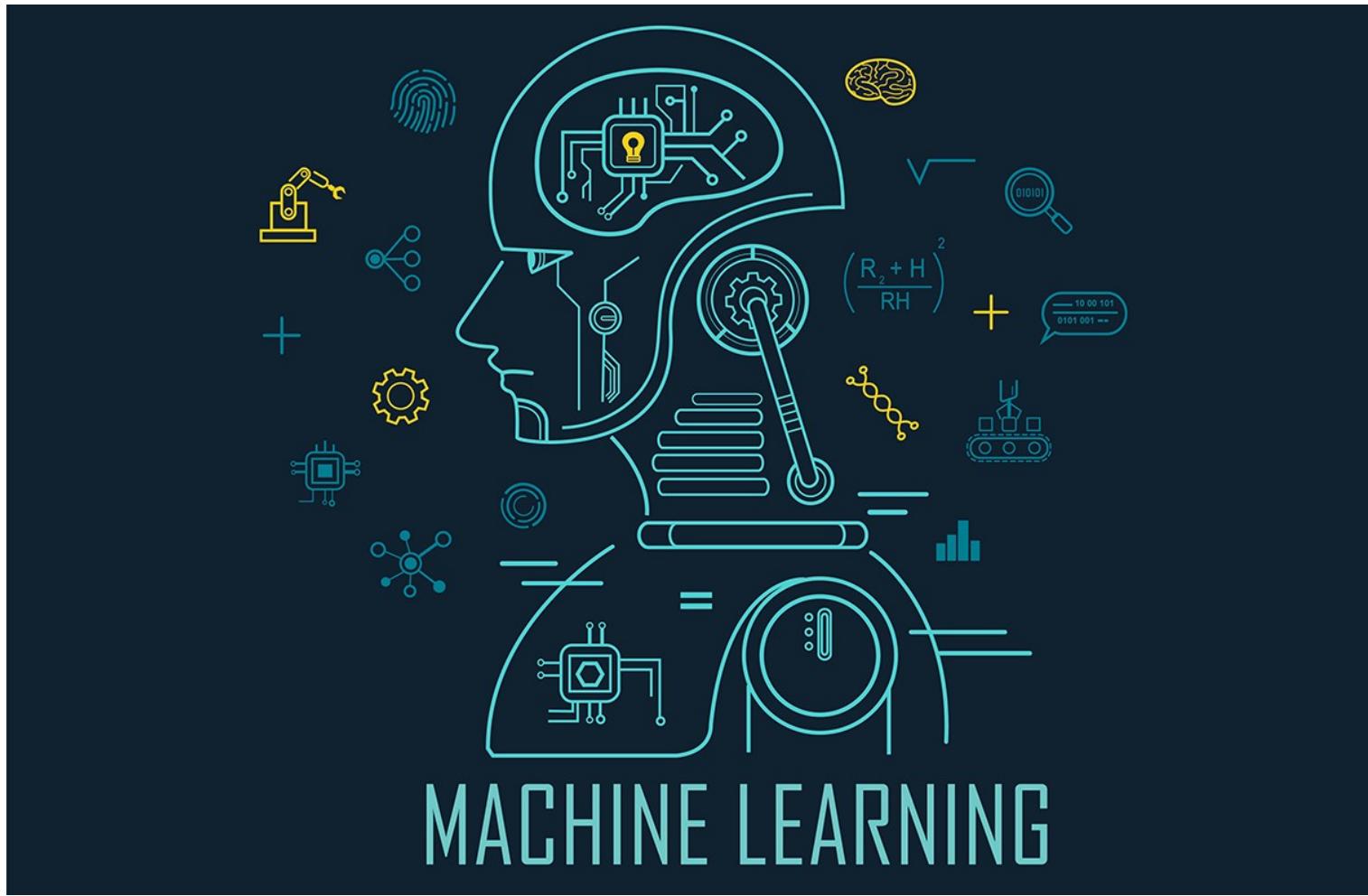


# An Introduction to Machine Learning



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## Introduction to Machine Learning

Machine Learning is the most widely used branch of computer science nowadays. It is used by many industries for automating tasks and doing complex data analysis. We already are using devices that utilize them. For Example, an intelligent assistant like Google Home, wearable fitness trackers like Fitbit. There are a bunch of examples around us with ML in use.

