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A Review on Artificial Neural Networks

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ABSTRACT:

This paper deals with the glance of introductory to Artificial Neural Networks. Neural networks simulate how the complex human brain works with neurons connected with other multiple neurons as that of humans. The neural networks keep updating regularly as that of the human brain increased growth levels, hence it does not need to get overwritten of usage as other securities worked out. Here it shows how it helps in the security in terms of technology that needs extensive computing power. The usage of neural networks has also been extensively used in cryptography algorithms which become weak over some time as the computing resources to break the algorithms are invented thanks to the advancement of the technologies like quantum computing. It has a positive impact on artificial intelligence as the neural networks can improve through the experience without human interference once it starts with a set of rules or guidelines however, the AI can start with nothing and can create its algorithm and learns the rule with the help of machine learning techniques based on the rules. Neural networks learn from the human feedback from the initial baselines whereas AI does not need the baseline as it can learn from the observations. Neural networks include a working side of industrialization, technologies that work on neural networks to differentiate them. The neural network's role in medical science analysis attached to technology shows its elaborative ways of developing neural networks.

Key Words: Artificial Neural Networks, Quantum computing, Industrialization, Medical science

1.INTRODUCTION:

Neural network works based on human brain structure as the human brain works it takes all the complexities and analysis of daily based algorithms and calculations how the human brain gets evaluated with the knowledge and shines up by knowledge gain it's like how a person picked up for a job like an experienced person for developing greater things exactly here these artificial neural networks as like human analyzing the complexities and calculations and works as like experienced person In a job here parallel computing simply it's an attempt to make a computer model of the brain. These are assigned with deep learning which associates with machine learning here it takes the input and trains itself to recognize itself and gives output. Let me take an example of image detection that differentiate human and animal for these, where neural networks are made up of neurons layers these neurons are the main processing units of the process here layers takes as a role input layer and the output layer remaining are layers to process here it takes an image as pixels and carries it to input layer and transmits next layer through connected channels these channels are assigned with numerical value "(X1 * 0.8 + X3 * 0.2) + B1" called as weight these transmits corresponding weights of the channel all these added pixels sum values are shares as input these neurons are associated with bias and these added values are passes through the threshold function called The result of the activation function determines if the particular neuron will get activated or not. An activated neuron transmits data to the neurons of the next layer over the channels in this manner the data is propagated through the network this is called forward propagation. In the output layer, the neuron with the highest value fires and determines the output. The values are probability. For example, here pixels are associated with a skin tone that's output by the neural network is not represented exactly but provides information it just needs training need to be trained toget exact information out till the actual output is compared.

These neural networks work on some strategies that help to differentiate the technology into categoriesand type of specifications and mainly works on the

(1)Supervised learning

(2)Unsupervised learning
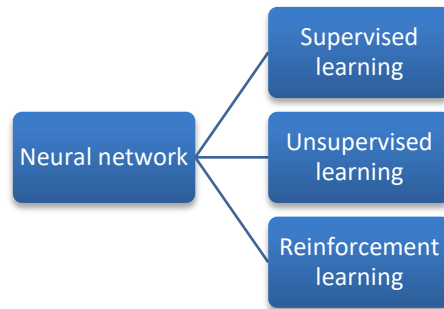
(3)Reinforcement learning

Fig:1.a Types of learning in Neural Networks

1.1 SUPERVISED LEARNING

Supervised learning looks like a prerequisite provided by itself to create the perfect solution and to make an adjustment, it's like recognizing face data in a patterned manner if that pattern gets changes slowly it adjusts itself to correct it, if any face patterns is not recognized it detects an error In artificial neural Technology this works on an input object that consists of a pair of nodes.

1.2 UNSUPERVISED LEARNING

Unsupervised like moderating itself to a worker addressing itself without any prerequisites it's like a process without any instructions here system works itself it's like providing an artificial human hand. That works with neurons that transmit to process neurons and working for that hand according to the action of the neuron it has learning types like:

(i)Clustering

(ii)Dimensional Reduction

(iii)Association

(iv)Anomaly Detection

1.3 REINFORCEMENT LEARNING

Reinforcement Learning builds on "The observation of the nature it's like providing locking device permanently when iOS think that suspicious person using mobile.

2. LITERATURE REVIEW :

Three stages of Artificial Intelligence are Artificial Narrow Intelligence (ANI),Artificial General Intelligence(AGI),Artificial Super Intelligence(ASI)[4] . [6,8]The working nature and importance of Artificial Neural Networks may leads in all the upcoming fields and useful to the society in all kinds of aspects.

