

# Overview of Machine Learning and Artificial Intelligence

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**Abstract:** - Machine learning is a method of data analysis that automates analytical model building. It is a branch of artificial intelligence based on the idea that systems can learn from data, identify patterns and make decisions with minimal human intervention. All of the Machine Learning algorithms take data as input, and we can achieve new set of information about that data based on the task they are designed.

**Key Words:**— *Artificial Intelligence, Data Analysis, Machine Learning,*

## I. INTRODUCTION

Machine learning (ML) is a category of an algorithm that allows software applications to become more accurate in predicting outcomes without being explicitly programmed. The basic premise of machine learning is to build algorithms that can receive input data and use statistical analysis to forecast an output while updating outputs as new data becomes available. We have seen Machine Learning very popular for the past few years, the reason for this might be the high amount of data production by applications and increase of computation power in the past few years and the development of better algorithms.

Machine Learning is great tool for better understanding of raw data and extract unique information out of it, as humans created nearly 40,000 Exabyte's of data and that is not possible to study that amount of data by human observation.

While many machine learning algorithms have been around for a long time, the ability to automatically apply complex mathematical calculations to Big data – over and over, faster and faster – is a recent development. Here are a few widely publicized examples of machine learning applications we are familiar with:

*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.

*Financial industry and trading* — companies use ML in fraud investigations and credit checks.

## II. TYPES OF MACHINE LEARNING

1. Supervised Learning
2. Unsupervised Learning
3. Reinforcement Learning

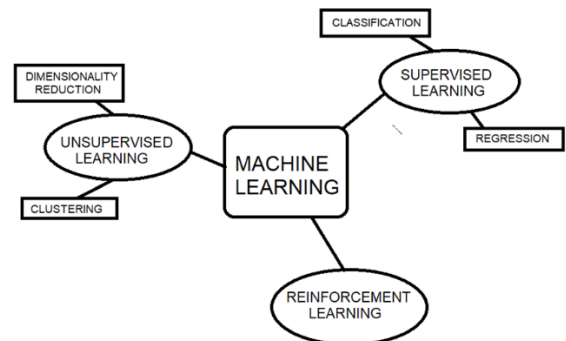


Fig.1. Supervised Learning Algorithm

In Supervised learning, an AI system is presented with data which is labeled, which means that each data tagged with the correct label.

The goal is to approximate the mapping function so well that when you have new input data 'x' that you can predict the output variables 'y' for that data. x is the independent variable, y is the dependent variable, we train our model on the basis of given data set, the machine observes and learn the linear and nonlinear relation between the dependent (y) and independent (x) variable and it is able to predict the value of 'y' with the new values 'x'.

### A. Types of Supervised learning:

**Classification:** A classification problem is when the output variable is a category, such as “male” or “female” or “infected” and “non infected”.

**Regression:** A regression problem is when the output variable is a real value, such as “length” or “temperature”.

### B. Unsupervised learning algorithm

In unsupervised learning, an AI system is presented with unlabeled, uncategorized data and the system’s algorithms act on the data without prior training. The output is dependent upon the coded algorithms. Subjecting a system to unsupervised learning is one way of testing AI.

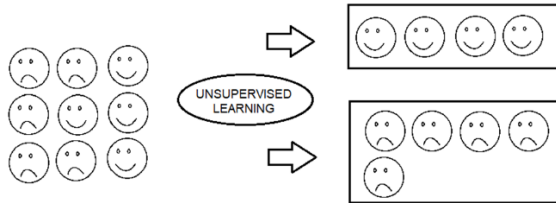


Fig.2. Unsupervised learning algorithm

In the above example, we have given some characters to our model which are ‘smiling’ and ‘Not smiling’. In our training data, we don’t provide any label to the corresponding data.

The unsupervised model is able to separate both the characters by looking at the type of data and models the underlying structure or distribution in the data in order to learn more about it.

#### Types of Unsupervised learning:

**Clustering:** A clustering problem is where you want to discover the inherent groupings in the data, such as grouping customers by purchasing behavior.

**Association:** An association rule learning problem is where you want to discover rules that describe large portions of your data, such as people that buy X also tend to buy Y.

### C. Reinforcement Learning

A reinforcement learning algorithm, or agent, learns by interacting with its environment. Reinforcement learning differs from the supervised learning in a way that in supervised learning the training data has the answer key with it so the model is trained with the correct answer itself whereas in reinforcement learning, there is no answer but the reinforcement agent decides what to do to perform the given task. In the absence of a training dataset, it is bound to learn from its experience.



Fig.3. Robot, Prize and danger sign.

The above image shows the robot, prize and danger sign. The goal of the robot is to get the reward that is the trophy and avoid the hurdles that are danger sign. The robot learns by trying all the possible paths and then choosing the path which gives him the reward with the least hurdles. Each right step will give the robot a reward and each wrong step will subtract the reward of the robot. The total reward will be calculated when it reaches the final reward that is the diamond.

It is basically leveraging the rewards obtained, the agent improves its environment knowledge to select the next action.

### III. CONCLUSION

Machine Learning can be a competitive advantage to any company be it a top MNC or a startup as things that are currently being done manually will be done tomorrow by machines. Machine Learning revolution will stay with us for long and so will be the future of Machine Learning.

### REFERENCES

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