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# A SURVEY ON MACHINE LEARNING

Bhoomika C H
Student, Department of CSE
CIT, Mandya, Karnataka, India

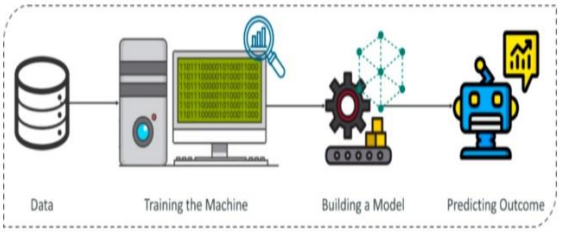
Rakshitha B H
Assistant Professor, Department of CSE
CIT, Mandya, Karnataka, India

***Abstract*— Machine learning is a category of an Artificial Intelligence (AI). The goal of machine learning is to understand the structure of data and design a models using that particular data that can be understood and utilized by people. Machine learning forms to be an important application of an Artificial Intelligence (AI). This paper provides the information about the introduction, advantages, disadvantages and applications of Machine Learning. Also, this helps individual to understand why we needs to choose Machine Learning.**

*Keywords*— **ML, AI.**

## I. INTRODUCTION

Machine learning is a category of an Artificial Intelligence (AI). The goal of machine learning is to understand the structure of data and design a models using that particular data that can be understood and utilized by people.
Humans are learning from their own past experiences and the machine will follows the instructions given by the humans. In other words. We get the machines to understand data to learn on its own eventually give as a solution without us having intervene during that entire process.



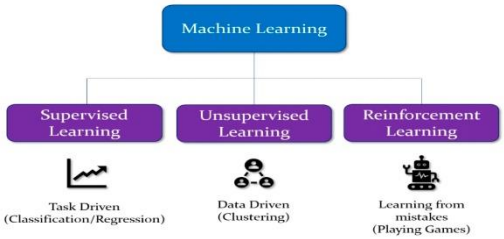

Machine learning is one of the concepts which forms to be most important aspects of data science. Machine learning is mainly focus on the designing of systems, thereby allowing them to learn and make predictions based on some experience which is data in case of machines.
Machine learning forms to be an important application of an Artificial Intelligence (AI). In machine learning the programs learn from experience and improve on their own and the goal is to make machines more human-like.

## II. WHY IS MACHINE LEARNING REQUIRED?

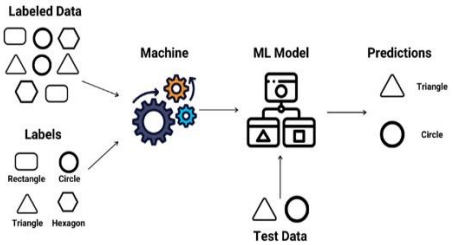
- Machine learning is most important because of its wide range of applications and it provide solutions to complex problems efficiently and quickly.
- It helps to reduce the production cost.
- It has the ability to easily process large amount of data.
- Machine learning is gives overview of trends in customer's behavior, also it supports the development of new products for many companies like Google, Uber and Facebook etc.
- Machine learning deriving key insights about business.
- Finding out hidden trends in data.
- It helps to predict maintenance in manufacturing retailing.

## III. TYPES OF MACHINE LEARNING

There are mainly 3 types in Machine Learning,




A. Supervised Learning: Supervised learning is used to train machines using labelled data, labelled data means that the output is already known to us the model just needs to map the outputs to the inputs.
Data which is governing entity in a way where the machine itself knows what data it is seem, not literally being supervised but it understands the data as if it were supervised.




For example: A child who studying for an examination and there is a parent who supervising and making sure the child does not play a game, but he/she is actually studying, keep in the control.

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- Presence of data and associated labels for the data.


