Comparative Study Between Machine And Deep Learning

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Abstract- *Learning is part of human behavior now a day our researcher want to this behavior add to machine to perform the task without using explicit instruction latest recognize that Machine learning , deep learning (subset of machine learning) is evolving techniques; This paper also discusses principles regarding various learning algorithms and comparison in machine and deep learning*

Keywords- AI, Machine Learning, Deep learning

I. INTRODUCTION

Now a day's artificial Intelligence has become basic need of any technology for example cloud computing ,IOT etc reason behind of this artificial Intelligence basic idea is expert system can take decision and make predictions without human ,to take decision and make predictions its compulsory need to learning process for that need of learning techniques that meet requirement of IT industry and to solve real time problem,

Machine learning is subset of artificial Intelligence, It helps to perform task specific and accurate, machine learning work on basis on the three types of learning algorithms ,while implementing machine learning in visual art processing ,image recognition etc need more accurate result to meet the requirement need of another techniques at this point emerge the deep learning.

Deep learning is subset of Machine learning ,its is also known as deep structured learning or differential programming it is based on artificial neural network with representation learning, learning can be supervised, unsupervised or semi-supervised.
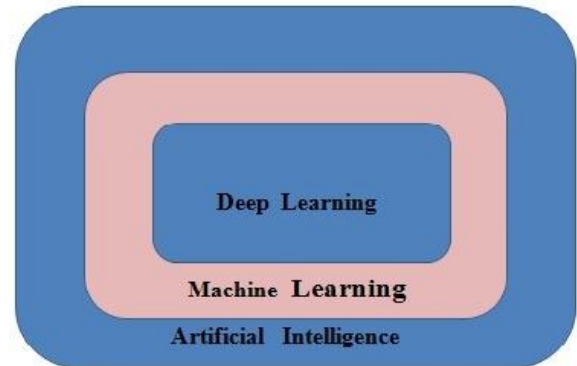

Fig.1 Classification of Artificial Intelligence

II. LITERATURE SURVEY

The field of AI research was born at a workshop at Dartmouth College in 1956, coined by John McCarthy by the middle of the 1960s, research in the U.S. was heavily funded by the Department of Defense and laboratories had been established around the world AI's founders were optimistic about the future: Herbert Simon predicted, "machines will be capable, within twenty years, of doing any work a man can do". Marvin Minsky agreed, writing, "within a generation ... the problem of creating 'artificial intelligence' will substantially be solved".They failed to recognize the difficulty of some of the remaining tasks[1]

The machine learning skills are grown in past few years. Currently, machine learning methods are tremendously vigorous to practical circumstances, and the structures really advantage of the learning process. It previously pertains in the rehearsal of medical imaging, and it will perhaps cultivate at a quick stride in the coming future. The use of machine learning in medical imaging has important inferences for the medication. It is very significant that this research area ensures better care to patients. The possessions of machine learning tackles are serious to confirming that they are applied in the greatest real way. In the medical image analysis, the deep learning algorithms help to categorize, classify, and enumerate disease patterns from image processing. It also permits to extend analytical goals and generates prediction models of treatment for patients. The medical imaging researchers are considering these challenges, deep learning in health care

research domain and imaging is enduring to flourish. It is improving rapidly, as deep learning is in numerous other applications other than of health care.[2]

This paper also gives a relative comparison of all the techniques based on their application, advantages and Limitations, after analysis of all techniques ,we cannot State as any one technique being the best.each techniques has different application area and is useful In different domain based on its advantages. [3]

III. MACHINE LEARNING

It is mainly focus on designing system (mathematical model),thereby allowing them to learn and make prediction based training data.
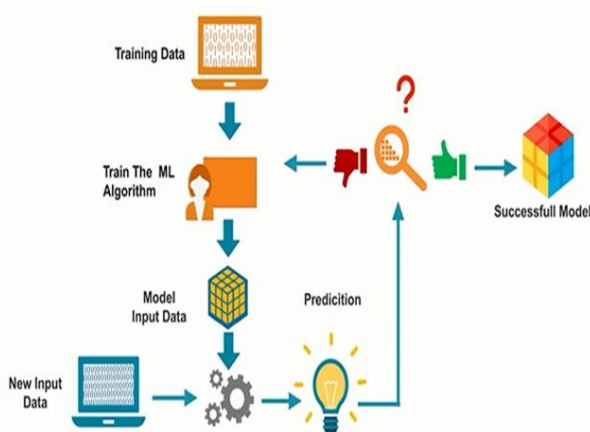

Fig 2. Machine Learning algorithms model

As above fig 2. training data is nothing collected data we can called labeled data ,its means that data need to collected Then analysis sometime data are not fetch in model ,its needs to analyse and differentiate through the structure these type data is called unlabeled data.