- Prediction — Machine learning can also be used in the prediction systems. Considering the loan example, to compute the probability of a fault, the system will need to classify the available data in groups.
- Image recognition — Machine learning can be used for face detection in an image as well. There is a separate category for each person in a database of several people.
- Speech Recognition — It is the translation of spoken words into the text. It is used in voice searches and more. Voice user interfaces include voice dialing, call routing, and appliance control. It can also be used as simple data entry and the preparation of structured documents.
- Medical diagnoses — ML is trained to recognize cancerous tissues.

## Trending AI Articles:

1. Making a Simple Neural Network

2. From Perceptron to Deep Neural Nets

### 3. Neural networks for solving differential equations

### 4. Turn your Raspberry Pi into homemade Google Home

## **History Of Machine Learning**

It was back in 1945 when the first electronic general-purpose computer was developed. It was Turing-Complete, digital and able to solve a large class of numerical problems through reprogramming. The name of the computer was ENIAC (Electronic Numerical Integrator and Computer).

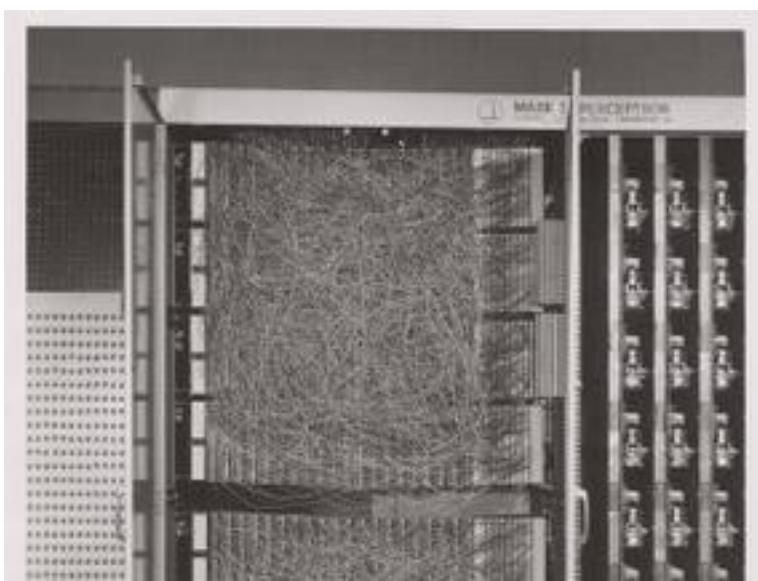


ENIAC — Electronic Numerical Integrator and Computer | Image:  
[www.computerhistory.org](http://www.computerhistory.org)

Though ENIAC was a machine meant for doing intensive numerical calculations, the idea behind its development was to build a machine to simulate human thinking.

But it not took many years after the development of ENIAC and in 1950's Arthur Samuel, an American pioneer in the field of computer gaming and artificial intelligence coined the term "Machine Learning" while at IBM. It was also at that time a computer claimed to help checker players improve there experience came to existence.

At the same time, a very simple classifier named Perceptron was invented by Frank Rosenblatt. The perceptron was intended to be a machine, rather than a program. When it was combined with large numbers it became a powerful monster. This monster at that time was a real breakthrough. Then we saw a stagnation of machine learning and neural networks due to its difficulty in solving some problems

