



Artificial Neural Network

Dhanashree V. Navghare¹, Vijay M. Rakhade², Lowlesh N. Yadav³

Student, Computer Science & Engineering, Shri Sai College of Engineering & Technology Bhadrawati, Bhadrawati, India¹

Assistant Professor, Computer Science & Engineering, Shri Sai College of Engineering & Technology Bhadrawati, Bhadrawati, India²

Head Of Department, Computer Science & Technology, Shri Sai College of Engineering & Technology Bhadrawati, Bhadrawati, India³

Abstract: An Artificial Neural Network (ANN) is additionally a science paradigm that's inspired by the way biological system, rather a touch just like the brain, process information. The key element of this paradigm is that the novel structure of the knowledge processing system. ANN's like people, learn by example. An ANN is configured for a particular application, like pattern recognition or data classification, through a learning process. It's composed of an out of doors number of highly interconnected processing element working in unison solve specific problems. Learning in biological system involves adjustment to the synaptic connections that exist between the neurons. This could be true of ANNs also. This paper gives overview of Artificial Neural Network, working & training of ANN. It also explain the applying and advantages of ANN.

Keywords: Artificial Neural Network (ANN), Artificial Neuron, Biological Paradigm, Pattern Recognition, Feedback Network, Feed Forward Network.

I. INTRODUCTION

The study of the brain may well be a simulating area since an extended time. With advancement within the sphere of electronics and computing, it had been the assumed that we'll use this natural way of this thinking process style some computing system. The primary step toward artificial neural network came in 1943 when Warren McCulloch, a neurophysiologist, and a young mathematician, Walter Pitts, wrote a paper on how neurons might work. They moulded a straightforward neural network with electrical circuits. Neural networks, with their remarkable ability to derive meaning from complicated or imprecise data, could even be accustomed extract patterns and detect trends that are too complex to be noticed by either humans or other computer techniques. A trained neural network is additionally thought of as "expert" within the category of knowledge it's been given to analyse.

II. ARTIFICIAL NEURAL NETWORK

In electronics engineering and related fields, artificial neural network (ANNs) are mathematical or computational models that are inspired by a human's central system (in particular the brain) which is capable if machine learning still as pattern recognition. Artificial neural network are generally presented as systems of highly interconnected "neurons" which could compute values from inputs. Whereas animal's system is more complex that the human that the system designed this might be ready to solve more complex problem.

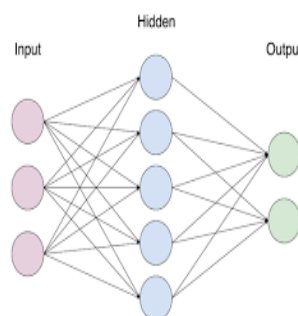


Fig. 1 A Simple Neural Network



Neural Network is simply an online site of interconnected neurons which may be millions is number. With the assistance of those interconnected neurons all the multiprocessing is being done number. With the assistance of those interconnected neurons all the data processing is being tired body and also the best example processing in human or animal’s body.

Currently, artificial neural network are the clustering of the primitive artificial neurons. This clustering occurs by creating layers which are then connected to a minimum of every other. How these layers connect is that the other a component of the “art” of engineering network to resolve the complex problem of the important world.

So neural network, with their strongly ability to derive meaning from complicated or imprecise data, is accustomed extract patterns and detect trends are too complex to be noticed by either human or other computer techniques.

Neural Network are like biological neural network in performing functions collectively and in parallel by the units, instead of there being a transparent delineation of subtasks to which various units are assigned. The term “Neural Network” usually refers to models employed in statistics, cognitive psychological and computing. Neural network models which emulated the central system are a part of theoretical neuroscience and computational neuroscience.

III.CHARACTERISTICS OF NEURAL NETWORK

Basically computers are good in calculations that takes inputs process then and offers the results as per the calculations which is completed by using the actual algorithm which are programmed within the software not ANN uses its own rules, the more decision may become. The characteristics are basically those which should be presented in intelligent system like robots and other engineering applications. There are six characteristics if Artificial Neural Network which are basic and important for this technology which are showed with the assistance of diagram:

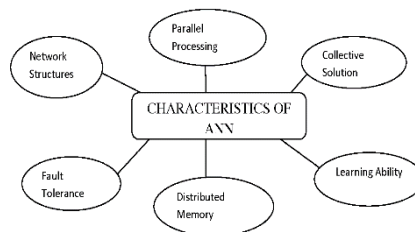


Figure: 2 Characteristics of ANN

Fig 2. Characteristics of ANN

III a: THE NETWORK STRUCTURE:

The Network Structure of ANN should be simple and easy. There are basically two types of structure recurrent and non-recurrent structure. The recurrent structure is additionally called auto associative or feedback network and Non Recurrent Structure is additionally observed as Associative or feed-forward network. In feed forward structure is additionally stated as Associative or but in Feedback Network, the signal travel in both the direction by introducing loops within the network. As shown within the figure below:

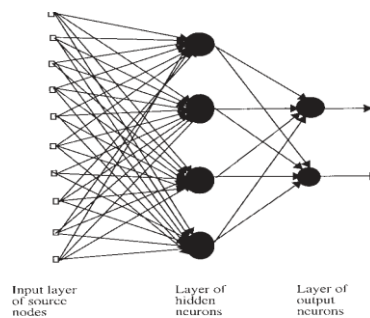


Fig III a.1 Feed Forward Neural Network

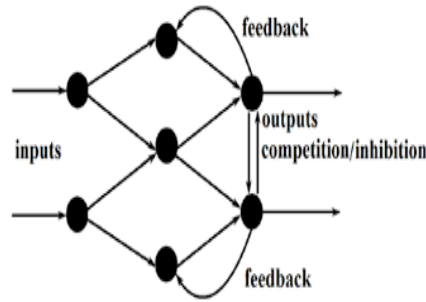


Fig III a.2 Feedback Neural Network

III b: ABILITY OF PARALLEL PROCESSING:

ANN is solely the concept of multiprocessing within the computer field. Multiprocessing processing is finished by the fabric body in human neurons that's very complex but by applying basic and easy processing techniques we implemented it in like ANN like Matrix and a few matrix calculations.

III c: DISTRIBUTED MEMORY:

ANN is extremely vast system so single unit memory or centralized memory cannot fulfil the requirement of ANN system so during this condition we'd like better to store information in weight matrix which form an extended term memory because information is stored as pattern throughout the network structure.

III d: FAULT TOLETANCE ABILITY:

ANN can be a very complex system so it in necessary that it should be a fault tolerance. Because if any part becomes fails it'll not affects the system the utmost but if the all parts fails at the identical the system will fails completely.

III e: COLLECTIVE SOLUTION:

ANN is additionally a interconnect system the output of a system could even be a collective output of various input so therefore the result's is summation of all the result's is summation of all the output which comes after processing various inputs. The partial answer is worthless for any user within the ANN system.

III f: LEARNING ABILITY:

In ANN most of the training rules are accustomed develop models of processes, while adopting the network to the changing environment and discovering useful knowledge. These learning methods are Supervised, Unsupervised and Reinforcement Learning.

IV. LIMITATIONS OF NEURAL NETWORK

In this world everything has some merits and demerits, that the neural network system also has some merits and demerits. The limitations of ANN are:

1. ANN or Neural Network isn't an everyday of living existence solver.
2. There's no single standardized paradigm for Neural Network Development
3. There's no structure methodology available.
4. Many ANN Systems doesn't describe how they solve the matter.
5. The Output Quality of an ANN is unpredictable.
6. Nature of ANN is type of a equipment.

V. ADVANTAGES

1. Adaptive Learning: A capability to be told to undertake and do tasks supported the information given for training or initial experience.



2. Real Time Operation: ANN computation is additionally dispensed in parallel, and special hardware devices are being designed and made which take advantages of this capability.
3. Self Organization: An can create its own organization or representation of the knowledge it receives during learning time.
4. Pattern recognition may be a robust techniques for the knowledge security. Neural network learn to acknowledge the patterns which exist within the knowledge set.
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6. Because neural network can handle very complex interactions they'll easily model data which is simply too difficult to model with exist within the information set.
7. The system is developed by learning rather than programming. Neural network teach themselves the patterns within the knowledge freeing the analyst for more interesting work.

VI. APPLICATION

The Various real time application of Artificial Neural Network are as follows:

1. Application areas of ANNs include system identification and control (vehicle control, process control), game-playing and deciding (backgammon, chess, racing), pattern recognition, (radar system, face identification, beholding etc), sequence recognition (gesture, speech, handwritten text recognition), diagnosis, financia, application, processing (or knowledge discovery in database, "KDD").
2. Function approximation, or method, including statistic prediction and modelling.
3. Processing including filtering, clustering, blind signal separation and compression.
4. Call Control- answer an incoming call (Speaker ON) with a wave of the hand while driving.
5. Skip tracks or control volume on your media player using simple hand motions tip and with no must shift to the device control what you watch/hear.
6. If your hands are dirty or a private hates smudges, touch free control are a benefit.

CONCLUSION

In this paper we discussed about the unreal Artificial Neural Network. There are various advantages of ANN over conventional approaches. Looking forward to the character of the appliance and also the strength of the inner data patterns you'll be able to generally expect a network to educate well. This might be applicable to problem where the relationships could even be quite dynamic or non-linear. ANNs provide an analytical alternatives to traditional techniques which are often limited by strict assumptions of normally, linearity, variable, independence etc. because an ANN can capture many sorts of relationship it allows the user to quickly and relatively easily model phenomena which otherwise may are very difficult or impossible to show otherwise may are very difficult or impossible to teach otherwise. Today's, neural network discussion are occurring everywhere. Their promise seems very bright as nature itself it that the proof that this sort of things works. Yet, its future, indeed the very key to complete technology, lies in hardware development currently most neural development is just proving that the principal works.

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