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Short Communication

Congestion analysis in wireless network using predictive techniques

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Abstract

With the increasing number of internet users the non-stop growing traffic is starting to experience unexpected scenario of network congestion. This paper comprehensively reviews on congestion detection and control mechanism using predictive techniques. Here more number of mechanisms and methods are made to identify various types of network problems in existing network environment. Prediction of network congestion is a technique to ensure the reliability, maintenance of network traffic and availability of the network. Rapidly growing need of service, more techniques are implemented to maintain the QoS of the network.

Keywords: Congestion analysis, Congestion detection, Congestion avoidance, Neural network.

Introduction

Congestion is very important issue in our communication network. Network congestion arises due to low capacity of the network and high capacity demanded by users.

Congestion in network may occur when the load on the network is larger than the capacity of the network- the network is carrying more data than it can handle. Network congestion occurs when too many packets are present in part of subnet. Congestion is totally dependent on network capacity because availability of the net network and demanded amount of traffic is major part of the network.

When the total load for assets is greater than the whole obtainable capacity of assets then this situation is said to be in the state of congestion. When there is no congestion in network the operation of data transmission, file downloading, file uploading etc are done in few minutes but at the time of congestion same operations take too much time.

During congestion in network, network faces packet drop, wastage of bandwidth, unwanted delay and other consequences appears. When admitted traffic demand to some sub-network which is either nodes and links cross the capacity of subnet which is buffer and output capability, congestion arises from that location and spread along its link. The throughput can be distinct as the percentage utilization of the network ability.

When network congestion occurs they often terribly split the service for those companies or those that depends on the network associations. To deal with this problem a mechanism is required to ensure network availability and effectiveness by preventing unwanted network failures.

To handle this above network difficulties we created a new intelligent method to recognize incoming problems earlier. When problems are recognizing as early as possible then administrator will change network parameter and preventing such costly breakdowns[1].

Nowadays internet user's increases day by day so to maintain the QoS of the network availability and reliability are very important factors. Neural network predictive technique is a feasible method to detect network problems as early as possible. They also have shown the simulation result with the help of neural network which generates exceeding average results[1].

The internet services require QoS for time sensitive applications and data transmission but at the time of network congestion, degrades Quality of service. By using TCP–Friendly congestion control algorithm provides improved quality service to all types of dissimilar traffic network can be considered. This control technique designed neural network learning mechanism which has to be taught to optimize a TCP network recital measure and further wireless parameters are used. In this paper Bit error rate and Round trip time congestion control parameters are used for applying the network weights and biases in learning algorithm for the planned network to reach their best possible values[2].

Buffer maintenance is also very important factor which requires early detection for buffer overflow so random balanced random early detection algorithm (BRED) can be used[3]. They have optimized balanced random early random detection Algorithm which is used to detect non-adaptive data flow and restrict them. This method also provides fairness between flows of data and avoids congestion and buffer overflow. In this method, with the help of fairness, queuing delay, and buffer overflow parameters gives a better result.

Network traffic is classified according to latency bandwidth and QoS. The above classification required a model that uses round trip time, nodes link capacity and average queue sixe to reduce the chances of network congestion in high speed network through alteration of sending data rate. They used high speed network parameters to regulate the values through instantaneous condition and applying them. This method provides effective and efficient result over high speed network[4].

Methodology

In this paper we are using neural network algorithm which must be trained our network data and shows the reason of congestion. For the duration of the data preparation the weights and biases are efficient.

Neural network definition: Neural network are program designed to solve any linear and non linear problem. Neural network is a learning mechanism to predict the network congestion. Neural network has number of neurons that are connected together and cooperate to perform desired function. Every neurons has one input and one or more outputs beside with a bias and makes a result based on them which is known as activation function. Neural network are organised into layers and layers are made up of interconnected nodes that contains activation function. Layers are categorised into two parts first is single layer and another is multilayer. Neural network be able to also be classified as feed forward or recurrent based on the flow of data or in order.