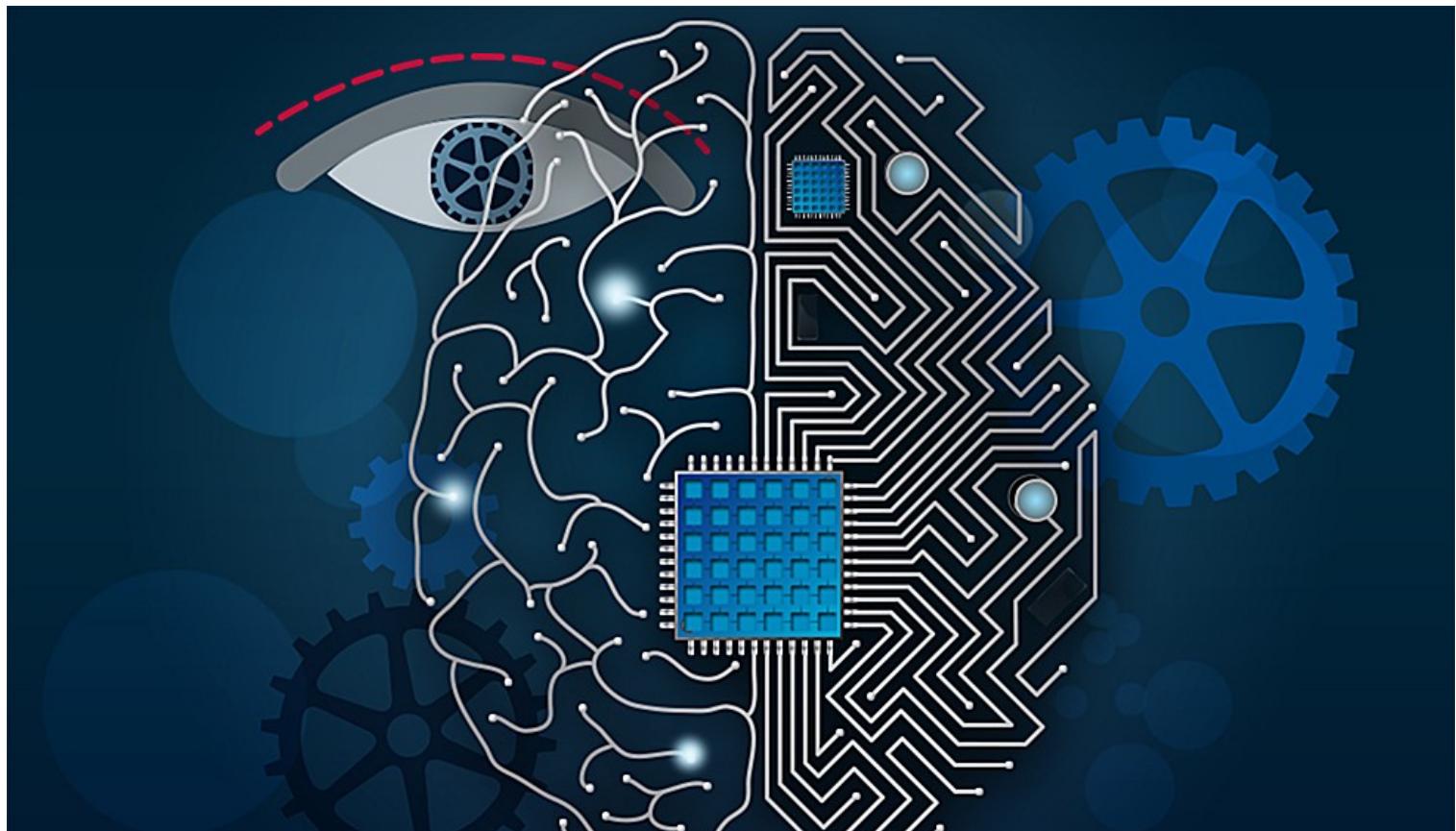




Mark I Perceptron Machine

In the 1990s due to the intersection of computer science and statistics, machine learning again became popular and new probabilistic approach in AI developed. Since then, machine learning is a constantly evolving branch. The reason for this is also the development of better algorithms and increase in computational power in the last few years.

## Humans Vs Machine



Ever thought how is a machine different from humans? Why can't a machine learn by itself? Let us answer these questions in this section.

