www.ioirp.com
International Journal of Innovative Research in Computer Science and Engineering (IJIRCSE)
ISSN: 2394-6364, Volume – 3, Issue – 2. April 2018

NEURAL NETWORK CHARACTERISTICS, ADVANTAGES AND ITS APPLICATIONS

1. Mrs.P.Vidhya Devi, Asst Professor

2. Mr.S.Vetrivel , Asst Professor

Department of Information Technology, AJK College of Arts and Science

Abstract:

A Neural Network (NN) is an information processing paradigm that is inspired by the way biological nervous systems, such as the brain, process information. The key element of this paradigm is the novel structure of the information processing system. It is composed of a large number of highly interconnected processing elements (neurons) working in unison to solve specific problems. NNs, like people, learn by example. An NN is configured for a specific application, such as pattern recognition or data classification, through a learning process. A neural network is a complex structure which consist a group of interconnected neurons which provides a very exciting alternatives for complex problem solving and other application which can play important role in today's computer science field so researchers from the different discipline are designing the neural networks to solve the problems of pattern recognition, prediction, optimization, associative memory and control. In this paper we have presented the basic study of the artificial neural network, its characteristics and its applications.

Keywords: Neural Network, Feedback Network, Feed-Forward Network, Artificial Neuron, Biological Paradigm, Pattern Recognition.

1. Introduction

The human cerebrum has capacities in preparing data and checking momentary choice. The numerous analysts demonstrated that the human mind makes calculations in a drastically unique way to that done by double PCs. The neurons is a gigantic network of parallel and circulated registering components, numerous researchers are working most recent couple of decades to manufacture computational framework called neural network, which is additionally called as connectionist show. A neural network is made out of set of parallel and circulated preparing units called hubs or neurons, these neurons are interconnected by methods for unidirectional or bidirectional connections by requesting them in layers.

The human cerebrum has limits in getting ready information and checking passing decision. The various examiners showed that the human personality makes estimations in a radically one of a kind path to that done by twofold PCs. The neurons is a tremendous network of parallel and flowed enrolling parts, various specialists are working latest couple of decades to produce computational structure called neural network, which is moreover called as connectionist appear. A neural network is made out of set of parallel and flowed planning units called center points or neurons,

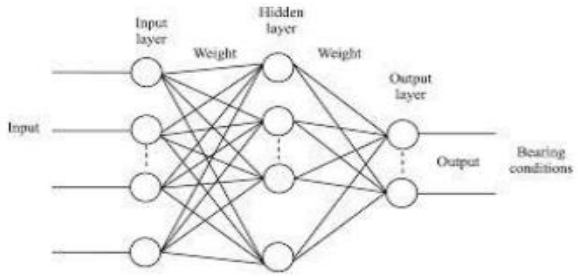

Figure 1: Basic Structure of Neural Network

these neurons are interconnected by techniques for unidirectional or bidirectional associations by asking for them in layers.

2. Working of Neural Networks

The human cerebrum has limits in planning information and checking fleeting decision. The various investigators showed that the human

personality makes computations in a definitely novel manner to that done by twofold PCs. The neurons is a massive network of parallel and circled enrolling parts, various analysts are working latest couple of decades to produce computational system called neural network, which is moreover called as connectionist appear. A neural network is made out of set of parallel and circled planning units called centers or neurons, these neurons are interconnected by strategies for unidirectional or bidirectional associations by asking for them in layers.

3. Characteristics of Neural Network

Fundamentally Computers are great in estimations that takes inputs process at that point and gives the outcome according to the counts which is finished by utilizing the specific Algorithm which are modified in the software's yet NN utilizes its own guidelines, the more choices they make, the better choices may progress toward becoming. The Characteristics are essentially those which ought to be available in astute System like robots and other Artificial Intelligence Applications.

3.1 The Network Structure

The Network Structure of ANN ought to be basic and simple. There are essentially two sorts of structures repetitive and non intermittent structure. The Recurrent Structure is otherwise called Auto acquainted or Feedback Network and the Non Recurrent Structure is otherwise called Associative or feed-forward Network. In Feed forward Network, the flag go in one way just yet in Feedback Network, the flag go in both the headings by presenting circles in the network. As appeared in the figures underneath:

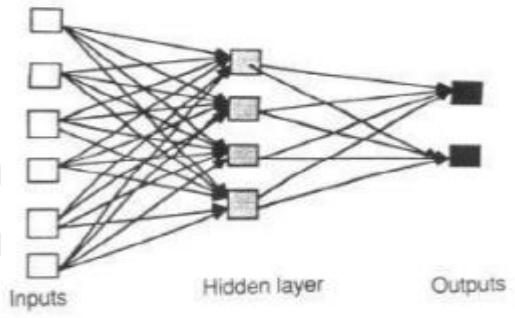

Figure 2: Feed Forward Network

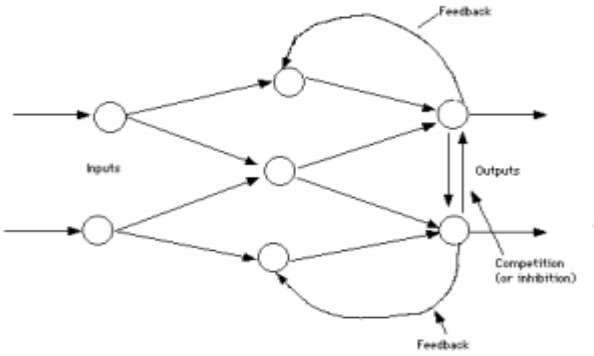

Figure 3: Feedback Network

4. Training an Neural Network

Once a network has been structured for a specific application, that network is prepared to be prepared. To begin this procedure the underlying weights are picked randomly. Then, the training, or learning, starts. There are two ways to deal with training - directed and unsupervised. Directed training includes a mechanism of furnishing the network with the coveted yield either by manually "reviewing" the network's performance or by giving the coveted yields the data sources. Unsupervised training is the place the network needs to understand the contributions without outside help. The tremendous greater part of networks use managed training. Unsupervised training is utilized to play out some underlying portrayal on inputs. In any case, in the all out feeling of being really self learning, it is still only a sparkling guarantee that isn't completely comprehended, does not totally work, and accordingly is consigned to the lab.

4.1 Supervised Training

In supervised training, both the data sources and the yields are given. The network then procedures the data sources and thinks about its subsequent yields against the coveted yields. Mistakes are then proliferated back through the framework, making the framework alter the weights which control the network. This procedure happens again and again as the weights are ceaselessly changed. The arrangement of information which empowers the training is known as the "training set." During the training of a network a similar arrangement of information is handled many circumstances as the association weights are ever refined. The present business network improvement bundles give devices

to screen how well an artificial neural network is focalizing on the capacity to foresee the correct answer. These devices permit the training procedure to continue for quite a long time, halting just when the framework achieves some measurably wanted point, or precision. In any case, a few networks never learn. This could be on account of the information does not contain the particular data from which the coveted yield is determined. Networks likewise don't meet if there isn't sufficient information to empower finish learning. Preferably, there ought to be sufficient information so part of the information can be kept down as a test. Many layered networks with numerous hubs are fit for retaining information. To screen the network to decide whether the framework is just remembering its information in some non significant way, supervised training needs to keep down an arrangement of information to be utilized to test the framework after it has experienced its training.On the off chance that a network basically can't tackle the issue, the originator then needs to audit the information and yields, the quantity of layers, the quantity of components per layer, the associations between the layers, the summation, transfer, and training capacities, and even the underlying weights themselves. Those changes required to make an effective network constitute a procedure wherein the "workmanship" of neural networking happens. Another piece of the architect's innovativeness oversees the tenets of training. There are many laws (calculations) used to execute the versatile feedback required to change the weights amid training. The most well-known method is in reverse mistake spread, all the more generally known as back-proliferation. These different learning systems are investigated in more noteworthy profundity later in this report. However, training isn't only a system. It includes a "vibe," and cognizant analysis, to guarantee that the network isn't over prepared. At first, an artificial neural network designs itself with the general measurable patterns of the information. Afterward, it keeps on finding out about other parts of the information which might be false from a general perspective. At the point when at long last the framework has been accurately prepared, and no further learning is required, the weights can, if wanted, be "solidified." In a few frameworks this finished network is then transformed into equipment with the goal that it can be quick. Other frameworks don't secure themselves however keep on learning while underway utilize.

4.2 Unsupervised, or Adaptive Training

The other kind of training is called unsupervised training. In unsupervised training, the network is furnished with inputs yet not with wanted yields. The framework itself should then choose what highlights it will use to aggregate the information. This is often alluded to as self organization or adaption. Right now, unsupervised learning isn't surely knew.

This adaption to the earth is the guarantee which would empower sci-fi kinds of robots to ceaselessly learn alone as they experience new circumstances and new conditions. Life is loaded with circumstances where correct training sets don't exist. Some of these circumstances include military activity where new battle systems and new weapons may be experienced.

In light of this sudden perspective to life and the human want to be readied, there keeps on being research into, and seek after, this field. However, right now, the tremendous majority of neural network work is in frameworks with supervised learning. Supervised learning is accomplishing comes about.

