A review Study of Neural Network on Traffic Analysis

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Abstract: This paper contains the study regarding artificial neural network, the technique used for traffic analysis. In current time, traffic is the one of the problem in world which has faced by every country on their every corner of road. Many people have lost their life due to heavy or unmanageable traffics on road. With the help of this technique, we can analyze the traffic and control to it from road jam in our daily life.

Keyword: Artificial neural network, Neural Network, Supervised Learning, Unsupervised Learning

I. INTRODUCTION

With the development of the countries, roads are the common way for communication. Each person uses the road for their work. So as a result traffic on the roads increasing day by day. So it is necessary to maintain traffic on the roads. For maintaining traffic, some traffic analysis method will be needed. This will be done by artificial neural network. After analyzing the traffic, an alternative path will provide to the vehicles which has less traffic and this is done with the help of ant colony optimization.

Artificial Neural Network: A network inspired by biological neural networks is known as **artificial neural network** (**ANN**). Its structure is based on the structure of neurons of human brain. Neural Network helps in analysis of the traffic.

An artificial neural network is the mathematical models depend upon some particular learning algorithm and rule. An artificial neural network contains a set of nodes, layers and set of weighted links that connected these layers. Here we use the word network which implies that there is an interconnection between various layers with the help of the links. An artificial network neural contains mainly three layers. These are:

1. *Input Layer:* It is the first layer which is used to take input and send data from synapse to neurons.
2. *Hidden Layer*: The second layer in artificial neural network is Hidden Layer. It takes input from input layer and then process this input and sends the result to output layer which is the third layer.

3. *Output Layer:* The third layer in artificial neural network is output layer. The synapse calculates the weights and then sends the result to the output layer.

An artificial neural network works with the help of these three layers and calculates the result using these three layers. An artificial neural network (ANN) is typically uses the three types of parameters. These are:

1. *Interconnection Pattern:* The different layers of neurons formed interconnection patterns.
2. *Weights:* Another type of parameter is weights. These are the mathematical values which are given to the various links of the interconnections.
3. *Activation Function*: With the help of activation function an input is converted into output. An input may be a neuron's weights.[15]
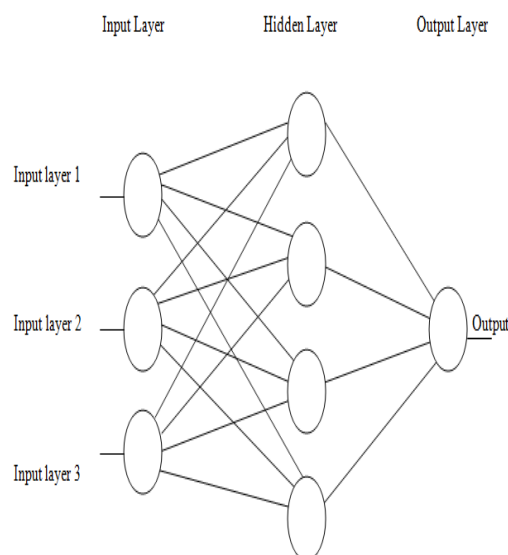

Fig.2. Artificial Neural Network

Artificial Neural Networks has many properties and it is capable of handling the systems which has dynamics behaviour. Some of the important properties of artificial neural networks are as follows:-

A. *Recognition and Classification*: Artificial Neural Network helps in recognition and classification of the data. It learns the characteristics of the data after that recognized the pattern and then classified it during its training.

B. *Approximation:* Artificial Neural Network helps in calculating the multivariable functions. These are based on the learning properties of functions.

C. *Association:* Artificial Neural Network also helps in calculating the association. Association is the measure of degree of togetherness.

D. *Data clustering:* Artificial Neural Network helps in clustering the data by finding the common characteristics or groups of the data.

E. *Prediction:* Artificial Neural Network helps in predicting the static parameters.

For congestion avoidance on the roads traffic analysis plays an important role. Due to congestion a person has to face many difficulties like they will not able to reach their destination on time, wastage of fuel and pollution. Various techniques are used for traffic analysis. Some of them are: data mining, soft computing, artificial neural network, etc. This paper provides information for analysis of traffic by using artificial neural network.

Artificial Neural Network provides two approaches for training:

1. Supervised Learning
2. Unsupervised Learning

Supervised Learning: Supervised training involves a mechanism of providing the network with the desired output either by manually "grading" the network's performance or by providing the desired outputs with the inputs. Unsupervised training is where the network has to make sense of the inputs without outside help. The vast bulk of networks utilize supervised training. Unsupervised training is used to perform some initial characterization on International Journal on Recent and Innovation Trends in Computing and Communication inputs. However, in the full blown sense of being truly self learning, it is still just a shining promise that is not fully understood, does not completely work, and thus is relegated to the lab.

1. Supervised Training: In supervised training, inputs as well as outputs are provided. The network then processes the inputs and compares its resulting outputs against the desired outputs. Errors are then propagated back through the system, causing the system to adjust the weights which control the network. This process occurs over and over as the weights are continually tweaked. The set of data which enables the training is called the "training set." During the training of a network the same set of data is processed many times as the connection weights are ever refined. The current commercial network development packages provide tools to monitor how well an artificial neural network is converging on the

ability to predict the right answer. These tools permit the training process to go on for days and stopping just when the system reaches a number of statistically required point or accuracy. However, some networks never learn. This could be because the input data does not contain the specific information from which the desired output is derived. Several layered network with various nodes are able of memorize information. There are many algorithms used to execute the adaptive feedback required to adjust the weights during training. The mainly common technique is back-propagation.