Our history and our literature show us that for most of human history machines were seen as tools to help people do more than they were capable of on their own. From simple stone tools to the inventions of the Iron Age and Bronze Age, technology augmented human capability for survival, Competitive advantage and convenience.

Machines followed orders of humans and performed tasks while humans are capable of performing tasks by themselves. Humans can do this because they learn from past experience and make a decision according to the experiences while the machine doesn't learn from past experience. Thus, machines aren't capable of making decisions by themselves.

Thus, a machine cannot learn by itself and requires to learn decision making. In ML we incorporate decision-making capabilities in machines so that they can mimic human behavior.

## How to make a Machine Learn?

The most important thing that requires a machine to mimic human is having to learn to make decisions by itself from past experiences.

*According to Tom Mitchell,a machine is said to learn from experience E with respect to some task T and some performance measure P,if its performance on T,as measured by P,improves with experience E.*

In general, the following are the steps to make machines learn -

1. Gathering raw data or experience

2. Converting data into information

3. Gathering knowledge from information

4. Becoming intelligent to make decision

To gather experience or raw data, we require a source and a technique for data extraction. The technique used here is Big Data Hadoop. The way of analyzing raw data and extracting information from it is called **Big Data Hadoop**.

For converting raw data into information we use Data Mining. The process of discovering patterns in large data sets involving methods at the intersection of statistics and database systems is called **Data Mining**.

Understanding all the parameters of information and gathering knowledge to become intelligent is done using **Machine Learning**. Machine Learning algorithms help a machine in making decisions by itself.

## What is Machine Learning?





*According to Arthur Samuel, Machine Learning algorithms enable the computers to learn from data, and even improve themselves, without being explicitly programmed.*

Machine Learning (ML) is a branch of computer science where we develop algorithms that make a machine learn to do something without actually making computations about it. The basic premise of machine learning is to build algorithms that can receive input data and use statistical analysis to predict an output while updating outputs as new data becomes available.

Machine Learning is classified into 3 types of algorithms -

1. **Supervised Learning** — [Link coming soon in a future blog]
2. **Unsupervised Learning** — [Link coming soon in a future blog]
3. **Reinforcement Learning** — [Link coming soon in a future blog]

## **Difference between Artificial Intelligence, Machine Learning, and Deep Learning**

# ARTIFICIAL INTELLIGENCE

A program that can sense, reason, act, and adapt

## MACHINE LEARNING

Algorithms whose performance improve as they are exposed to more data over time

## DEEP LEARNING

Subset of machine learning in which multilayered neural networks learn from vast amounts of data

Nowadays many misconceptions are there related to the words **machine learning**, **deep learning** and **artificial intelligence(AI)**, most of the people think all these things are the same whenever they hear the word AI, they directly relate that word to machine learning or vice versa, well yes, these things are related to each other but not the same. Let's see how.

AI means to replicate a human brain, the way a human brain thinks, works and functions. The truth is we are not able to establish a proper AI till now but we are very close to establish it, one of the examples of AI is

*Sophia*, the most advanced AI model present today. The main goal here is to increase the success rate of an algorithm instead of increasing accuracy. It works like a computer program that does smart work.

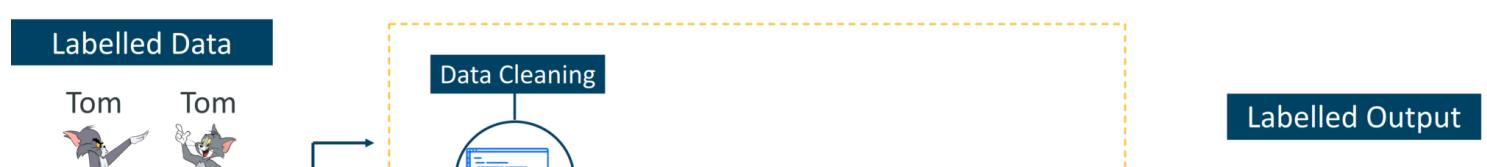
Machine learning is one subfield of AI. The core principle here is that machines take data and “learn” for themselves. It’s currently the most promising tool in the AI kit for businesses. The main goal here is to increase the accuracy of an algorithm instead of its success rate.

