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A SURVEY OF DEEP LEARNING APPLICATIONS AND FRAMEWORKS

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***Abstract*-- The advancement of technology and the introduction of the high computing power helps us to perform the complex calculation with speed and accuracy. The idea of mimicking the power of brain in the technology is not new but the implementation of this becomes more efficient and effective recently due to the introduction of GPUs. This give rise to the area of deep learning which insidiously occupied the most of the area in real world. Various models proposed by different organization and companies have been proposed to solve some general problems. This paper discuss the models and their application in the various field applicable. After that a brief discussion on the different frameworks helpful to implement the various models have been discussed.**

Keywords*: *Deep Learning, Machine Learning, Supervised Learning, Unsupervised Learning, Framework.

I. INTRODUCTION

Deep learning technique is basically an new advent of neural networks model proposed by McCulloch and Pitts [1]. Initially the number hidden layer in the neural network was limited because of the several reason like, lack of computation power and one big factor was the vanishing gradient problem. The network VGG Net stands for (Visual Geometry Group) was proposed [2] with 13 convolution layer. Various application for the Deep Learning which notably shows a remarkable change in different fields of technology. The basic implementation of convolution neural network is by using various convolution layers to first apply the convolution operation on the input to extract the important feature. After that the various operation like pooling is used to reduce the size of the input. Then this is fed into the fully connected layer to train the model on the basis of input.

1) *Medical field (Cancer diagnosis)*: The Deep Learning models and algorithms have proven to be the vary helpful tool for the diagnosis of the problem[3]. Recent learning methods have help medical person to diagnose the symptoms with high accuracy.

2) *Social media recommendation*: In today's era social network has touched every aspects of human life. It provides a different way to connect with others and to look out for several products and services online. Deep learning models analyze the various parameters of the user and recommend them the product, digital content or other services of their interest [4]. Various social media, content creation plate forms are using these recommendation system to reach their users effectively.

3) *Autonomous vehicle*: Various companies and research institutes are working toward the automation of this field. Self driving cars have become an reality due the use of deep learning[5]. For the self driving cars we need to train the model on vary large number of parameters so, some dedicated models have been develop to achieve the goal. Companies like google ,Tesla are working in this field for several years and have produce remarkable results.

4) *Translation with Natural Language processing*: Speech recognition and language translation have become very important part of todays life. Speech recognition helps machine to understand the human voice and produce the results accordingly [6][7]. Translation from one language to another language

requires experts of the fields. The deep learning models have provide the tool which automate and fasten the process of language translation[8].

5) *Analyzing the sentiments*: Now days sentiment analysis has grown in various industries for the better productivity of the members[9]. This can be done by facial recognition, NLP and other metrics.

In the recent years Deep Learning has shown a tremendous growth, the main reason behind this is the availability of various tools and frameworks. These framework provides various built in algorithms , models , function to solve complex problems which helps researchers and developers to work without worrying about the different methods implementation as they are already available and optimize to use. Writing a Deep Learning model from the scratch is a cumbersome task and require a high experience of developing the models. But the help of the tools and frame works available one can easily develop and their hypothesis on the given dataset. Most of them are open source therefore available to use for everyone without any cost or liscence. Some of the frameworks available are

A) *GraphLab*: GraphLab is written in C++ and available as python library graphlab contains various built in algorithms [11]. It is the parallel machine learning framework developed to handle the large size and complex data of the real world. It consists of the data structures like SFrame which can handle TeraBytes of data and SGraph which can create the relation between nodes and edges of the graph.

B) *Apache System ML*: This framework contains some of the customized algorithm via Python and R [12]. It includes Spark Batch ,Hadoop Batch and provide optimization for the scalabilty and efficiency.

C) *Petuum*: This is basically a distributed plate form for ML aim to solve large size industrial problems. This was founded by the professors and researchers from the carnage mellon university[13].The motive of this war to convert AI into industrial and software development process.

D) *DeSTIN*: This framework uses the Bayesian inference and unsupervised learning technique to represent the dynamic pattern. The key point of this network is that no pre training is required to start the model[14]. This is well suited for the dealing with the high dimensional data.

E) *Tensorflow*: It is very popular framework for the Deep Learning and Machine learning models. It is mostly use for the training and implementation of the Deep Learning models[15]. It consists of lots of libraries and API for the expert developers and also for the beginners. It is an open source model. A user can easily go from model building to deployment in few steps.

F) *PyTorch*: It is the similar framework developed by the facebook to handle the various Machine Learning and Deep Learning models. The key features are that it is scalable on distributed environment and robust. It can be deployed easily on the cloud.

G) *Nexus*: It is the plateform developed based on the GPUs and the accelerators to fasten the computation of the Deep Learning Model[16].it is basically a high performance architecture use the hybrid caching parameters for the speed up of training models.

III. CONCLUSION

In this paper we discuss some of the core applications of the deep learning but no all as that is not possible to cover at on place. Deep Learning is growing field so it is now applied widely. To solve some of the problems in this field different frameworks are also available but in future more optimized fast and efficient frameworks will be there to handle these problems.

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