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A Review of Deep Learning Techniques

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Abstract: **In Today's world, Deep learning Techniques are playing a vital role in all Areas. Deep Learning has achieved great Success in many fields such as Computer vision and Natural Language Processing. It compared to traditional Machine Learning Methods, Deep Learning has a strong Learning ability and can make better use of Datasets for feature Extraction. Deep learning is a class of machine Learning algorithms that uses Multiple Layers to Progressively extract higher level features from the raw input. Deep learning allows computers to take in new information, decipher it, and produce an output all without humans needing to be involved in the process. This field has enormous implications for the technologies of the future, including self-driving vehicles, facial recognition software, personalized medicine, and much more. In this Paper, Deep Learning techniques and their Applications are discussed.**

Index terms: **Natural Language Processing, Deep Learning, Machine Learning**

I. INTRODUCTION

A type of machine Learning Based on artificial neural network in which multiple layers of processing are used to extract progressively higher level features from data. Deep Learning is an important element of data science which includes statistics and Predictive modelling. The term deep learning was introduced to the machine learning Community by Rina Dechter in 1986 and artificial neural network by lgor Aizenberg and colleagues in 2000,in the context of Boolean threshold neurons. Deep Learning architectures are RNN (Recurrent Neural Network), LSTM (Long Short Term Memory), CNN (Convolutional Neural Network), DBN (Deep Belief Network), DSN (Deep Stacking Network) etc.

II. DEEP LEARNING ARCHITETURES

1) Recurrent Neural Network

A Recurrent Neural Network (RNN) is a class of artificial neural networks where connection between nodes form a directed graph along a temporal sequence. RNN produce predictive results in sequential data that other algorithms can't.

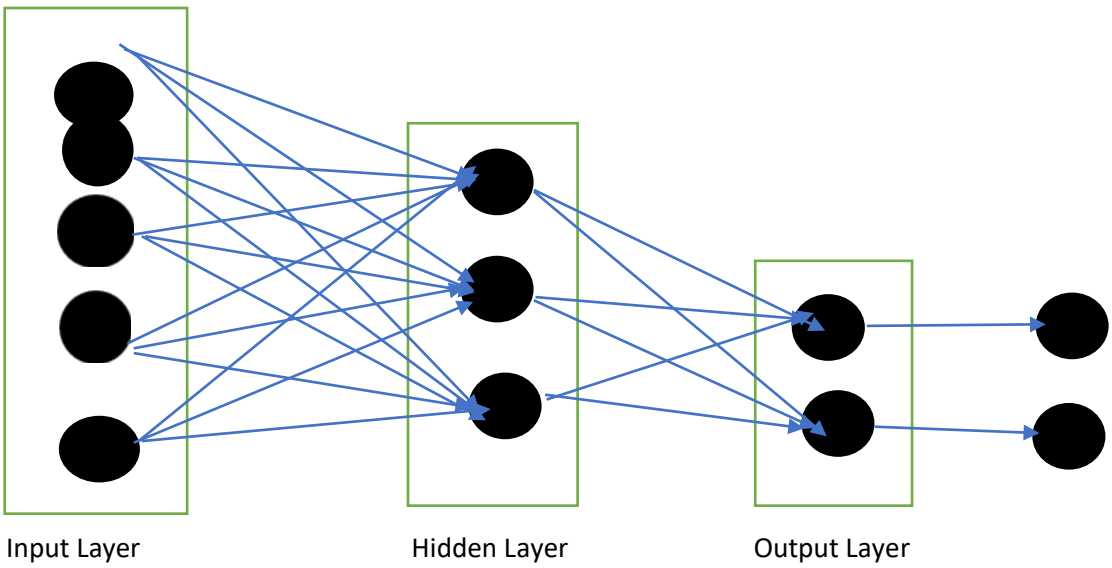

Fig 1: Recurrent Neural Network

2) Long Short Term Memory

LSTM is an artificial recurrent neural network architecture. It has feedback connections. It can process not only single data points such as images but also entire sequence of data. LSTMs have three types of gates: input gates, forget gates, and output gates that control the flow of information. The hidden layer output of LSTM includes the hidden state and the memory cell. Only the hidden state is passed into the output layer and the memory cell is entirely internal.