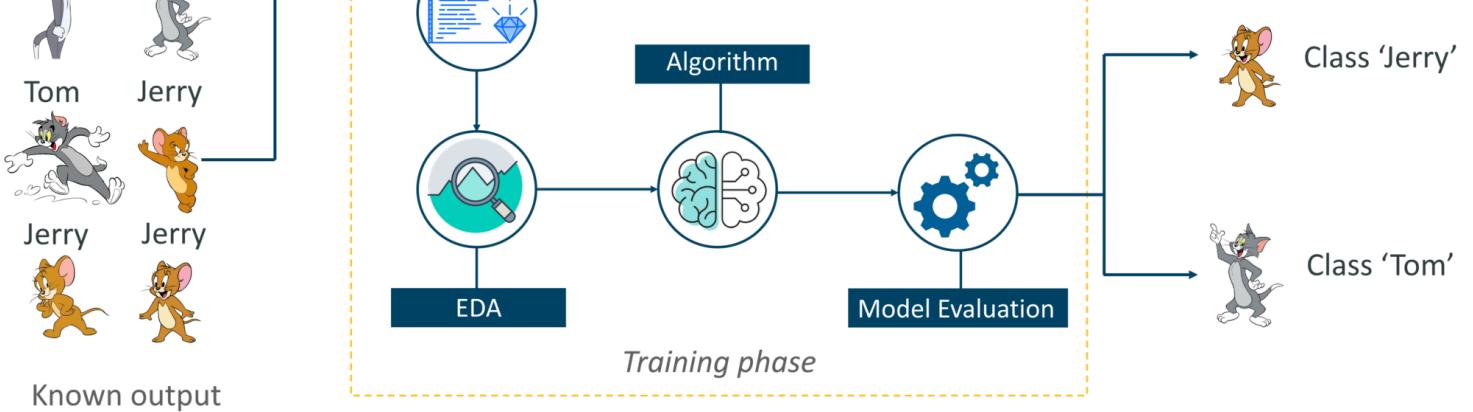
There are some steps involved in machine learning which are a prediction, classification, recommendations, clustering and decision making. When all these five work together we call it artificial intelligence.

Deep Learning is a subset of ML. The main difference between deep and machine learning is, machine learning models become better progressively but the model still needs some guidance. If a machine learning model returns an inaccurate prediction then the programmer needs to fix that problem explicitly but in the case of deep learning, the model does it by himself. Automatic car driving system is a good example of deep learning.

## Overview of Supervised Learning

In supervised learning, the algorithm is provided with a finite set of data which contains the right answers for each of the input values. The machine has the task to predict the right answers by analyzing the dataset correctly.





### Example of Supervised Learning.

As shown in the above example, we have initially taken some data and marked them as ‘Tom’ or ‘Jerry’. This labeled data is used by the training supervised model, this data is used to train the model.

Once it is trained we can test our model by testing it with some test new mails and checking if the model can predict the right output.