These two types of data are need to analyze and solve problem for that different algorithms are used.
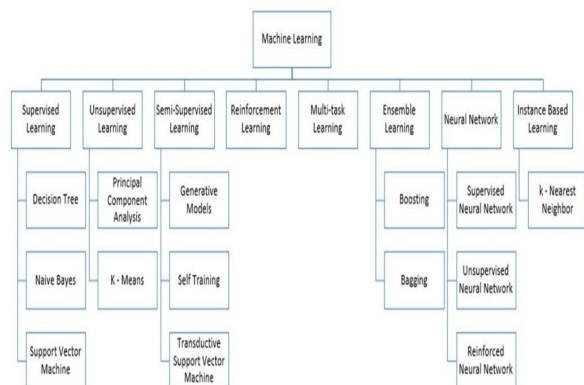

Fig 3. Types of learning [4]

A. Supervised Learning:

The supervised machine learning algorithms are those algorithms which needs external assistance. The input dataset is divided into train and test dataset[4] . In supervised already known the input and output below algorithms are used for supervised

1. Decision trees: it used for classification based on their values
2. Naïve Bayes:it is used for classification based on text industry
3. Support Vector Machine:it is used for classification based on margin calculation

B. Unsupervised Learning:

This algorithms are learns from characteristic of data(unlabeled data),its need to clustering data respective features

1. k-means clustering :It is used for grouping of similar kind of item characteristic its creates distinct cluster.
2. Principal Component Analysis: it is used for clustering similar data which is plotted on graph

C. Semi-supervised Learning:

Semi-supervised learning (SSL) is a type of Machine Learning (ML) technique. It is half-way between supervised and unsupervised learning . The main objective of SSL is to overcome the drawbacks of both supervised and unsupervised learning.[5]

i. Generative Models:

Generative models are perhaps the oldest semi-supervised learning method. It as-sumes a model$p(x, y) =p(y)p(x|y)$where$p(x|y)$is an identifiable mixture dis-tribution, for example Gaussian mixture models. With large amount of unlabeled data, the mixture components can be identified[6]

ii. Self-training:

It is classifier is first trained with the small amount of labeled data. The classifier is then used to classify the unlabeled data. Typically the most confident unlabeled points, together with their predicted labels, are added to the training set. The classifier is re-trained and the procedure repeated [6]

iii. Transductive support vector

Machine or TSVM is an extension of SVM. In TSVM, the labeled and unlabeled data both are considered. It is used to label the unlabeled data in such a way that the margin is maximum between the labeled and unlabeled data. Finding an exact solution by TSVM is a NP-hard problem[4].

D. Reinforcement Learning:

In this learning the software agent take decision and action in environment ,if decision taken is correct then Rewards with point otherwise point will be deduce wrong decision in environment need updated with the correct information .

E. MultitaskLearning:

It is an inductive transfer mechanism whose principle goal is to improve generalization performance. MTL improves generalization by leveraging the domain-specific information contained in the training signal s of related tasks. It does this by training tasks in parallel while using a shared representation.[7]

F. Ensemble Learning:

Different learning combine such as classifier ,expert etc to solve the particular problem is called Ensemble learning two techniques are popular for implementin boosting and bagging algorithms are used

G. Neural Network Learning

Neural Network is circuit of neurons composed of artificial of nodes it is used for artificial intelligence problem, implementing neural network leaning three techniques are used supervised ,unsupervised, reniforcement

H. Instance-Based Learning

It is also called memory based learning,its compare new Problem instance with instance seen in training, which Stored in memory,it store new instance and throw old instances, K-nearest algorithms are used.

IV. DEEP LEARNING

Deep learning is part of a broader family of machine learning methods based on learning representations of data.
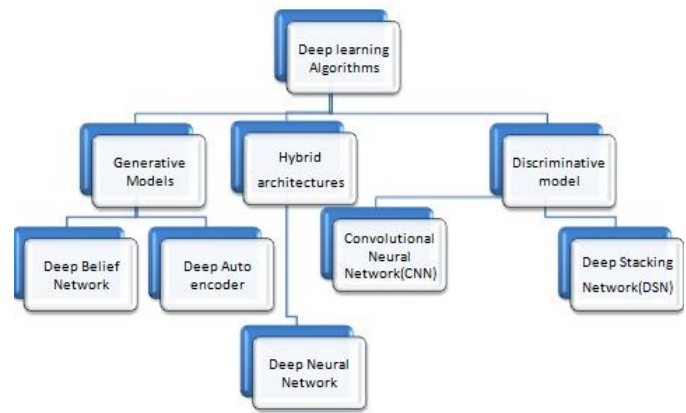

Fig 4. Deep Learning Algorithms[8]

Deep learning is a set of algorithms of machine learning which uses multiple layers that corresponds to different level of abstraction to each level. . It consists of input layer, output layer and several hidden layer. It is used for voice synthesis, image processing, handwriting recognition, object detection, prediction analytics and decision making[8].