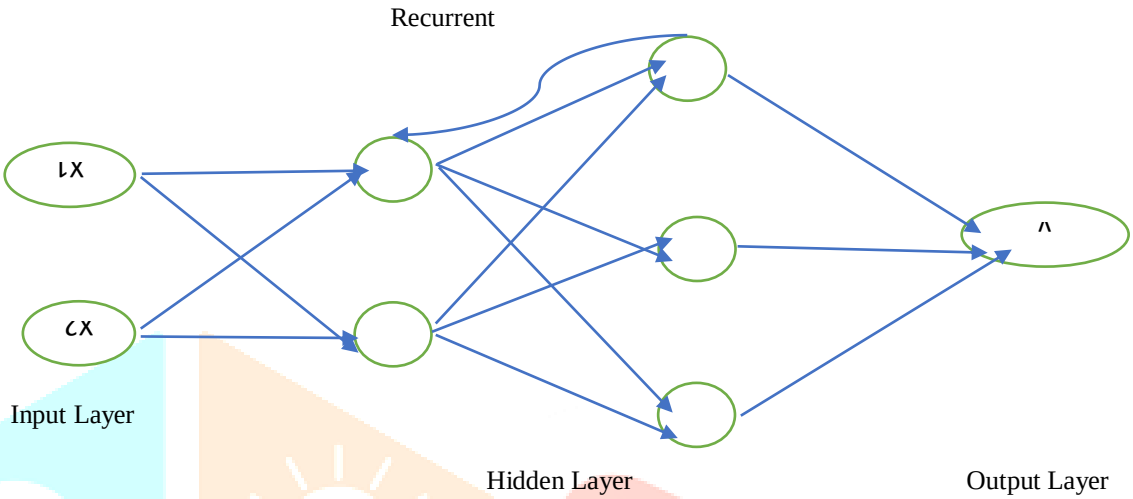

Fig 2: Long Short Term Memory

3) Convolutional Neural Network

A CNN is a class of artificial neural network.convolutional neural network that uses perceptrons, a machine learning unit algorithm, for supervised learning, to analyze data. CNNs apply to image processing, natural language processing and other kinds of cognitive tasks. A convolutional neural network is also known as a ConvNet.