Neural network are inspired in learning process. There are three types of learning process: Supervised, unsupervised and reinforcement learning. Supervised learning utilises simply the accessible set of pairs of input and preferred output to regulate the weights. Unsupervised learning can utilize an accessible place of inputs and outputs.

Architecture: In our project we are using multilayer feed forward neural network has n input nodes, 1 hidden layer containing n nodes, and output layer also containing n nodes.

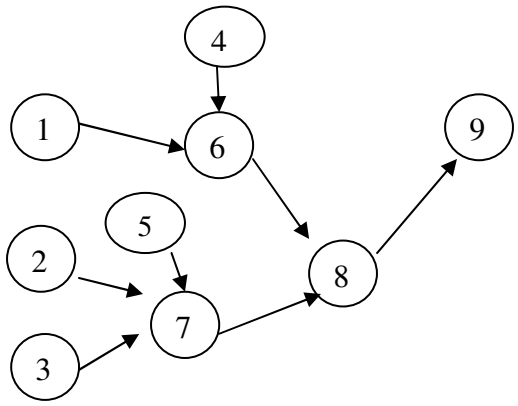

Figure-1: Data communication network.

The n input nodes equivalent to the n traffic generating nodes in the network simulation: there are three input nodes for each node in the network simulation equivalent to the total drop, average per packet drop, cumulative per packet drop, maximum packet drop and minimum packet drop and all these parameters for send receive and forward features.

Figure-1 shows the data communication network between nodes. We positioned a supplementary optimization of the structure of the neural network, to additional pressure the consequence of adjacency association connecting nodes in the data network.

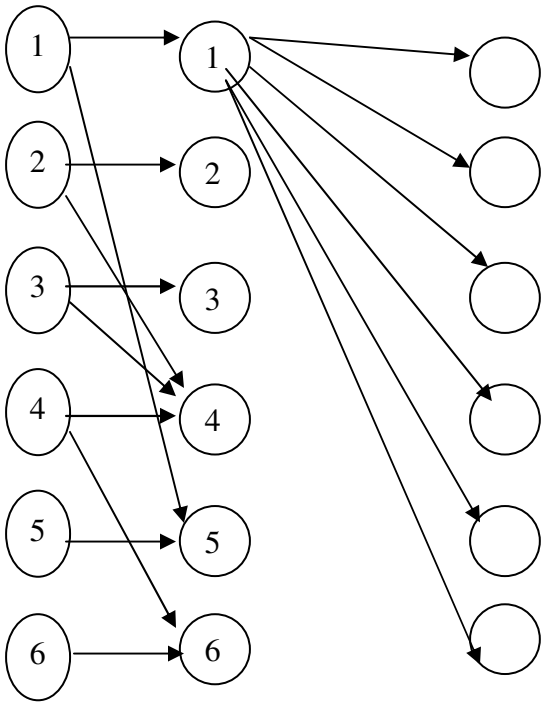

Figure-2: Neural network data communication network[1].

Training: For train our data we have training patterns from which the neural network would learn about congestion. In our project two type of pattern were used to train our data first is congestion and another one is non congestion at a choice of location.

Testing: The packet size was set at 1500 bytes for each sending node and we used 10 fold validations testing to test our data.

Simulation Environment: Entire system is simulated in matlab and time series neural network toolbox to generate the outputs. The wireless network has a number of attributes and these parameters are input to neural network.

Results and discussion

A general breakdown of the result can be found. Our testes comprise cases in which improvement to one node is essential,

corrections to numerous nodes are essential, and someplace no improvement is necessary.

