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Communication among Neural Networks

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Abstract
Artificial Neural networks are being used for forecasting and producing good and satisfactory results. The properties of artificial neural network like adaptability and arbitrary function mapping ability makes it special for the task of forecasting. Our purpose of study includes the analysis of various aspect of artificial neural network which includes the introduction of term called communication among neural networks.

Keywords: Neural network, communication.

Introduction

Artificial neural networks are inspired from biological networks and have the brilliant pattern recognising and classification properties. Artificial neural network are suitable for conditions where exact method does not exist but there exists proper data that can be observed and used for training further testing is performed to get statistics.
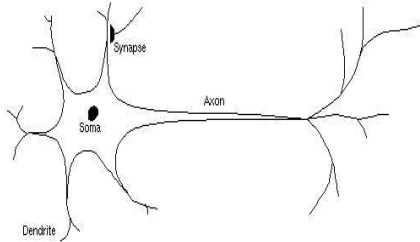
Biological Background

Figure 1- A Biological Neuron [1]

Artificial neural network attributes---
1. Data Type
2. Training
3. Input Nodes
4. Hidden Layer Node
5. Output Nodes
6. Transfer Function
7. Training Algorithm
8. Data Normalization
9. Performance Measures

Activation Functions [2]—
1. The sigmoid functions
   $F(x) = 1/(1+\exp(-x));$
2. The hyperbolic tangent function:
   $F(x) = (\exp(x) - \exp(-x)) / (\exp(x) + \exp(-x));$
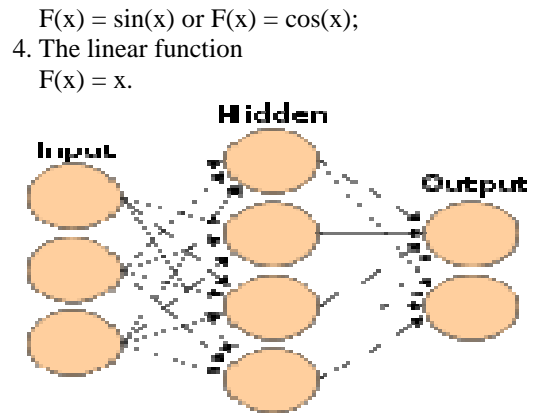3. The sine or cosine function:

$F(x) = \sin(x)$ or $F(x) = \cos(x);$
4. The linear function
   $F(x) = x.$

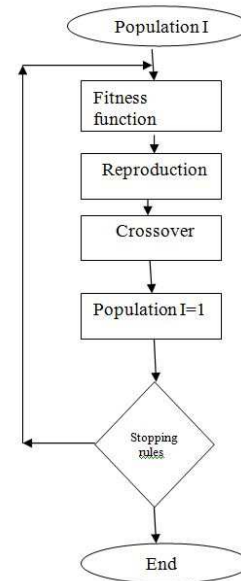**Figure 2- Neural Network [1]**

Figure 3. Genetic algorithm: Optimization process [1]

There are various optimization techniques that are integrated with neural networks. The purpose of integration is to select the appropriate features and to reduce the searching overhead. In our proposed method the purpose is to study or to make an analysis on neural network communication.

Proposed Architecture

In the proposed architecture the basic framework of communication is given that can be modified according to the concerned scenario. To use the neural network firstly dataset is required for proper training so that interpolation of required input can be made in proper manner. As given in figure 5 the three neural networks are arranged for the purpose of communication. Consider that these neural networks are working for common scenario for which the analysis is to be performed.

Now consider that the first neural network is trained according to some features of testing entity and the second neural network is also trained according to some another features that determines the result. The third neural network is trained according to some features may be hybrid partially of both features taken by neural network one and neural network two. Now the input parameter is given to first neural network for testing which produces output one. Similarly the same input parameter is given to the second neural network and the second neural network produces output two. Now matching occurs between output one and output two for similarity. If both are found to be same in this process then there is no conflict no need of third neural network but here occur a kind of communication between neural network one and neural network two.

This is simple case that is discussed above which involves the communication between two neural networks .Suppose the similarity test gets fail and the output showed by two neural network on same input feature is different then the third neural neural will take the input parameter and the corresponding output three will be produced that output will break the situation of confusion. The example shown below depicts the similar kind of process.
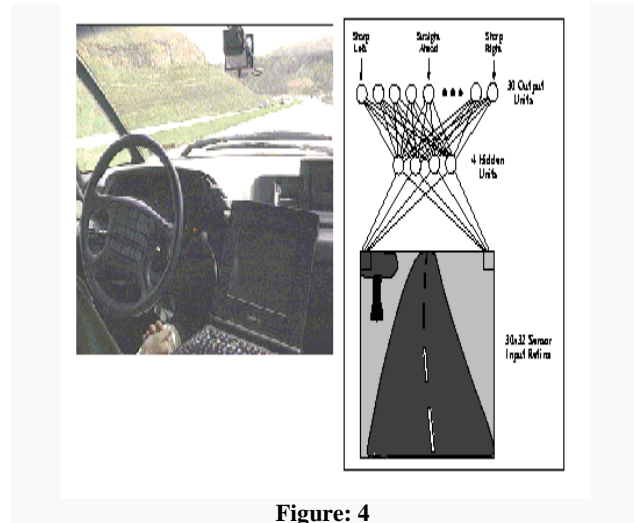

Figure: 4

The above figure shows driving a car that convert image into features using neural net with several outputs. This process can be enhanced as a Measure of security of cars that belong to nearby range while driving by using the logic of communication explained here.
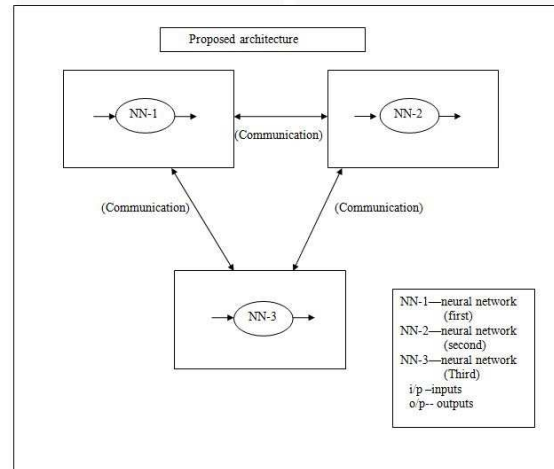

Figure: 5

Conclusion

In this paper the main emphasis is given to explain the issue of communication among neural networks and how the process of interaction will flow is explained. In future we will try to make the implementation of this in any real case.

References

[1] http://en.wikipedia.org/wiki/Artificial_neural_network
[2] http://wwwcsfaculty.stanford.edu/~eroberts/courses/soco/projects/neuralnetworks/Neuron/index.html