ADV MATH SCI JOURNAL
Advances in Mathematics: Scientific Journal **10** (2021), no.12, 3725–3731
ISSN: 1857-8365 (printed); 1857-8438 (electronic)
https://doi.org/10.37418/amsj.10.12.12

REVIEW ON APPLICATION AREAS OF DEEP LEARNING

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ABSTRACT. The current era is the golden era of Artificial Intelligence. Machine learning is used mostly in all Applications of Artificial intelligence(AI). Machine learning is proven as a great tool to make AI strong. As an advanced form of machine learning, the popularity and success of Deep Learning is proven in different applications is at the top level. As the accuracy in forecasting is high as well as it is very important for the corporate world. The leadership of deep learning cannot be underestimated. It is used to develop systems that mimic the human knowledge gain process using neural networks. In this paper, we are going to discuss innovative developments in application areas of deep learning.

1. INTRODUCTION

Nature of Artificial intelligence is pervasive as it is influencing our day to day life in many ways. In the past few years' scientists and researchers are more involved in this area as compare to other fields. Due to wide variety of application of AI like speech recognition, object detection, natural language processing, self-driving cars all these are based on machine learning that's why ML is also popular among top business organizations as well a research people. If we look at the internal structure of AI applications, then we analyze that power of AI is due to machine

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2020 *Mathematics Subject Classification.* 68T05, 68T07.

Key words and phrases. deep learning, artificial intelligence, application, review.

Submitted: 21.11.2021; *Accepted:* 09.12.2021; *Published:* 29.12.2021.

learning. Caliber of machine learning cannot be underestimated in terms of its influence on society. For e.g. mining of content on social networking portals and websites related to ecommerce, smart phone which we are using today, advanced cameras not only these ML is used in analysis of sentiments, text translation, news extraction related to precise topic and also in growth of business with predictive models. Traditional approach of implementation is followed by machine learning in which processing of raw data is performed and feature are extracted. Highly skilled experts related to particular domain are needed so that algorithms can be developed which can extract features and representation of raw data into vectors which store specific feature set can be created, so that it can facilitate machine learning algorithms mainly concerned with classification so that identification and classification of input data is carried out. In machine learning there is only single layer for the processing of raw data so that it can be classified, recognized and detected. Accuracy of machine learning algorithms is less because there is only one level of processing in mapping inputs to outputs. Deep Learning techniques are used to overcome accuracy issues of machine learning, these techniques are based on neural networks which are based on human brain and there are multiple layers between input and output which are known a hidden layers. Representation of one layer is updated to next layer in which it is more conceptual with the help of modules which are nonlinear. Discrimination and variations are decreased because of using these general updating from one layer to another by building functions which are complex in nature. Layers which are concerned with extracting features are not developed by programmers an overall learning procedure is used to train layers for this purpose. Accurate and Strong Decisions can be achieved with the contribution of Deep Learning. From the last few years the whole scene has been changed due to power of Deep Learning, there are numbers of applications of machine learning including medicine, business, self-driving cars and many more in our day to day life. Leadership of DL cannot be underestimated [1]. In this paper we are going to discuss revolutionary progresses in applications of deep learning.

2. Deep neural network applications

Here Applications of Deep Networks are discussed in a general review.

2.1. **Speech Recognition.**

Use of machine learning algorithms is very high in recognition of speech automatically and acoustic modelling [2]. Speech recognition problem is general one in which sequences of features are analyzed to identify sequences of words or waveforms of speech. In order to develop a satisfactory speech recognition system there is need to rectify many issues like noise in environment, recognition of multiple models as well as multilingual recognition. In general pre-processing of data is performed in which techniques are used which remove noise and speech recognition algorithm starts its execution. [3] discussed approaches which are used to remove noise and use spectral subtraction to enhance speech., spectral amplitude estimation as well as Wiener filtering windowing is also used. Results of Neural Networks and Support Vector Machine are favorable in recognition of speech. Speech recognition systems are developed with Gaussian mixture model(GMMs) and Hidden Markov model's relationship with hidden states is identified and represented [4]. Identification of Deep Learning as Advanced version of machine learning is accepted by researchers as well as scientists. In feature extractor results of deep learning leads to high accuracy, patterns can also be successfully recognized with Deep Learning. In Deep neural networks lower layers provide features to higher layers. As experienced by researcher's performance of DNN is more in speech recognition's acoustic modeling as compare to GMM's. GMM's are replaced by DNN's because of their exceptional performance in data modelling for speech recognition [5,6]. Phone recognition [7] is one of the initial Applications of Deep Learning in speech recognition.

