FUTURISTIC TRENDS IN INFORMATION TECHNOLOGY-DEEP LEARNING

By

Prof.Anjuman A Ranavadiya

Grow More Faculty of Engineering,Himatnagar.

Email Id:anju.ranavadiya@gmail.com

Mobile No:9979548277

 The information technology industry is experiencing a boom like never before, more and more advance technologies will be the part of this area due to immense potential of various area and various brand. Information has various area which are developing like never before. The future is all about information technology different trends like artificial intelligence, neural network , deep learning , machine learning, smart technology, automation ,virtual reality ,augmented reality , predictive analytics ,cloud migration, open source solution ,edge computing etc. Here I would like to introduce one of the main IT trends for future enhancement and that is “Deep Learning “.

 Deep Learning is sub part of the machine learning –that take historical data as input and to predict the new output values. It is concerned with algorithm that is inspired by structure and function of the brain called artificial neural network [1].

 We are always getting wonder that how the goggle can translate one entire paragraph in one language to other language without any hassle or difficulties within few milliseconds; how the YouTube or any other app like Netflix give recommendation within microseconds in all the circumstance, the self-driving car is working automated that all things are the part of even green technology that is the deep learning. Deep learning is actually one major sub part or sub area of machine learning that is also one part of the artificial intelligence. Artificial intelligence is the general term of the computer technology that is used to enable computer is work like mimic human behavior. Machine learning have numerous amount of data that is use the working of deep learning concept [1].

 Artifial Intelligence is that can sense ,reason , act and adapt which the main set of this technology .machine learning is the sub set of artificial intelligence which have algorithm whose performance improve as they are exposed to more data over the time. Deep Learning is the layered technology which is used to analyzed vast amount of data.

Deep learning is highly recommended part of the family of machine learning methods that is actually a based on learning representations of information. An observation that is done by the machine like various images can be represented in many forms like as a vector of intensity values per pixel, or in a more common way of sub set, regions of particular fill and shapes, etc. in all of the contain some of them representations make it very easiest to learn various task like face recognition and various facial recognition, finger recognition etc. [2] One of the most prospective of deep learning is replacing hammered ability of data or hand crafted ability of data with well-planned algorithms for unsupervised or semi-supervised machine learning content with the hierarchical data extraction[3]. Attempts to make the best representations and develop models to learn these representations from vast amounts of unlabeled data are at the heart of deep learning studies. even we can say that some of the representation are highly recommended by the advance technology concept like neuroscience that are very likely loosely coupled based on interpretation neural coding, which refers to the definition of a link between diverse inputs and related neuronal responses in human brains, is one method of processing informational data and efficient communication patterns in a neurological system. [5]. Different kind of deep learning concepts or we can say various technology which are highly working with the concept of deep learning is like deep neural networks, sinuosity deep neural networks, deep optimism networks and chronic neural networks have been very likely work with now days in the concepts of computer vision, natural language processing, audio recognition ,bioinformatics and automatic speech recognition, where they have been represent the data to the most common form to various state of the art with various tremendous result based on various tasks. On the other hand we can say that the major concept of the deep learning has been characterized as a buzzword, or a modern concept of neural networks.

Deep Learning is the mainly classified with the major part of the machine learning concept that is the main hierarchy of the various layers of nonlinear processing units that is used for the various extraction and transformation of data. This technique is built on a number of layers, each of which takes its output as an input. this is mainly use the concept of machine learning both type supervised and unsupervised include the pattern analysis that are completely based on the multiple levels of the various features or various representation of the anonymous amount of the data. The hierarchy level is always a component of the data representation. [1].



Figure 1 Deep Learning Architecture [6]

We can see that deep learning is the set of various immersive technology , one of the area or you can say that one of the most effective technology that is used by the deep learning is the gesture recognition.it is the broad field of involving different types of interactions. This is the kind of the system that is utilized to identify human gesture to convey the information for various device control the primary goal of gesture recognition is to capture motions that are made in a specific way and are afterwards picked up by a device like a camera. For a variety of purposes, hand gestures can be utilized as a method of communication. People with various disabilities, such as those who have hearing impairments, speech disorders, and stroke patients, may utilize it to communicate and meet their fundamental needs [7]. Hand gestures have been the subject of numerous studies in the past. Various methods for carrying out the hand gesture experiments were suggested by other studies. In order to process photos, a variety of tools are available, as well as artificial intelligence, which uses a variety of classifiers to categories various kinds of data. An efficient method is needed to extract images from 2D and 3D hand gestures and classify the numerous small motions and movements. Hand gesture recognition is the one of the best and easy way to understand high resilience interface between device and user .using the different kind of finger movement as well as the hand movement through the operation of complex and hierarchical machine is allow to use the gesture recognition[8].

