Innovative Applications of Deep Learning and Big Data in Healthcare

***Abstract-* With advancement in technology and medicine, the healthcare facilities have improved a lot. The key player in the domain is data, which not only provide insights but also forecast the upcoming trends. The enormous amount of data which is generated each day in healthcare and other fields is so massive that it is impossible for traditional technology to evaluate and study. These type of data that falls in the category of Big Data is processed differently by the data scientists which create advanced algorithms to study it. These specialized algorithms are too complex that they behave like human brain, the scientists have created deep learning models which are known as neural networks which behave like neurons and make decisions appropriately. The intersection of both these fields provide a path for future developments that will not only revolutionize the healthcare but will change the core in all other domains. This paper provides an overview, applications, challenges and future aspects of Deep Learning and Big Data in Healthcare.**

***Keywords- Machine Learning, Deep Learning, Neural Networks, Big Data, Data Analytics, Medicine, Healthcare***

INTRODUCTION

In this decade, the healthcare industry has witnessed a drastic change driven by the advancements in technology especially in the areas of Artificial Intelligence and Machine Learning. Deep learning which is subset of Machine Learning and Artificial Intelligence has emerged as a powerful tool for extracting meaningful insights from large and complex databases. Similarly, Big Data, characterized by the massive volume, velocity and variety of healthcare data, presents both challenges and opportunities for transforming healthcare in a great way.

The collaboration of Deep Learning along with Big Data and healthcare with change the various aspects of healthcare including diagnosis of the disease, treatment therapy, preventive measures, medicine and surgical intervention through bots and AI. The management sector will also be positively impacted by the data driven decisions. The medical sector generates many different categories of data ranging from structured, semi-structured and unstructured. The diagnosis facilities in the healthcare include studying images, graphs and visualizations. The mobile devices and wearable gadgets help keep record of vitals and generate daily logs incorporating huge amount of data which lays the foundation for studying the trends, recognizing patterns and make predictions via modelling which is the core of advanced data analytics.

*Big Data- Understanding the Five Vs.*

The term Big Data is coined to demonstrate the enormous data which cannot be studied by the traditional data studying tools. To understand the complexity and magnitude of big data, the five core fundamentals volume, velocity, variety, veracity and variability plays an important role. The **Volume** represents the huge amount of data which is generated every single day. The media, sensors and devices creates terabytes of data which needs robust infrastructure to study. The **Velocity** at which the data flows also plays a crucial role in decision making. The transactions, streaming devices, online interactions generate a huge flow which needs to be studied for the insights.

The images, audio files, videos, spreadsheets and text files contribute to the **variety** of data that needs to be processed. This create a challenge for the data analysts to understand, manage and modify the data. The **Variability** refers to the fluctuations in the data generated over the time. The inconsistent nature of the data poses a problem for accurate predictions which needs to be addressed. In the vast sea of data, it is mandatory to check the quality of data being created which constitutes the **veracity** factor. It pertains to accuracy and reliability of data.

*Deep Learning- Understanding neural networks and AI.*

The data analytics and machine learning focus on the detailed and comprehensive study of data which is possible using deep neural networks. The deep learning which is subset of machine learning, is inspired by the functioning of human brain, with layers of interconnected nodes which act as neurons to process the data. Deep neural networks have multiple hidden layers along with input layer and the output layer. The Computer Vision, speech technology, natural language processing, recommendation systems are some of the applications of the Deep Learning.

The keys models and architectures of deep learning are Feedforward neural network (FNN), which is also known as multilayer perceptron (MLP) which are used for regression and classification. The CNN Convolutional neural networks are used for processing images and grid like data structures. The Recurrent neural network (RNN) are majorly used for natural language processing, sequencing problems and gradient issues. The intersection of reinforcement learning and deep learning lay the pavement for the deep reinforcement learning, DRL. Each architecture and model have their own strengths and limitations. The research is continuously evolving the field of Deep learning. The transfer learning and multi-model techniques are the future of the Artificial Intelligence and its applications.

LITERATURE REVIEW

CONCLUSION

REFERENCES