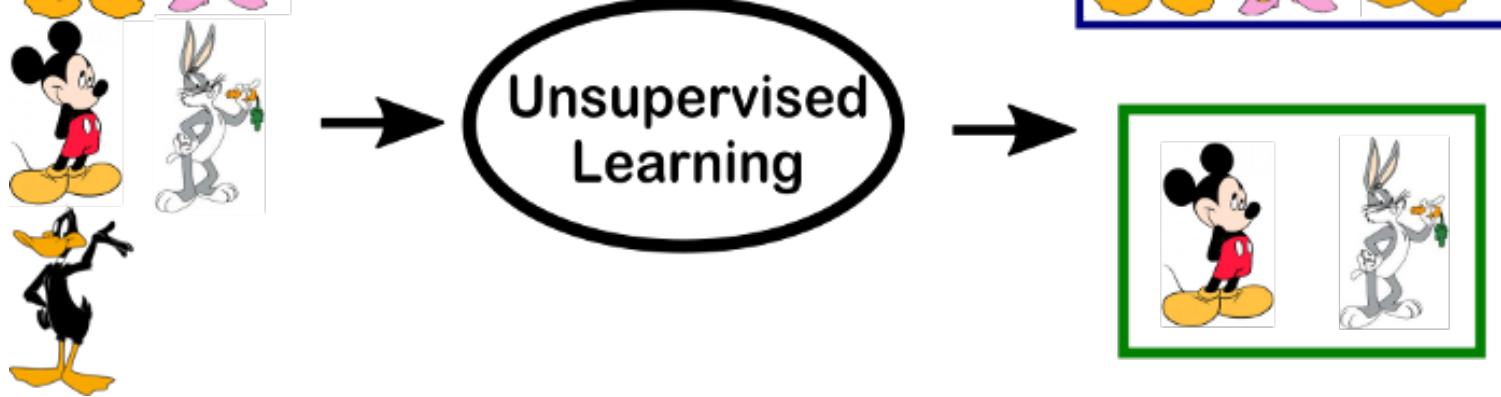
### Types of Supervised Learning

- **Regression:** It is a type of problem where the output variable is a real value, such as “dollars” or “weight”.
- **Classification:** It is a type of problem where the output variable is a category, such as “red” or “blue” or “disease” and “no disease”.

## Overview of Unsupervised Learning

In unsupervised learning, the algorithm is provided with an unlabelled dataset and it predicts a pattern in the data.





Example of Unsupervised Learning

In the above example, we have given some characters to our model which are ‘Ducks’ and ‘Not Ducks’. In our training data, we don’t provide any label to the corresponding data. The unsupervised model can separate both the characters by looking at the type of data and models the underlying structure or distribution in the data to learn more about it.