I. NEURAL NETWORK FURTHER SCOPE:

Neural Network in Artificial intelligence has a large scope in developing future Technology that could mold The future of artificial intelligence in a neural network in their respective fields like aerospace, automobile, military, electronics, Financial ,industrial, speech, Telecommunication ,Transportation software, signal processing Anomaly detection all these working in the normal future These are expanded in their respective fields like auto pilot aircraft are works when instruction is given by pilot so These not works total on The basic of autopilot option so it needs to be more progress like auto start and moving on the basic of unsupervised learning makes more progressive may help from any accidents, not only this but like automobile industry also it's just like providing getting headlights on or off based on sunlight focus this helps to work of reinforcement learning. Neural networks' keen observation can help to make their respective fields can help from many accidents this could be the leads of artificial super intelligence (ASI).

So if these applications work as necessary for required learning techniques makes more immensely when these technologies are gathered perfectly and get so much scope for the future it's hard to say whether neural network development will continue indefinitely or whether some new more efficient technology will take its place, either way, this breakthrough in the field of artificial intelligence deserves your attention.

II. HISTORY:

The study of the human brain is started in the very old days. In 1943, Warren McCulloch, a neurophysiologist, and a young mathematician, Walter Pitts, wrote a paper on the working of neural networks. It is said, this is the first step toward neural networks. In 1949, Donald Hebb added some extra information about neurons in his book, The Organization of Behavior. It is found that neural networks improve each time they are used. In 1950, Nathanial Rochester from IBM research laboratories tried to stimulate a neural network for the first time. In 1958, Frank Rosenblatt, a neuro-biologist of Cornell, started work on Perception. The result Perception from this research was built using hardware and is the oldest neural network still in use today. ADALINE and MADALINE named models were developed by Bernard Widrow and Marcian Hoff of Standford. The first neural network used on a real-world problem was MADALINE. It is still in commercial use. It eliminates echoes on phone lines. Until 1981, work on neural network research halted due to fear, unfulfilled claims, etc. In 1982, Japan announced its Fifth-Generation effort at US-Japan Joint Conference on Competitive Neural Networks. This worried the US about being left behind. Soon large funding flowed in for neural networks. Several things happened to reach where we are now.

III. APPLICATION OF NEURAL NETWORK:

ANN plays a very important role due to the following reasons

(1) For some problems, algorithm method solutions may be expensive or may not exist. Here neural networks can find solutions.

(2) Neural networks learn using examples. So, there is no need to put effort to write complex programs emphasizing every small aspect.

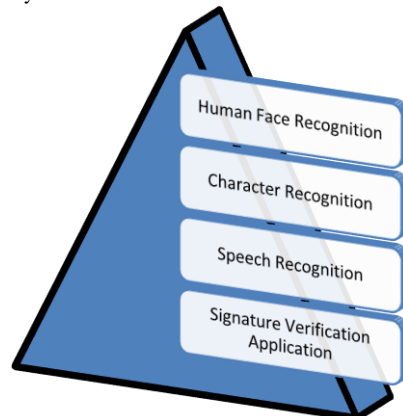(3)   Neural networks have accuracy.

Fig:(5.a) Applications of Neural Networks

5.1 Speech Recognition

It is preferred to communicate through speech for human-human interaction. So, people expect speech interfaces with computers. Humans still need to learn sophisticated languages to interact with computers which are hard to learn and use. When the machine can understand our spoken language, then communication becomes easier for human-machine interaction. Great progress took place in this field. Still, systems are facing issues to understand properly spoken language because of limited vocabulary or grammar. It is required to train the system with many examples to understand different speakers in different conditions. ANNs used for speech recognition are

(1)Multilayer networks

(2) Multilayer networks with recurrent connections

(3)Kohonen's self-organizing feature map

5.2 Character Recognition

It falls under the pattern recognition area. Many neural networks are developed to recognize handwritten characters including letters, digits, and special characters. ANNs used for character recognition are

1.   Multilayer neural networks such as Back propagation neural networks.

2.   Neocognitron

5.3 Signature Verification Application

Signatures are one of the most useful and widely used ways in legal transactions to authenticate and authorize a person. It is a non-vision-based technique. The geometrical feature set representing the signature is extracted and used to train neural networks with efficient neural network algorithms. This trained neural network can recognize whether a signature is a genuine one or forged.