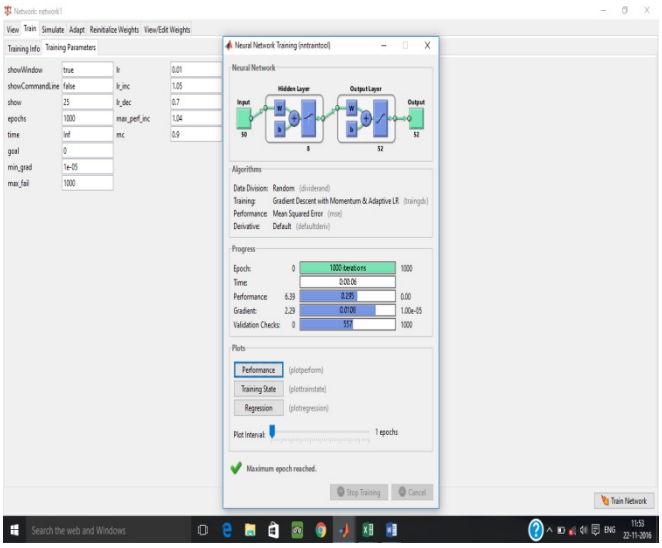

Figure-3: Training Environment.

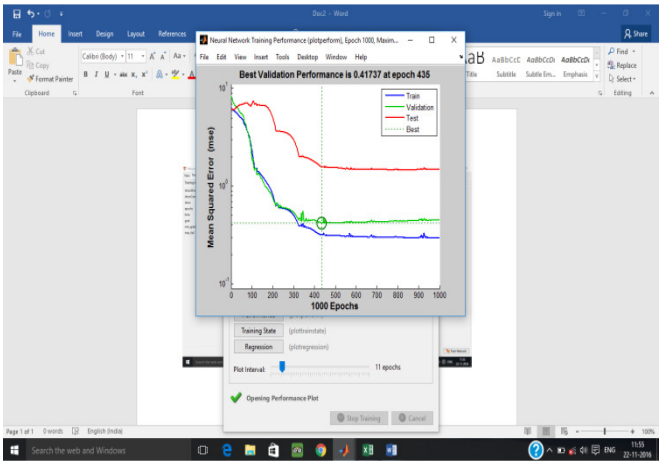

Figure-4: Validation performance.

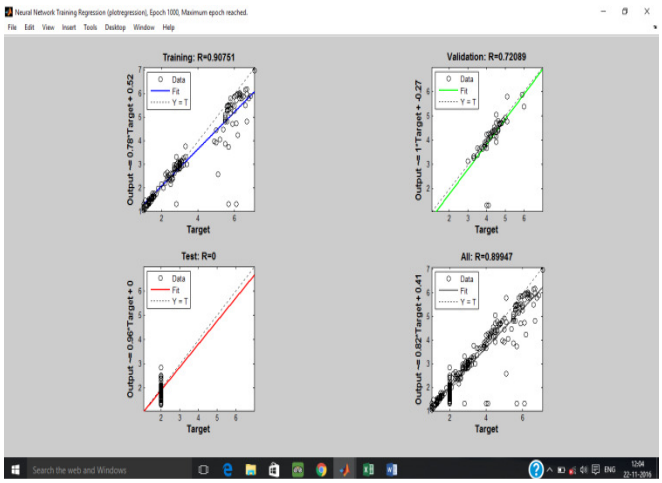

Figure-5: Regression performance.

Finally in the case of our developed system missed some points which have congestion nearby were a general feature. The neural network faces problems during detection congestion in one or more points. This perhaps can be enhanced ahead close up assessment of the preparation pattern and arrangement of the neural network.

Above Figure-5 and Figure-6 shoes the validation performance of our data and regression performance.

Conclusion

The wireless connectivity and availability are very important factors for today's internet growing world. Unreasonable delay, bandwidth wasted and network unavailability reduce the throughput of the network and increases the chances of network failure. In this work We used neural network predictive technique to predict the congestion earlier which is helpful to reduce the chance of network congestion as early as possible. We have illustrated through the use of the network simulator, which generates better result and provide accuracy in our congestion detection system.

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