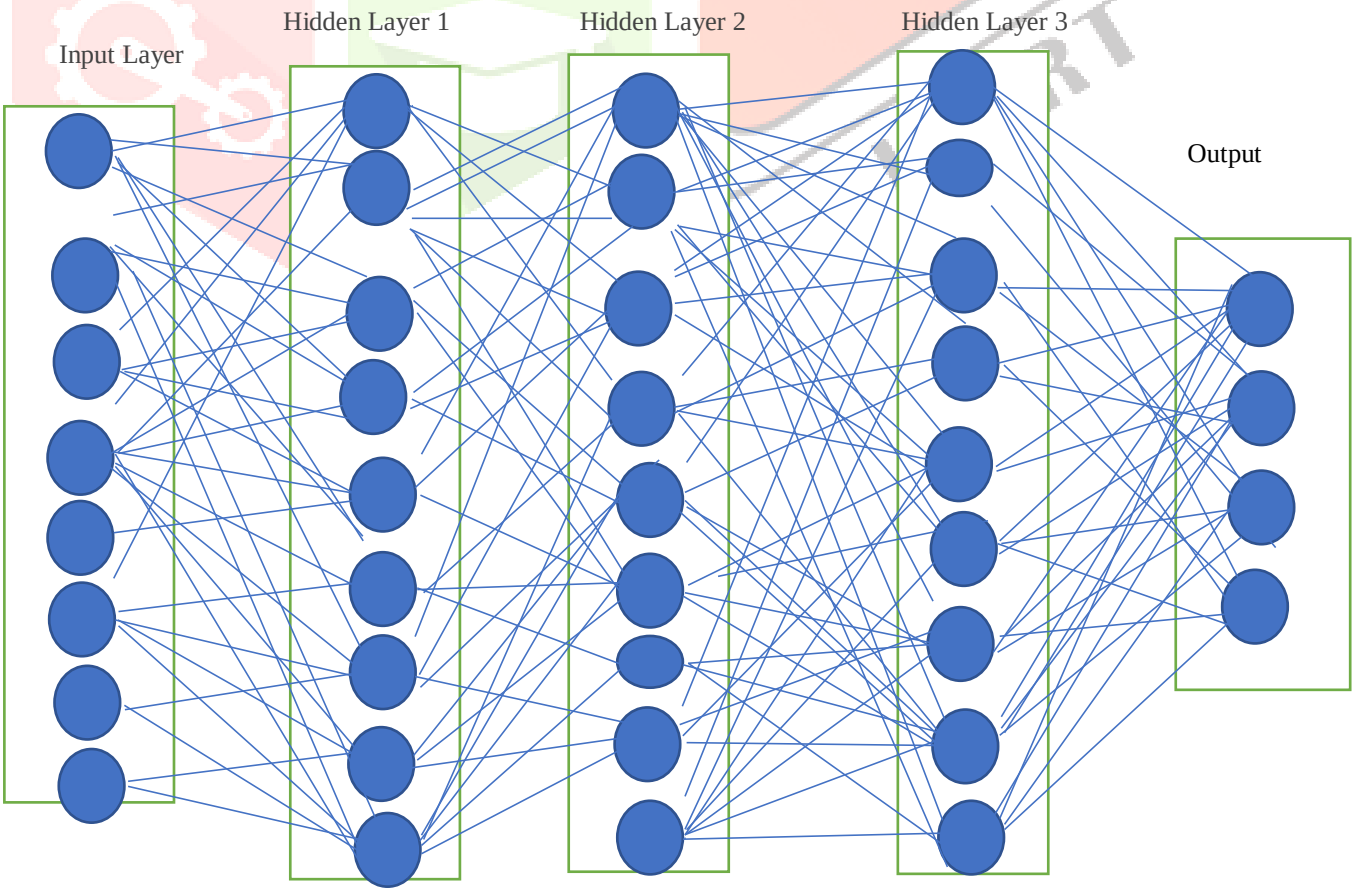

Fig 3: Convolutional Neural Network

4) Deep Belief Network

In Machine Learning, a deep belief network is a generative graphical model or alternatively class of deep neural network composed of multiple layers of latent variables (hidden units), with connections between the layers but not between the units with each other.

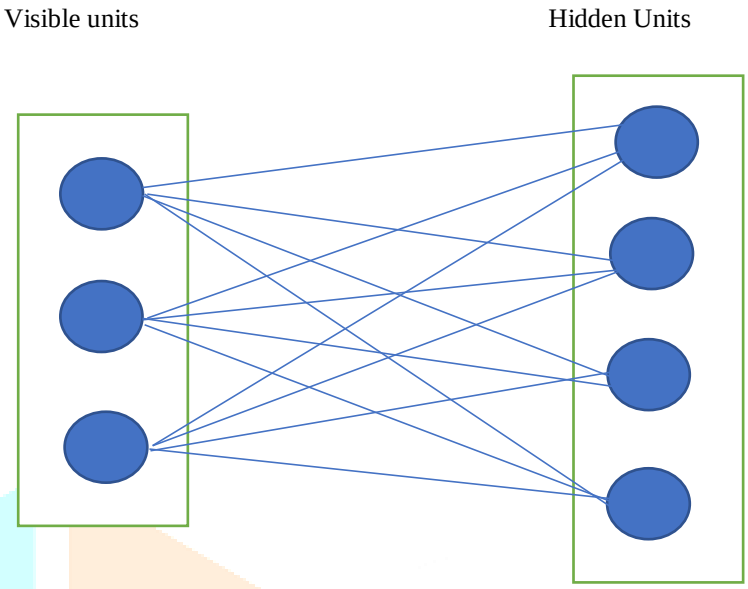

Fig 4 : Deep Belief Network

5) Deep Stacking Network

Deep Stacking network is a deep architecture designed to enable large CPU Clusters and benefit from the deep learning capabilities of deep neural networks. The DSN has ability to provide features such as feature extraction has made their use more viable.

