Chapter 2
Comprehensive Modelling of ANN

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ABSTRACT

An artificial neural network (ANN) is an information processing modelling of the human brain inspired by the way biological nervous systems behave. There are about 100 billion neurons in the human brain. Each neuron has a connection point between 1,000 and 100,000. The key element of this paradigm is the novel structure of the information processing system. In the human brain, information is stored in such a way as to be distributed, and we can extract more than one piece of this information when necessary from our memory in parallel. We are not mistaken when we say that a human brain is made up of thousands of very powerful parallel processors. It is composed of a large number of highly interconnected processing elements (neurons) working in union to solve specific problems. ANN, like people, learns by example. The chapter includes characteristics of artificial neural networks, structure of ANN, elements of artificial neural networks, pros and cons of ANN.

INTRODUCTION

Features of Artificial Neural Network

- It's an impartially applied scientific model.
- Its contains vast figure of interrelated handling components named neurons to do all operations.
- Information put in storage in the neurons are basically the weighted linkage of neurons.

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- The input signals reach at the processing components through associates and attaching masses.
- It has the capability to study, remember and simplify from the given data by suitable assignment and adjustment of weights.
- The mutual activities of the neurons define its computational power, and no single neuron transmits explicit data.

Structure of ANN

An ANN is recognized as a Neural Network, it is mainly based on mathematical model based on the arrangement and roles of natural neural networks. This is almost a non-natural human nervous system to receive, process and transmit information in Computer Science (Mehrotra et al., 1997) (Agatonovic-Kustrin & Beresford, 2000).

The ANN idea is created on the certainty of the functioning of the People mind in creation the accurate influences can be copied for use of silicon and cables like neurons and active a short branched extension of a nerve cell.

The People mind is ready up of 86 billion nerve cells is known as neurons. neurons connected to a multiple other cells by Axons. A short branched extension of a nerve cell accepts the provocations of the outside atmosphere or the assistances of the physical structures.

The inputs generate electrical compulsions, which are transmit through the neural network. A neuron cannot send any message to some other neuron to solve the any difficulties. (Mehrotra et al., 1997)[2].

ANNs are made up of multiple nodes that mimic the genetic neurons of the People mind. Neurons associated with bonds and interrelate to each other.

The intersection is takings contribution information and do basic Process on the information. The outcome of these processes is spread to next neurons. The productivity on individually intersection applies to the beginning or importance of the node.

Separately connection is connected to a weight. ANNs are skilled of learning and altering weight values.

The structure of an ANN contains of artificial neurons in a clustered layer. The ANN structure contains three layer like: an input layers, hidden layers, and an output layers (Agatonovic-Kustrin & Beresford, 2000; Artificial Neural Networks in Data Mining, n.d.; Maind & Wankar, 2014; Mehrotra et al., 1997; Papantonopoulos, 2016; Sharma et al., 2012; Xenon Stack, n.d.).

Details of layers in a neural network see in below Figure 1.

1. **Input Layer:** Every input is sent to the prototypical through this layer.
2. **Hidden Layer**: There are many masked layers used to procedure the input acknowledged from the input layers.
3. **Output Layer:** Post-processing data is accessible at the output layer.

- **Input Layer:** Input layer is the starting layer of the neural network. The layer links to the outside atmosphere that offerings a strategy of the neural network. This layer handles only input. Gets the input and transfers it to hidden layers and detailed in the Hidden layer. The input layers have to signify the form for working in the neural network. Each inputs neuron has to mean approximately autonomous variable that influences the outcome of the neural network. It does not calculations on the given values like no weight and preference value connected. In figure there are four input