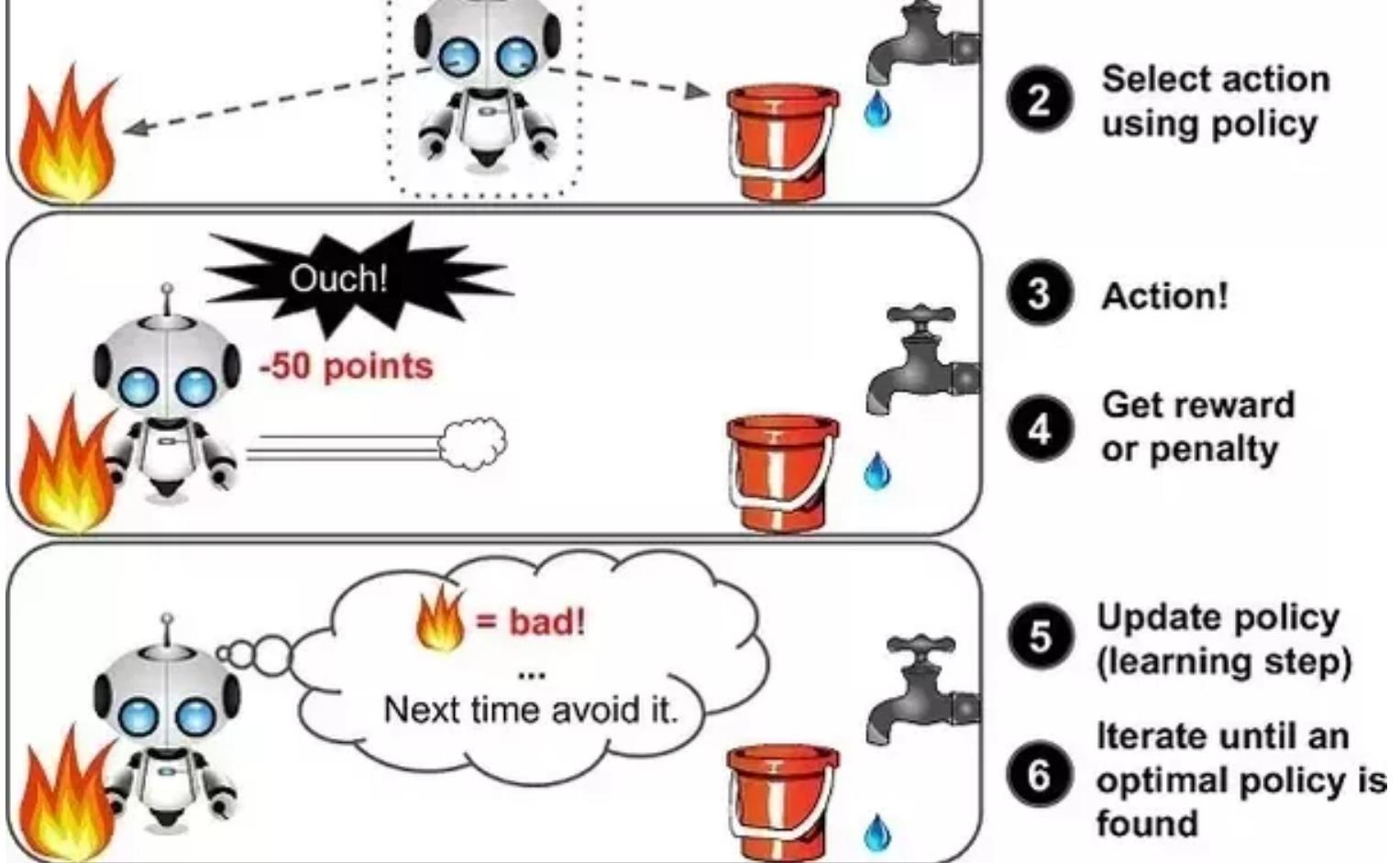
## Types of Unsupervised Learning

- **Clustering:** A clustering problem is where we group similar data according to a pattern in data, such as grouping customers by purchasing behavior.
- **Association:** An association rule learning problem is where we want to discover rules that describe large portions of your data, such as people that buy X also tend to buy Y.

## Overview of Reinforcement Learning

In reinforcement learning, the algorithm learns by interacting with the environment. The algorithm adjusts itself based on feedback.





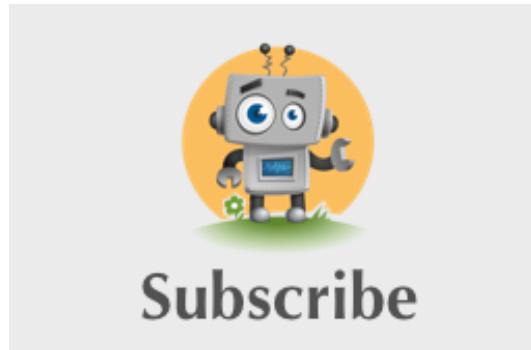
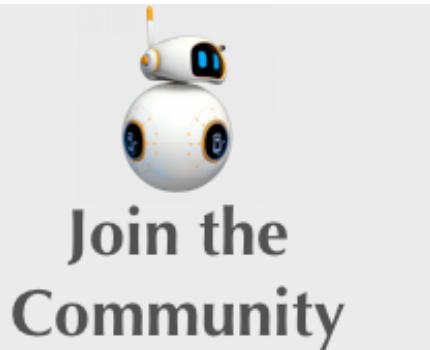
Example of Reinforcement Learning

In the above example, we can see that the agent is given 2 options i.e. a path with water or a path with fire. A reinforcement algorithm works on reward a system i.e. if the agent uses the fire path then the rewards are subtracted and the agent tries to learn that it should avoid the fire path. If it had chosen the water path or the safe path then some points would have been added to the reward points, the agent then would try to learn what path is safe and what path isn't.

## Summary

In this blog, I have presented the basic concepts of machine learning. I hope this blog is helpful for beginners and will motivate them to get interested in this topic.

# Don't forget to give us your !



Machine Learning

Artificial Intelligence

AI

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