2.2. **Computer Vision and Pattern Recognition.**

Visual data such as images and videos can be properly analyzed and processed by computer vision[8].Data with high dimensions is fetched by computer vision system and converted to numerical arrays and symbols for processing purpose. Perceptual ability of human beings is provided to Deep Learning model. The concept of computer vision is extraction of useful information from images and develop a human like perception system.Pattern recognition issues can be easily resolved with the help of deep learning approaches which we are going to discuss.

1. Progress of Deep Learning is very high in computer vision area as well as recognitions of patterns if we look at past 5 to 10 years with main focus on recognition of objects [9].
2. One of the main sub-area of computer vision that is Detection is easily performed with the help of Deep Learning. Using Detection objects in images which are targeted can be easily located and classified.Special issues in an Image are identified by scanning the image in the process of Detection[10]
3. Alignment of face has its remarkable importance in applications which are visual in nature for e.g. recognition of faces. Sometimes while the processing of face images, alignment of face is the biggest issue when these face images are analyzed. These issues can be resolved by models in which there is variation for appearance and shape. Method used in these types of models are classified into three categories.

- Appearance Active model
- Local constrained model
- Regression Based

Adaptive cascade deep convolutional neural network(ACDCNN)is used to detect facial points [11] if we compare this method with method based on regression then it reduces the complexity of the system. Simple DCNN is reconfigured by [11] by developing a new method for training which is adaptive when applied to different network architectures. Results which are acquired by practical implementation conclude that performance is much better as compared to DCNN's. Annotation of images which have multiple labels is a latest concept in computer vision. [12]. Content-based image retrieval can also be developed using Deep Learning [13]. Cross-Modal retrieval can also be facilitated by correspondence AE(Corr-AE) in which representations of uni-model AE's which are hidden are correlated [14].

2.3. **Virtual Assistants.**

Virtual Assistants are one of the most important applications of deep learning for e.g. Google Assitant,Siri etc .Every time you interact with the virtual assistant its experience regarding your accent and voice increases, by using this experience it will give you a human like feeling[15].Concept of Deep Learning is applied in the backend of virtual assistants so that their knowledge can be increased about your personal life like your favorite food, actors, subject etc. Natural Human

Language is evaluated for the understanding and execution of human commands [16]. Translation of speech to text can be performed by virtual assistants., notes can be created for human beings as well as appointments can be booked. Text can be generated and documents can be summarized using Deep Learning, this feature of Deep learning lets your virtual Assistant compose and send emails [17]. Workplaces will be transformed by Deep Leaning in upcoming years. As jobs are being automated due to Deep learning so it is going to replace human beings.

2.4. **Healthcare.**

Medical Imaging, analyzation of genomes, conduction of research , discover new drugs and whole medical industry is transforming day by day and C.P.U's are not sufficient for computing there is need of G.P.U's.Software which run on G.P.U's are more efficient and can make complex tasks more easy and doctors, clinic assistants and medical lab staff will become more powerful in the improvement of life of patients. Due to this disease which can lead death can be easily detected with speed and accuracy and lack of availability of highly qualified physicians can be addressed. Results of pathology and setting standards for course of treatment and future risk of diseases can be predicted by understanding genetics are examples of Deep Learning applications in Healthcare [18]. Read Mission is a major problem in health care sector its cost if we estimate it is around ten of millions of dollars. Deep learning and neural networks can be used by large healthcare organizations can moderate risks of health concerned with read missions at very low cost[19]. Diseases which are untreatable can be treated by applying AI and Deep Learning in clinical researches. As there is always shortage of proper datasets it is a great challenge in the application of Deep Learning in medicine.

3. CONCLUSION

Most of the important applications of Deep Learning are discussed in this paper like computer vision, healthcare, virtual assistants etc. Issues related to these areas are also discussed. As hardware infrastructure is progressing at very fast speed we are sure that deep learning will be widely accepted in future. Although there is need of more research in this area. Due to rise in virtual assistants Deep Learning is also going to replace human beings in their jobs. There is need to overcome challenges regarding proper datasets so that Deep Learning models can be trained

well for accurate predictions. In Future we going to discuss issues which arise in acquiring proper datasets for Deep Learning.

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