

AN ANALYSIS OF AI, MACHINE LEARNING & DEEP LEARNING

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Abstract

This research paper aims to give an idea about Machine Learning, Deep Learning, and AI. The main objective is how Machine Learning, Deep learning, and AI are connected and their role in real-world problems. Methods or Techniques used to solve problems by using Machine Learning and Deep Learning.

Keywords: Algorithm, Artificial Intelligence (AI), CNN, Deep Learning (DL), Machine Learning (ML), Natural Language Processing (NLP), Reinforcement, Supervised, Unsupervised Learning.

I. INTRODUCTION

An AI is the field of study that describes how a machine can be capable of thinking like a human and act on its own to make a decision without human intervention. This can be achieved with the help of some techniques that can be done by writing code or a program to make the machine to think on its own is known as Machine Learning[1]. ML is usually considered as a subpart of AI where we can apply the algorithms to make a machine to think. Deep Learning is the extension of Machine Learning. It is used to test a large amount of data.

Artificial Intelligence depends on Algorithms and models as a strategy that is structured dependent on logic, decision theory, probability theory, computational logic, statistics, and biology. This can be achieved by making the machines think. Allen Turing was the first person in 1950 to test the Turing machine that mimics human intelligence[2],

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later it became the technology after 60 years in the computer field. Big data and AI are the two areas that are booming today. AI can replicate many aspects of human intelligence. Machine learning is a concept that allows the machine to learn from examples and experiences. Machine Learning algorithms are evolved in studying about recognizing and predicting[3] the outcome, based on computational learning in AI.

II. TECHNIQUES

Machines Learning Techniques are classified in three ways that follows:

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

1. SUPERVISED LEARNING:

Supervised Learning[4] causes the machine to adapt explicitly. Data should be defined clearly to get the desired output. If we know the data is given as input and the expected output or the future extraction is predicted by building a Model. After building a model the algorithm is tested. Mostly it uses the classification and regression[5] to solve the problems. For every instance, there will be an output that is called Label data. The algorithm consists of the training phase and the testing phase. Once the machine is trained then it can be used to predict very quickly.

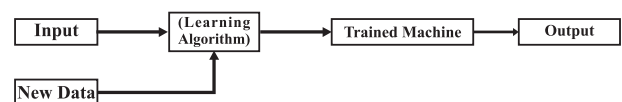


Figure (a) Supervised Learning

2. UNSUPERVISED LEARNING:

Only the input data is given as input in unsupervised learning[6]. It gains knowledge from previously trained data. We have to summarize or find some patterns in it and

grouping should be done. There is no labeled data in unsupervised learning. The data instance is unlabeled so association and clustering are done.

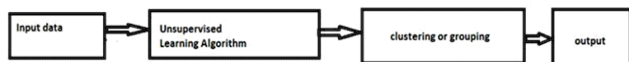


Figure (b) Unsupervised Learning

3. REINFORCEMENT LEARNING:

In Reinforcement learning[7] the computer interacts with an agent who is acting as an environment to meet a certain goal. In this, a reward or penalty is awarded in different states. If it is correct, a point is rewarded and if it is wrong a penalty is given.

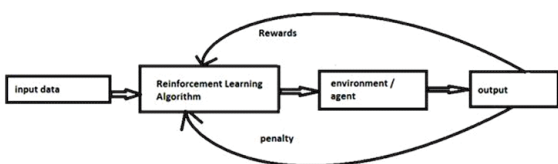


Figure (c) Reinforcement Learning

Some of the popularly used Machine learning algorithms are given in the following image.