The Hand is often well known as the most natural and involuntary interaction for humans’ interaction. In the deep learning of hand recognition, a proper hand tracking is the first phase to develop instinctive deep learning system that may be used in applications such as, virtual object manipulation, gaming and gesture recognition. And also the hand tracking is an interesting principle point which deals with three main parts of computer vision which are segmentation of hand, detection of hand parts, and tracking of the hand. Hand gestures are basically we can say that the most expressive way and the most used in gesture recognition system involving a posture form as static finger shape ration without hand motion and a gesture which is dynamic hand motion with or without finger movements [9].

A hand gesture if want to create than it requires the mainly the tracking of 27 degrees of freedom of hand including two major categories, A hand posture is a static hand pose without any movements; While hand motion is any movement of the hand, either the full hand or fingers.

A hand movement of recognition things mainly consists of three most common types are data-glove based, vision based & electrical field sensing. Evaluating the human body and the various part of the body requires electrical based the sensing, and this device is used officially to measure the distance of human hand or other body part from a device. Currently, most of the significant types almost all researchers are interested in studying, are data-glove-based and vision-based technologies. The data glove based is simply a glove that has multi various types of sensors used to detect hand and finger motions.

There are many styles of data glove and each one has its uses, such as MIT Data Glove, Cyber Glove III, Cyber Glove II, Fifth Dimension Sensor Glove Ultra, X-IST Data Glove and P5 Glove [11]. In current trends the vision based is one of the basic concept that actually requiring essential or necessary development. Simply, it is defined as to detect hand motion using a device such as cameras. Vision based mainly has two approaches which are used in gesture recognition system; model-based and image-based techniques. The definition of model based is attempting to generate a 3D model of the human hand and use this model for recognition while image based is detecting a gesture by capturing pictures of the user’s movement through the sequence of a gesture. Model based, also called spatial gesture models, has two various categories which are 3D model based and appearance based both have diverse types. For example, the 3D model has skeletal and volumetric algorithms whereas appearance based has deformable 2D templates and image sequences. Under volumetric algorithm, there are three other types of algorithms: Non-uniform rational basis spline (NURBS), Super quadrics and Primitives.

As normal, there is no perfection in the hand gesture world. It means there are serious issues faced by people now days are the self-occlusion, hand deformation how it works and irregular motion and appearance similarity making 3D hand tracking a challenging mission.

## Hand Gesture Recognition (Data Glove, Vision Based) For human-machine connection, hand gestures are very natural and essential. The several sorts of data gloves and vision-based techniques will be briefly covered in this section. Data Glove - The development of data gloves marked the beginning of the history of hand gesture recognition. Some researchers realized that sign language influences gestures and can be used to generate simple computer instructions [9]. A data glove is a unique, challenging, and distinctive kind of glove with real switches or with a crucial sensor that relates to the fingers or joints of the glove. It is almost exclusively completed by a person. When used with an optical instrument technique, tactile switches or resistance sensors assess the main area of the twisting of different joints.

When used with simple hand gestures, an optical instrument technique using tactile switches or resistance sensors predicts the majority of the twisting of different joints. The primary factor, which is essentially focused, affects whether a hand is open or closed or whether some finger joints are straight or twisted. Results are given to a computer, which maps them to unusual motions and interprets them. The advantage of a straightforward device is that no pre-processing of any kind was required. These kinds of systems showed some promise despite the fact that the fundamental functionality of the system is limited since cables were utilized to connect the gloves to the computer back in the main field where processing power was much more constrained. [10].

Unlike the traditional gloves, wireless gloves can now be worn comfortably thanks to technological advancements. [11] This area of recognition will discuss the background of some of these gadgets and how they perform with hand gestures. Data gloves have two different criteria which have appeared over many years – active data gloves and passive data gloves an effective data glove consists of many sensors on a glove to measure the movements of joints or quicken and have a major communication track to the host machine via wired technology. These types of hand gloves are actually used to recognize main limits the user of innovative ability.