5.4 Human Face Recognition

Facial recognition systems are used for surveillance. Recognition systems recognize human faces and authenticate them with the list of IDs present in their database. A large number of pictures are used and processed for the training of neural networks.

IV.   CLASSIFYING TECHNIQUES OF NEURAL NETWORKS:

These neural networks classified techniques are the main key features of development for the feature and classification formed because these neural networks are the main part of deep learning and it is part of machine learning which is associated with artificial intelligence all these are associated with each other to perform these tasks so these are classified by these techniques.
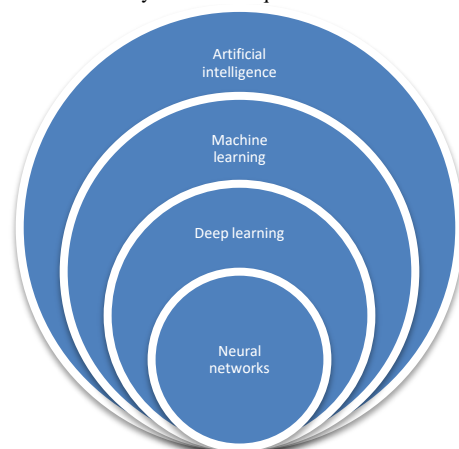

Fig:(6.a) Relation with Neural Networks

6.1 SHALLOW NEURAL NETWORK

These neural networks are made of channels presented in layers of neural network called perceptron to stimulate the neural network of the human brain

here this shallow network layer is single or double-layered it is a weak layered neural network because these operation limitations of algorithms are very low show it looks the easy part when it applied artificial intelligence but in developing it is started with this neural network only so its use in developing side of a neural network like

    (1)   BINARY CLASS TEST CLASSIFICATION

    (2)   MULTI-CLASS TEST CLASSIFICATION

a) **MULTILAYER PERCEPTRON (DEEP NN)** This multilayer perceptron is like a very hard level of the game because it is formed by many hidden layers and perceptron makes it very useful to find the accurate value of the input so these provide an exact answer as its work on the input compared of the shallow neural network because it filtered throughout all layers and also makes a deciding point when two points look so similar.

b) **CONVOLUTIONAL NEURAL NETWORK(CNN)** Here we can most advance feature of a neural network because it provides a more accurate than multilayer neuron network and also better than human it means no chance to win any human because these finding nature of curve works are helping to find exact values google lens and google translators are the best examples of these finding techniques of convolutional neural network.

c) **RECURRENT NEURAL NETWORK (RNN)**

Natural language processing deep forms is processed by this recurrent neural network, it helps to make self learn and corrects the predictions faster to an extent these semantics are helpful in understanding processing of NLP operations.

d) **LONGSHORTTERM MEMORY(LSTM)**

The vanishing gradient problem is present in RNN. To solve this, LSTMs are specially designed. Vanishing gradients happen with large neural networks where gradients of loss function near zero and makes neural networks stop learning. LSTM solves this problem by not changing the stored values and by preventing activation functions within its recurrent components. The final model improved a lot because of this small change. This resulted in tech giants adapting LSTM in their solutions.

e) **ATTENTION-BASED NETWORK**

Attention-based networks are basic helpful network layers that are identified only focusing point is just like focusing on the face and eliminating the remaining background is done by this attention-based network and to identify what data it needs to be focused on, multiple attention models stacked hierarchically is called transformer these transformers are more efficient to run these stacks run parallel occupy result data is what type result in it is the attention this attention can produce text through images what type it is these had those capabilities.

f) **GENERATIVE ADVERSARIAL NETWORK(GAN)**

This GAN is the most advanced part in neural networks which comes under the neural networks these were added with the noise to the world data, its latest technology in deep learning these works on the collection of unsupervised learning these where AI that together to train through a neural network.

V.   ARTIFICIAL INTELLIGENCE NETWORK (AIN) :

Here it could be a new topic some on basic information that all gathered information network can proceed at so,I was to develop the revaluation ideas like providing a complete valid life that to the user on what they interested in by general gathered information simply the respective fields of AI are gathered at one and their styled service is could be new in great technology is these AIN these can change the lifestyle of human it's like providing programmed material to programming interested through their basic of interest so it could lead to high range technology.

INDUSTRIALISATION :

It had industrialization in their respective fields but these AIN could make new industrialization in education and business are together to form industrialization in AI for the all type of lifecycle that s like In advance even we can provide every element of human observations that like providing an os and from their search and collecting their data in keen providing great opportunities through industrialization right know google is following a little bit more but need more revolution in these that makes.

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