2. Unsupervised Training: The other type of training is called unsupervised training. In unsupervised training, the network is provided with inputs but not with required outputs. System itself must then decide what features it will use to group the input data. This is called self- organization or adaption. Because of the unpredicted aspect to life and the human wish to be prepared, there continues to be research into, and hope for, this field. At the present time, the bulk of neural network work is in systems with supervised learning. Supervised learning is achieving results. [1]

II.   LITERATURE SURVEY

J. Mohamed Rizwan1, P. Navaneetha Krishnan1,(2016)[1] Real time traffic control is a main criteria of the urban traffic signal control system, and giving viable ongoing traffic signal control for a substantial complex traffic system is a testing issue. The objective of the work is to find and adjust the timing of signals based on the traffic density. The timings of the signals on both sides of the road at the same time, Artificial Neural Network technique is used. A real time traffic survey of Light Motor Vehicle, Heavy Motor Vehicle, two and three wheeler vehicular movement in Thanjavur city is done. The number of vehicles (cars, auto, bikes, trucks and buses) and width of the road was given as a input and the output predicted was in terms of timing for the traffic signal at any particular place and for any particular width of the road.

Ming Zhang and Yanhong Lu, (2015)**[2]** proposed an adaptive network traffic prediction algorithm based on BP neural network. Simulation results showed that, compared with the traditional BP neural network, the present algorithm has better performance in the prediction results, and has smaller error.

C. Narendra Babu and B. Eswara Reddy,(2015)**[3]**In this review paper studied about the suitability of different methods for better Internet traffic data. This suitability of hybrid ARIMA-ANN models is studied for both one-step ahead and multi-step ahead prediction cases. They found that for one-step ahead prediction, with a forecast horizon of 10 points and for three-step prediction, with a forecast

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horizon of 12 points, the moving average filter based hybrid ARIMA-ANN model gave better forecast accuracy than the other compared models.

Manish R. Joshi et. Al.(2012)[6] did the survey and analysis of many network traffic prediction techniques. The individuality and rules of preceding studies were looked into. They have also summed the earlier works done in the field on network traffic analysis and prediction. For this they surveyed the previous studies of network traffic analysis and enlisted and discussed various approaches proposed to analyze and prediction of network traffic including data mining techniques, neural network and component analysis, and linear and nonlinear time series models

Chenqi Wang, et.al (2013)[5] In this paper Traffic congestion in urban areas is a severe problem in many cities around the world. these solutions, sensor data is collected by mobile devices onboard the vehicles, sent to a central server via vehicle-to-infrastructure (V2I) or cellular communications, and used collectively to determine the traffic states of the roads. the system can function properly even if there is only a smaller number of vehicles equipped with the system, which is usually the case at the early stage of the deployment of a vehicle-to-vehicle (V2V)network or a large scale intelligent transportation system. the system can function properly even if there is only a smaller number of vehicles equipped with the system, which is usually the case at the early stage of the deployment of a vehicle-to-vehicle (V2V) network or a large scale intelligent transportation system. GPS data will be collected from mobile devices onboard vehicles on the road, in order to validate that with GPS data our proposed method and developed model can still yield high accuracy.

Suresh Nanda Kumar, et.al(2012)[8] In this paper, we have conducted a literature review on the recent developments and publications involving the vehicle routing problem and its variants, namely vehicle routing problem with time windows (VRPTW) and the capacitated vehicle routing problem (CVRP) and also their variants. The VRP is classified as an NP-hard problem the use of exact optimization methods may be difficult to solve these problems in acceptable CPU times, when the problem involves real-world data sets that are very large. The vehicle routing problem comes under combinatorial problem. Hence, to get solutions in determining routes which are realistic and very close to the optimal solution, we use heuristics and meta-heuristics. Under meta-heuristic, the contributions of the researchers on simulated annealing algorithms, tabu search, genetic algorithm, ant-colony optimization and GRASP applied to vehicle routing problems are presented.

Anuja Nagare, et.al (2012)[7] in this paper Intelligent Transportation Systems (ITS) are used to avoid these problems and improve efficiency, safety and service. Traffic Flow Forecasting is an important part of (ITS). Traffic Flow Forecasting (TFF) is for Controlling Traffic and Intelligent Traffic Guidance. TFF is the study of interactions between vehicles, drivers, and infrastructure (which includes highways and traffic control devices), with the aim of understanding and developing an optimal road network with efficient movement of traffic and minimal traffic congestion problems. Back Propagation Neural Network is widely used for short term Traffic Flow Forecasting. To enhance the performance of BPNN, Adaptive Learning Rate and Additional Momentum Methods can be used.

CONCLUSION

This is the review paper on artificial neural network and its advantages which are used for traffic analysis. For traffic analysis various techniques are used but this paper can contain only survey about artificial neural network. Artificial Neural Network uses the concept of biological neural network of human brain. Traffic analysis plays an important role for our society.

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