Gloves come in a variety of forms and have been created since 1977. Each glove has specific functions and capabilities. The Sayre Glove, which was created in 1977 [9] and uses multiple tubes with a light source at one end and a photocell at the other, was one of the earliest designed gloves. These tubes were riding along each finger of the glove. Gary Grimes created the Digital Data Entry glove, another glove with several sensors, in 1983. This glove made use of various sensors mounted on a substance. There are other types of gloves as well, such as the MIT glove and vision-based gloves, which are not discussed in depth in this article because my major focus is on deep learning and how it has an impact.

Deep learning technology is actually saturated with a variety of algorithms, all of which share the trait of being self-representative algorithms that rely on brain computing. Convolutional neural networks (CNNs), long short-term memory networks, recurrent neural networks, generative adverbial networks, multilayered perceptron's, deep belief networks, etc. are common deep learning algorithms.

The CNNs algorithm is also well known as Convent’s, that is the rigid form of multi-layer and that is mainly used in image processing and object detection.recetly that is known as LeNet.it was used for recognition of any kind of zip code and various kind of the digits. Mainly this algorithm is focus on image scanning system.There are other types of algorithms also work with this hand gesture technique in deep learning.so we can say that this is the vast area of future technical concern with the help of machine learning and artificial intelligence.

Automating the extraction of representations (abstractions) from the data is the core idea of deep learning algorithms [5].Deep learning techniques automatically extract complex representation from a large amount of unstructured input. These algorithms are mostly inspired by the study of artificial intelligence, which aims to mimic the human brain's capacity for observation, analysis, learning, and decision-making, particularly for issues that are exceedingly complex. A major driving force behind Deep Learning algorithms, which aim to mimic the hierarchical learning method used by the human brain, has been the work relevant to these complicated challenges. When attempting to extract meaningful information from complicated structures and relationships in data, models with shallow learning architectures like decision trees, support vector machines, and case-based reasoning.

Deep Learning architectures, on the other hand, have the capacity to generalize in non-local and global ways, producing learning patterns and relationships outside of the data's immediate neighbors. In reality, deep learning is a crucial step toward artificial intelligence. The end goal of AI is to create computers independent of human knowledge, thus it not only offers complex representations of data that are suitable for AI tasks. Without human intervention, it directly extracts representations from unsupervised data.

**References :**

[1] Ben-Bright Benuwa, Yongzhao Zhan, Benjamin Ghansah,” A Review of Deep Machine Learning “School of Computer Science and Telecommunication Engineering, Jiangsu University, International Journal of Engineering Research in Africa,2016.

[2] D. Li and D. Yu, "Deep Learning: Methods and Applications," Foundations and Trends in Signal Processing, Now Publishers, 2014.

[3] P. O. Glauner, "Deep Convolutional Neural Networks for Smile Recognition," arXiv preprint arXiv:1508.06535, 2015.

[4] Y. LeCun, Y. Bengio, and G. Hinton, "Deep learning," Nature, vol. 521, pp. 436-444, 2015.

[5] B. A. Olshausen, "Emergence of simple-cell receptive field properties by learning a sparse code for natural images," Nature, vol. 381, pp. 607-609, 1996.

[6] S. Bengio, L. Deng, H. Larochelle, H. Lee, and R. Salakhutdinov, "Guest Editors' Introduction: Special Section on Learning Deep Architectures," Pattern Analysis and Machine Intelligence, IEEE Transactions on, vol. 35, pp. 1795-1797, 2013.

[7]Y. Li, J. Huang, F. Tian, H.-A. Wang, and G.-Z. Dai, “Gesture interaction in virtual reality,” *Virtual Reality & Intelligent Hardware*, vol. 1, no. 1, pp. 84–112, Jan. 2019.

[8]V. Pavlovic, R. Sharma, and T. Huang, “Visual interpretation of hand gestures for human-computer interaction: a review,” *IEEE Transactions on Pattern Analysis and Machine Intelligence*, vol. 19, no. 7, pp. 677–695, 1997.

[9]H. Hasan and S. Abdul-Kareem, “Human–computer interaction using vision-based hand gesture recognition systems: a survey,” *Neural Computing and Applications*, vol. 25, no.

2, pp. 251–261, 2013.

[10]P. Premaratne, *Chapter2: Human Computer Interaction Using Hand Gestures*, 2014th ed. Singapore: Springer, 2014.

[11]P. K. Sharma and S. Sharma, “Evolution of Hand Gesture Recognition: A

Review,” *International Journal of Engineering and Computer Science*, vol. 4, no. 1, p.

9963, Jan. 2015.