5. Application

The different constant use of Artificial Neural Network are as per the following:

1. Capacity guess, or relapse analysis, including time arrangement expectation and demonstrating.

2. Call control-answer an approaching call (speaker-ON) with a flood of the hand while driving.

3. Grouping, including pattern and arrangement recognition, oddity location and consecutive basic leadership.

4. Skip tracks or control volume on your media player utilizing basic hand movements lean back, and with no compelling reason to move to the gadget control what you watch/tune in to.

5. Information preparing, including sifting, grouping, daze flag partition and pressure.

6. Parchment Web Pages, or inside an eBook with basic left and right hand motions, this is perfect when touching the gadget is a hindrance, for

example, wet hands are wet, with gloves, filthy and so on.

7. Application zones of ANNs incorporate framework distinguishing proof and control (vehicle control, process control), amusement playing and basic leadership (backgammon, chess, dashing), pattern recognition (radar frameworks, confront ID, protest recognition, and so forth.), grouping recognition (motion, discourse, handwritten content recognition), medicinal analysis, financial applications, information mining (or learning disclosure in databases, "KDD").

8. Another intriguing use case is when utilizing the Smartphone as a media center, a client can dock the gadget to the TV and watch content from the gadget while controlling the substance in a sans touch manner from far off. 9. On the off chance that your hands are grimy or a man loathes smircesh, without touch controls are an advantage.

6. Advantages

1. Adaptive learning:

A capacity to figure out how to do undertakings in view of the information given for training or introductory experience.

2. Self-Organisation:

An ANN can make its own particular organization or portrayal of the information it gets amid learning time.

3. Real Time Operation:

ANN calculations might be done in parallel, and extraordinary equipment gadgets are being composed and manufactured which exploit this ability.

4. Pattern recognition is an intense procedure for bridling the information in the information and making speculations regarding it. Neural nets figure out how to perceive the patterns which exist in the informational index.

5. The framework is created through learning rather than programming.. Neural nets show themselves the patterns in the information liberating the analyst for more fascinating work.

6. Neural networks are adaptable in a changing situation. Albeit neural networks may set aside some opportunity to take in a sudden extraordinary change they are brilliant at adjusting to constantly changing information.

7. Neural networks can construct informative models at whatever point regular methodologies come up short. Since neural networks can handle extremely complex communications they can without much of a stretch model information which is excessively troublesome, making it impossible to show with customary methodologies, for example, inferential insights or programming rationale.

8. Performance of neural networks is in any event on a par with traditional measurable demonstrating, and better on generally issues. The neural networks manufacture models that are more intelligent of the structure of the information in significantly less time.

Conclusion

In this paper we examined about the artificial neural network, working of neural networks, characteristics of NN, its advantages, impediments and utilizations of NN. There are different advantages of NN over ordinary methodologies. Contingent upon the idea of the application and quality of the inward information patterns you can for the most part anticipate that a network will prepare great. This applies to issues where the connections might be very unique or nonlinear. By concentrate artificial Neural Network we had inferred that according to as innovation is creating step by step the need of Artificial Intelligence is expanding a result of just parallel preparing. Parallel Processing is more required in this present time on the grounds that with the assistance of parallel preparing no one but we can spare more and more time and cash in any work identified with PCs and robots. On the off chance that we discuss the Future work we can just say that we need to grow considerably more algorithms and other critical thinking procedures so we can evacuate the confinements of the Artificial Neural Network. By concentrate Neural Network we had presumed that as the innovation is expanding the need of Artificial Intelligence is additionally expanding a result of parallel preparing, on the grounds that by utilizing parallel handling we can accomplish more than one errand at any given moment. So Parallel Processing is required in this present time in light of the fact that

with the assistance of parallel preparing we can spare more and more time and cash in any undertaking identified with gadgets, PCs and mechanical autonomy. In the event that we discuss the Future work we can state that we need to grow more algorithms and projects with the goal that we can evacuate the constraints of the Neural Network and can make it more and more valuable for the different sorts of uses. On the off chance that the Artificial Neural Network idea is joined with the Computational Automata, FPGA and Fuzzy Logic we will comprehend a portion of the constraints of neural network innovation.

References:

[1] Ms. Sonali. B. Maind et. al., Research Paper on Basic of Artificial Neural Network, International Journal on Recent and Innovation Trends in Computing and Communication Volume: 2 Issue: 1 | January 2014

[2] Vidushi et al., International Journal of Advanced Research in Computer Science and Software Engineering 2 (10), October2012, pp.278-284

[3] Christos Stergiou and Dimitrios Siganos, "Neural Networks".

[4] About Neural Network from website http://en.wikipedia.org / wiki/Neural_network .

[5] Girish Kumar Jha, "Artificial Neural Network and its Applications", IARI New Delhi.

[6] Image of a Neuron form website http://transductions.net/ 2010/02/04/313/neurons/

[7] Ugur HALICI, " Artificial Neural Networks", Chapter 1, ANKARA.