Flower


Car

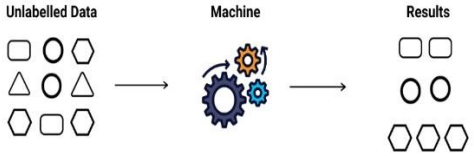
- If we show the picture of these things to computer (machine). It won't understand anything so to bridge this gap we labelled the pictures.
- The labels are very important in supervised learning.
- Y=f(x) forms to be the foundation of supervised learning.
- The input variable is 'X', while the output variable is 'Y'.
- Mapping the output as a function of the input variable.

There are 2 branches in supervised learning.

1. Regression- Prediction of future values from past data.
2. Classification- Categorization of items using data.

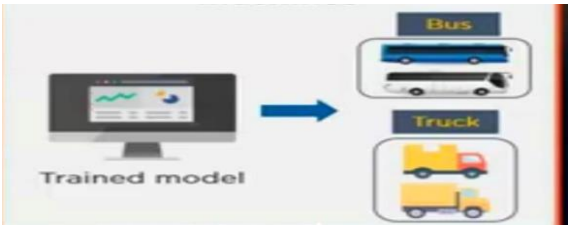
B. Unsupervised learning: Which provides the algorithm with no labelled data in order to allow it to find structure within its input data. Aim of the algorithm is to find a structure present in the data. The learning with unlabeled data is an unsupervised learning,

Unsupervised learning uses unlabeled data to train machines, unlabeled data means there is no fixed output variable the model learns from the data discovers patterns and features in the data and returns the output.




For example: An unsupervised learning technique that uses the images of vehicles to classify if it's a bus or a truck, So the model learns by identifying the parts of vehicles such as the length and width of the vehicle the front and rear end covers, roof hoods the types of wheels used etc.

Based on these features the model classifies if the vehicle is a bus or a truck.




I have already mentioned that unsupervised learning uses unlabelled data to train machine, It shows below

There are 2 branches in unsupervised learning

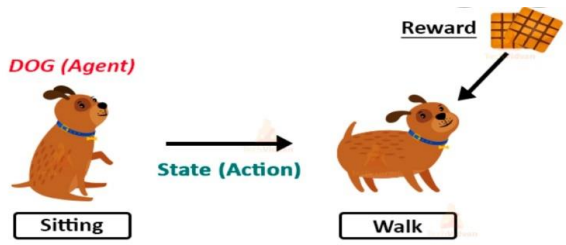
1. Clustering - Grouping of input variables with similar characteristics.
2. Association – Mapping associations based on the data.

C. Reinforcement Learning: Reinforcement learning is a type of machine learning training based on rewarding for desired behavior and punishing for undesired behavior.

This is reward based learning and this works on principle of feedback. Reinforcement learning agent is able to observe and understand its environment, take actions and learn through trial and error.

Reinforcement learning drains a machine to take suitable accents and maximize reward in a particular situation it uses an agent and an environment to produce actions and rewards, the agent has a start and an end state but there might be different parts for reaching the end state like a maze, in this learning technique there is no predefined target variable.

For example: If we have a dog, we have to start a simple training for it like sit, stand, and walk or give me a handshake etc. A dog is trained in a way if it walks it gets a tiny reward or it gets a biscuit, so our intension here is to get the dog to walk but the dog's intension is trained itself in a way when if it walk it gets a treat, our happiness lies in getting the dog to walk but dog happiness lies in getting the biscuits, these two are different things.



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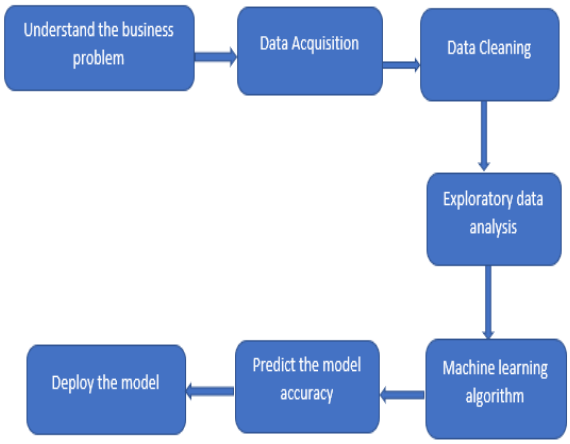
## IV. How does a Machine Learning Model Learn?