A. Generative Model:

Generative model is a class of models for Unsupervised learning where given training data our goal is to try and generate new samples from the same distribution. It includes algorithms i.Deep Belief Network ii.Deep Auto encoder

Among this DBN algorithms are widely used

i. Deep Belief Network

Deep belief network (DBN) is a typical unsupervised network architecture that provides a unique training algorithm. The DBN is multilayer network contains many hidden layers in which each pair of connected layer is made up with a restricted Boltzmann machine(RBM)[9] and typically represents as a stack of RBMs. There exists a symmetric connections between the top two layers and forms an associative memory. However, the lower layers consume top-down and directed connections
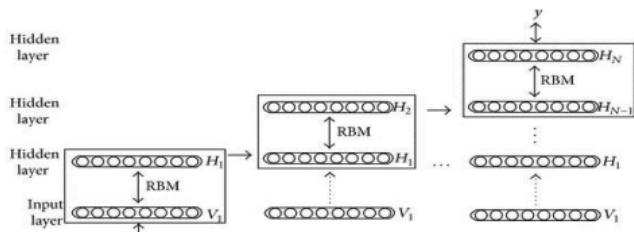
Fig.5 Architecture of DBN

B. Discriminative model:

it also referred to as conditional models, are a class of models used in statistical classification, especially in supervised machine learning

There two algorithms It involves Convolution Neural Network (CNN), Deep Stacking Network (DSN),most popular algorithms CCN let us see in brief

i.Convolution Neural Network (CNN):

A CNN is composed of one or more convolutional layers with fully connected layers (matching those in typical artificial neural networks) on top. It also uses tied weights and pooling layers. This architecture allows CNNs to take advantage of the 2D structure of input data. In comparison with other deep architectures, convolutional neural networks are starting to show superior results in both image and speech applications[10]
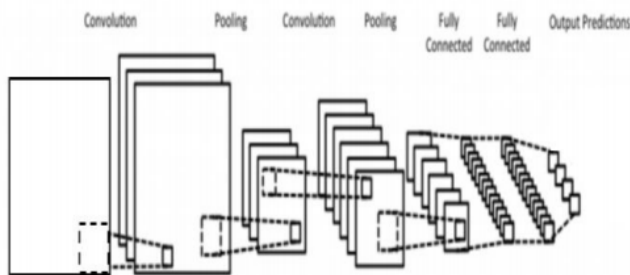

Fig 6. Architecture of CNN [10]

A. Hybrid models:

It incorporate the benefits of both discriminative and generative models. Deep Neural network (DNN) is an example of hybrid models.

Comparison of applications in Machine and Deep Learning

1. Machine Learning Application:

Machine Learning helps to extract data features for solving and predicting many tasks like named entity recognition (NER), forecasting, detecting anomalies, classifying data, ranking the sites, decision making etc, Machine learning is an area of science for getting systems to mimic without being plainly programmed. The explosive developments of machine learning are self-driving cars, practical speech recognition, effective web search, and an infinitely enhanced understanding of the human genome. Humans use machine learning technology on a daily basis without knowing it. Scientists assume that this is most excellent way to make advancement towards human-level AI.[11]

2. Deep Learning Application

Nowadays deep learning give the excellent solutions to the Problem in image recognition, speech recognition, and natural language processing.

In medical domain Deep learning play vital role for prediction for cardiovascular risk,coronary artery diseases, Seizure Detection, Diagnosis of Breast cancer, Syndrome Diagnosis of Chronic Gastritis

V. CONCLUSIONS

Learning is important to provide the exact solution for machine learning and deep learning,some application need specific values from data can extract then decision for perform action,as deep learning need more value or parameter to take decision and perform action **,the efficient and exact solution** for challenges need to apply proper algorithms either machine learning or deep learning.

Deep learning is subset of Machine learning ,deep learning will helpful in medical domain and machine Learning play vital role in general task such as self driving and weather forecasting .combination of machine and deep learning can performed all action and decision without human intervention

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