

# Utilization Of Artificial Neural Networking

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**Abstract :** This paper is an attempt to explore about the utilization of newly introduced technology ‘Artificial Neural Networking’ (ANN). Expertise of Machine Learning and Artificial Intelligence is required to perfectly evaluate the data which lead to the development of automated systems. An ANN is configured for various operations such as pattern recognition or data classification through learning process. It is inspired from the Neuron of human brain and this makes this technology unique from all other technologies in the existence. This tool helps us to draw the conclusion even on the individual basis not only on average trend. We have excess of data in this technical era on every field. This data can be utilized in the training of models and they can do the accurate predictions. The group of ANNs when perfectly used, allows the escalation of what can be achieved and predicted in the future rather than using simple probability concept.

**IndexTerms – Machine Learning, Deep Learning, Artificial Intelligence, Neural Network, Model Training**

## 1. INTRODUCTION

ANNs are inspired by the biological neurons present in our brain. These are the most advanced tools available today in the progress of artificial intelligence. An artificial neuron is a mathematical function which originates as a simple model of real neuron. McCulloch-Pitts Neuron is a plain model of real neurons known as a Threshold Logic Unit. A set of input connections brings in activation from other neurons and then processing unit sums input. Then non-linear activation function (threshold function/transfer) is applied and then an output line transmits the result to other neurons. There are three basic elements of the neuron- weights, thresholds and a single activation function. We use different learning algorithms for training and learning. Training is the process by which the network is taught to change its bias and weight whereas learning is the process by which neural network system learns to update or adapt the weights and biases. Weights are the numerical values associated with the connection between nodes. Bias is the constant which is added to the product of features and weights. It is used to offset the result. It helps in the shifting of activation function towards positive or negative side. Layers can be of two type multilayer or single layer networks. To overcome the limitations of single layer network, multi-layer network (MLN) is introduced. In MLN, the layers other than input and output layers are called hidden layers. Input layer collects the data and hidden and output layer processes the data. MLN uses linear discriminants. Different procedures are available for learning and training of ANNs. Supervised learning, reinforced learning and unsupervised learning are the main procedures available. Learning rules should be strictly followed for the learning of neural networks. Learning time should be less for capturing the information from the training pairs, local information should be used and it should capture as many as patterns possible.

## 2. METHODS OF LEARNING

### 2.1 Supervised Learning

Supervised learning requires a teacher supervision. This is dependent type of learning process in which input vector is presented to the network, which produces an output vector. Now the comparison is made between network generated output and desired output and error is determined. The error is used to change the network parameters (weights would be adjusted), that results in the improvement of performance. That's why supervised learning is also called error-based learning. Frank Rosenblatt developed Perceptron model which uses supervised learning rule and classifies data into to two classes.

Perceptron is the basic operational unit of ANNs which consist of a single neuron with an arbitrary number of inputs and the output of the neuron is 0 and 1 depending upon threshold.

### 2.2 Reinforced Learning

In the method of reinforced learning (RL), although teacher is present but do not show the expected answers. It only indicates whether the received answer is correct or not. In RL, data is accumulated from the ML systems which uses trial-error method but here data is not the part of input. There are two types of reinforcement positive and negative. In the positive reinforcement, when an event occurs due to a particular behavior, strength and the frequency if the behavior increases. In the negative reinforcement, strengthening of behavior occurs due to avoidance of negative condition. The elements of reinforcement learning are policy, reward function, value function and model of the environment. In RL due to absence of training dataset, model is bound to learn from its experience.

### 2.3 Unsupervised Learning

In the method of unsupervised learning, no teacher is present means the target output is not presented to the network. This makes the system to learn on itself discovering and adopting to structural features in the system inputs. Methods of unsupervised learning are Clustering, Association and Dimensionality Reduction.

Clustering is a technique to explore raw data and break it down to clusters based on similar properties or differences. In exclusive clustering, data is grouped in a way where a single data point can only exist in one cluster. In overlapping clustering, data is grouped

in a way where a single data point exists in two or more clusters with different degree of membership. In hierarchical clustering, data is divided into distinct clusters based on similarities, which are repeatedly merged and organized based on hierarchical relationship. There are two main types of hierarchical clustering: agglomerative and divisive clustering.

Association rule mining is a rule-based approach to reveal relationship between data points in large datasets. These unsupervised learning search for patterns and previously hidden relationship within data and different connection between datasets.

Dimensionality reduction is a learning technique that reduces the dimensions or features. It allows to extract important information from the dataset ignoring the irrelevant information. Principal component analysis (PCA) and singular value decomposition (SVD) algorithms are used in this technique. This technique involves feature selection and feature extraction. Feature selection is the process of selecting a subset of original feature that are most relevant and important to the problem at hand whereas feature extraction is a process of creating new features by combining and transforming original feature.

### 3. MAJOR APPLICATION OF ANNs

Artificial neural networking is effective in solving complex problems easily. The excess amount of data allows to explore and predict in any field. Day by day artificial intelligence models are becoming better and better due to the continuous learning through the data. These neural networks are widely used today to predict customer choice, gain the retention of the views in the social media, predict the rise and fall of the stock market, in the early prediction of disease. Various models of artificial intelligence have been developed for medical purposes. In modern healthcare systems, Convolutional neural networks are used for X-ray detection, MRI, CT-scan and ECG. Recurrent neural networks are extensively used for learning and perceiving voice recognition system. In modern era, mining of the data from social media applications is done using multilayer perceptron ANN. In the case of stock market hybrid neural network, dynamic artificial neural network and multilayer perceptron are uses unspecific auto-regressive conditional heteroscedasticity to mine extra input variables which can be used to give estimates of stock market.

CNN, MLP and recurrent neural network are used to forecast weather and sometime combination of these models are used to get more accurate prediction. Deep neural networks are occupying a large space in artificial intelligence, robotics technology and autonomous vehicles.

### 4. CONCLUSION

Artificial neural network or stimulated neural networks comes under the branch machine learning that uses various techniques of probability, statistics and development for the automated leaning and training of various AI models. Everywhere these technologies are now widely used for predicting customer needs, audience retention and many more. Every social media platforms are utilizing the technique of machine learning which allows them to retain audience in their platforms. Medical industry is using CNN for various purposes. Machine learning is used for the various disease prediction such as breast cancer prediction. Organizations will be prominently benefited from this technology and this is going to bring the new revolution in the industry.

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