Here the data is split into 2 parts

1. Training data: - Used to teach the algorithm.
2. Testing data: - Used to verify the learning capability.

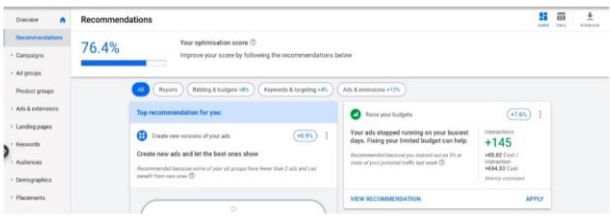



## V. Applications of Machine Learning :

1. Google Maps: - The app which we use every time When we go out, Despite of the usual traffic, we are on the fastest route. Everyone who is Using the google maps is contributing in making the app more accurate

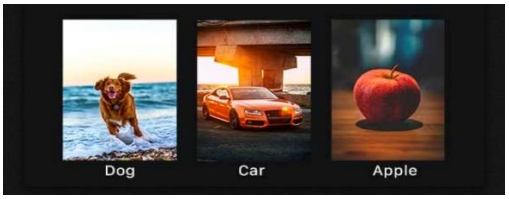
2. Facebook: - Facebook suggests if we want to tag a person name in the pic, Here the machine learning suggesting that this particular image may contain tree, plant, pen and nature etc.

3.Ads Recommendation: - Recommends ads based on our search history, Machine learning is used in generating recommendation. 35% of Amazon's revenue is generated by its recommendation system.



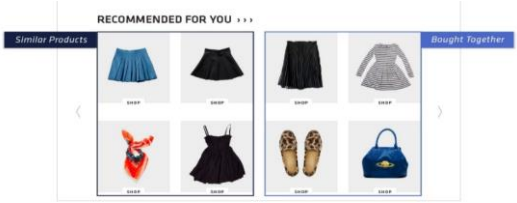

4. iPhone: - Smartphone with face recognition, core of the face detection. Ability is the use of machine learning algorithms that had been able to learn who you are?

5. Image recognition: - This is used to identify persons, places ,objects ,digital images etc.




6. Speech recognition: - While we using YouTube or Google There is an option of "Search by voice", it is referred as speech recognition and this is most important application of machine learning.


7. Product Recommendations: - Machine learning is used in the fields of E-commerce and entertainment like Amazon, Netflix etc.




## VI. Advantages of Machine Learning :

- In machine learning everything is automation, machine learning is answerable for cutting the workload and time.
- Machine learning has a wide range of applications like banking, financial sector, healthcare, retail etc.
- Scope of improvement.
- Efficient handling of data.
- Rapid analysis prediction and processing.
- Analyze past customer behavior.
- Best for education and shopping.
- Trends and patterns identification.
- Machine learning is a continuous improvement.

- Machine learning is handling multi-dimensional and multi-verity data.

## VII. DISADVANTAGES OF MACHINE LEARNING:

- Machine learning requires huge datasets to trained out the algorithms.
- Machine learning requires enough time to allow the algorithm to develop and learnt accomplished their tasks with the reason of amount of relevancy and accuracy.
- Machine language is also requiring huge number of resources to function.
- Probability of getting high errors.
- In machine learning the algorithm selection is still done by manually.
- Data Acquisition, in machine learning we constantly work on data.
- Time and Resources.
- This process is more time consuming.
- Interpretation of results.

## VIII. CONCLUSION

As a result, we have studied introduction, advantages, disadvantages and applications of Machine Learning. Also, this helps individual to understand why we needs to choose Machine Learning.

We have so many applications in Machine Learning and they all are used in our daily life, In future the machine learning is developed incredibly and uses widely.

Here in this paper we have a simple overview of some techniques and applications of machine learning, there are more techniques apply machine learning as a solution. In future, machine learning will play an important role in our daily life.

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