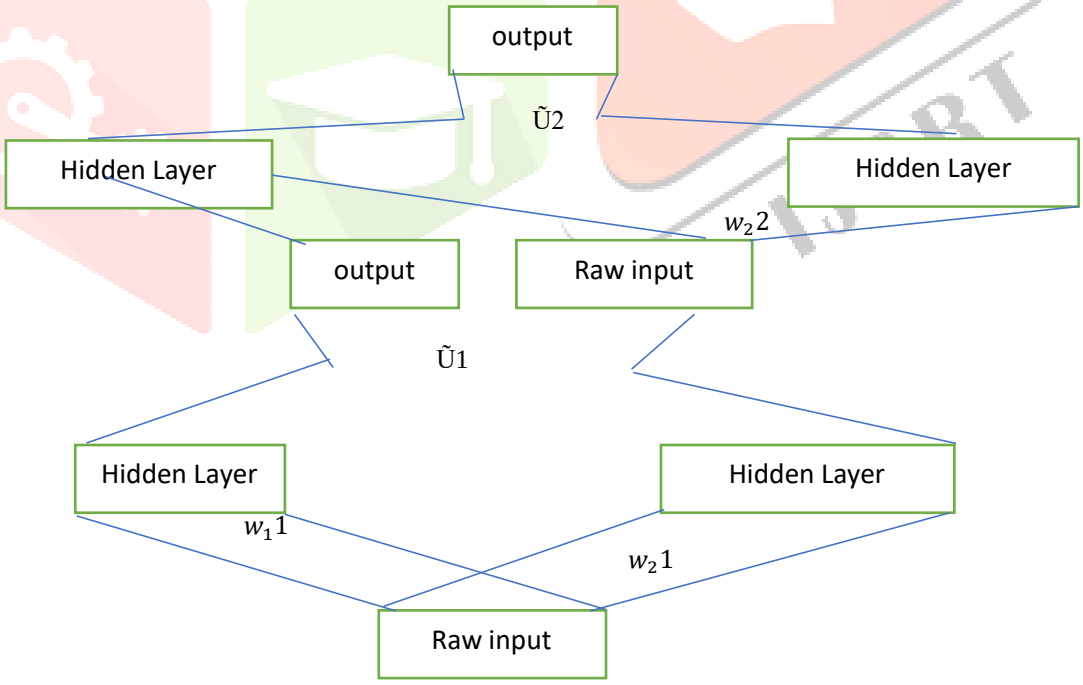

Fig 5 : Deep Stacking Network

III. APPLICATIONS OF DEEP LEARNING

1) Self Driving Cars

A System that can navigate just with On-Board Sensors shows the potential of self driving cars being able to actually handle roads.

2) Fraud Detection

Deep learning is the banking and financially sector that is played with the task of fraud detection with money transactions going digital Autoencoders in Keras and Tensorflow are being developed to detect credit card frauds saving billions of dollars of cost in recovery and insurance for financial Institutions.

3) Healthcare

The use of deep learning and neural networks healthcare giants are mitigating health risks associated with read missions while bringing down the cost.

4) Automatic Game Playing

This model of deep learning is capable of leaving how to spell, punctuate and even captures the style of the text in the corpus sentences. The LSTM recurrent neural network have also been demonstrating problem by character based model that generate one character at time

Entertainment, Visual Recognition, Natural Language Processing , Detecting development delay in children and so much applications of the Deep Learning.

IV. CONCLUSION

The Review Paper covers the deep study of Deep Learning and their architecture. There are wide variety of architectures Present today to develop any Application. Through this we came to know that there are many applications of deep learning such as Language Translation, Adding sound to silent movies, Deep Dreaming, Demographic and Election predictions and so on. We have lots of examples where Deep Learning Techniques are implemented. Self Driving Cars are latest example of implementation of deep learning and we still have to explore newer areas of deep learning.

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