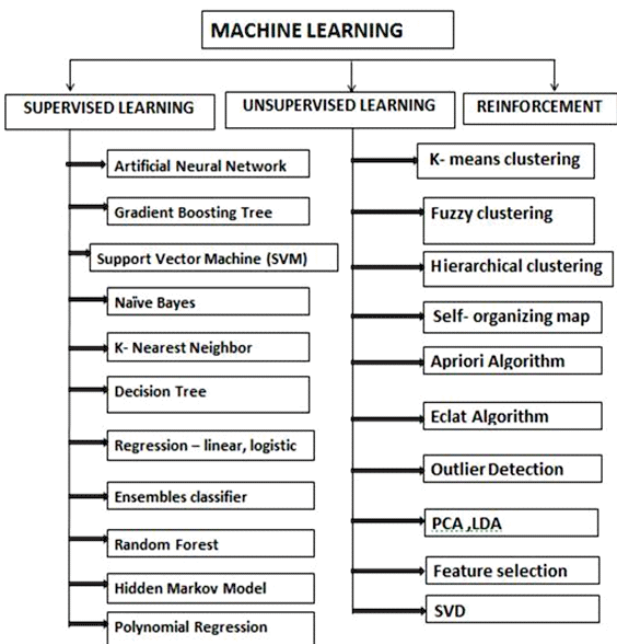


Figure (d) Popular Machine Learning Algorithms

III. STEPS TO ACHIEVE A SOLUTION TO A REAL-WORLD PROBLEM USING THE MACHINE LEARNING

1. Read the data set
2. Do data processing
3. Split the data into train and test data
4. Build the model with anyone of the machine learning algorithm
5. Train the model
6. Test the model with test data
7. Evaluate the model

Deep learning is a part of machine learning in implementing AI. It is also known as structured learning[8] where complex problems can be solved very easily. A huge amount of data sets can be tested using deep learning but it takes more time in training, where the small number of data sets is tested using Machine Learning and testing can be faster. CNN (Conventional Neural Network) Algorithm is a class of deep Neural Network[9]; it is most commonly applied to analyze the image and video processing. CNN is a type of ANN. It takes fixed-size information as a source and produces the output in a fixed size. NLP manages communication among computers and people utilizing the Natural language. NLP is to examine, comprehend, and understand human language in a way that is significant[10].

AI can be achieved by using deep learning algorithms. These algorithms will make the machine to think and decide quickly without human intervention. Here are the most prominent AI applications that we are presumably utilizing in our everyday life without knowing:

- Speech recognition
- Learning platform
- Manage taking decisions in self-driving cars
- Deep learning platform
- Fingerprint, face recognition in smartphones
- Robotics
- Chat bot
- Usage of AI in the Manufacturing industry
- Google translator

- Google Assistant developed by Google for mobile and smart home devices

Some of the popular algorithms are

- ANN (Artificial Neural Network)
- CNN (Conventional Neural Network)
- RNN
- NLP (Natural Language Processing)

IV. REAL-WORLD USAGE

Some Real-world usage of AI in

- Computer chess program
- Characters in Video Games

Some Real-world usage of ML in

- IBM Watson
- Google Search Algorithm
- Amazon / Flipkart recommendations of products to customers based on recent visiting history
- Spam filters in Email
- Text translation in the internet field

Some Real-world usage of DL in

- Alpha Go
- Medical Field
- Education

V. COMPARISON OF MACHINE LEARNING AND DEEP LEARNING BASED ON CONSIDERABLE FACTORS.

Factors to be considered	Machine Learning	Deep Learning
Data requirement	Can train on small amount of data	Requires large amount of data
Training Time	Takes less time to train the data	Takes more time to train
Accuracy	Gives very less accuracy	Provides high accuracy
Hardware Dependency	Trains on CPU	Trains on GPU
Hyperparameter Tuning	Limited tuning capabilities	Can be tuned in different ways

Figure (e) Comparison of ML and DL

VI. CONCLUSION

The algorithm plays a major role in Artificial Intelligence. When a small amount of data is to be trained then use Machine Learning, otherwise Deep Learning should be used. AI is implemented using ML or DL according to the need by making the computers to mimic human behavior. In future AI can be implemented in various fields to reduce maintenance costs, to increase the level of accuracy, and to use new technology in various fields. This research paper concludes when to use AI, ML and DL and how it is used in the real world.

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