Artificial Neural Networks in Machine Learning

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Abstract: Artificial Neural Networks are similar to human brain which are classified by the machine learning algorithms. It works similarly like brain. The brain will recall all the information in past through the neurons in the nervous system, similarly, ANN also recall the data by the inputs and respond through classifications and predictions. To produce a new pattern, ANN builds a relationship between inputs and outputs through examples of data sets. ANN main advantage is to provide outputs it takes sample data from the data set.

Keywords: Artificial Neural Network, Human Brain, Nervous System, input, output and feedback.

I. INTRODUCTION

Artificial Neural Network is important concept in machine learning. It was invented in 1970's, but it is not popular in those days because of low computational power but now it is everywhere. In every application Neural Networks plays an important role as an interface. ANN consists of some parameters through which output is generated. Some of them are biases, weights. In ANN every node has some weight through which the bias (mathematical sum) is calculated in the transfer function. Activation function receives the result and gives the output.
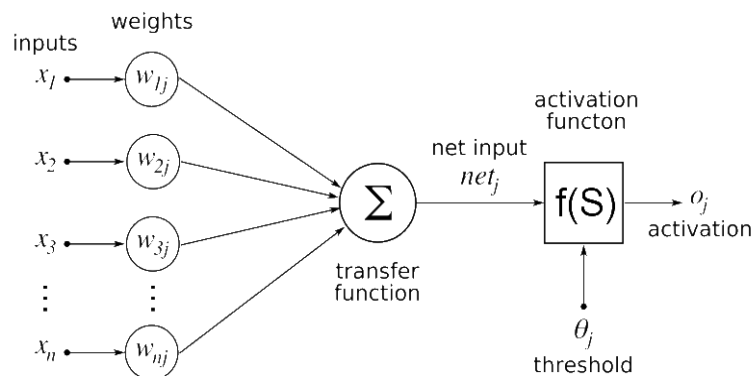

Fig. 1 Flow of data in ANN

II. ARCHITECTURE

Artificial Neural Networks works similarly to the nervous system. It consists of three layers:
- Input Layers
- Hidden Layers
- Output Layer

1.Input Layers
Artificial Neural Networks consists of input layer as the first layer. Inputs can be of many forms so it can have any number of input layers. Input layer sends the information to the hidden layer. Input is taken in the form of numbers, text, images, audios and etc.

2.Hidden Layers
Hidden layer is the middle layer of the ANN module. It can be single or multiple. These layers receives information from the input layers and do all the mathematical operations based on the input data and produces the patterns.

3.Output Layer
Output layer is the last layer of ANN. It takes data from the hidden layers and gives the result.
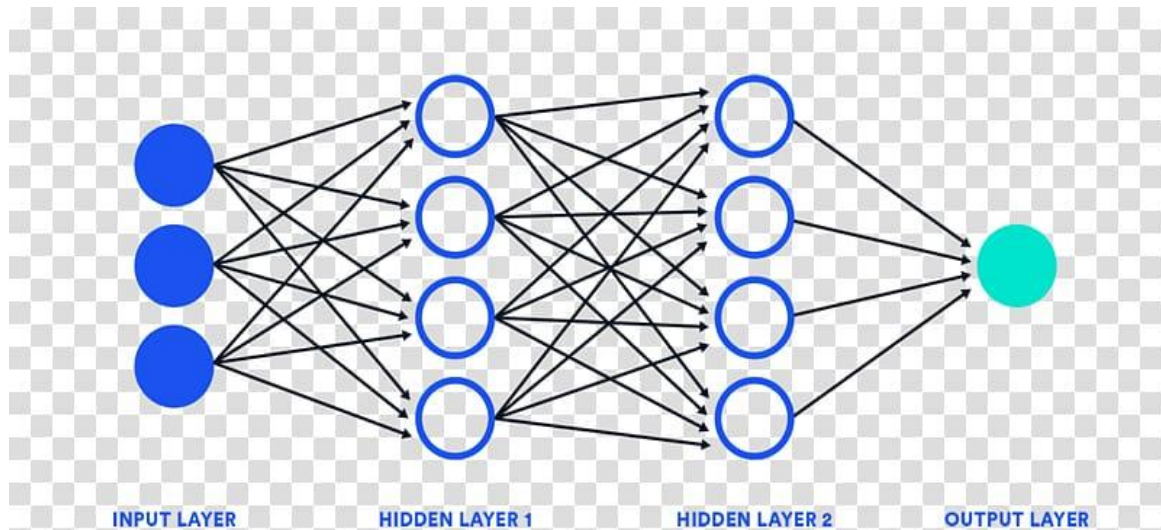
Fig. 2 ANN Layers

III.   TYPES

Artificial Neural Networks has two types, they are:
- Feed Forward Neural Network
- Feed Back Neural Network

1.Feed Forward Neural Network
In this the information will flow in only one direction. The data will transfer form input layer, hidden layer and finally to the output layer. Feedback is not given in this process. In case of non-sequential data this process is used.

2.Feed Back Neural Network
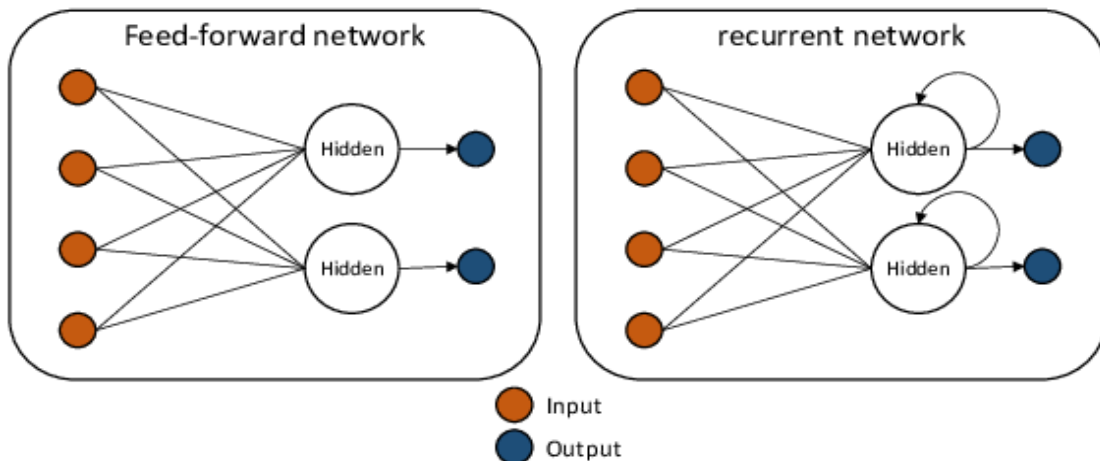In this the feedback is also generated through the recurrent network. In case of sequential data this process is used.

Fig. 3 ANN Types

IV.   APPLICATIONS

- Handwritten Character Recognition
- Signature Classification
- Facial Recognition
- Speech Recognition

1.Handwritten Character Recognition
Artificial Neural Network is used for recognition of handwritten characters which are in the form of digits or letters.
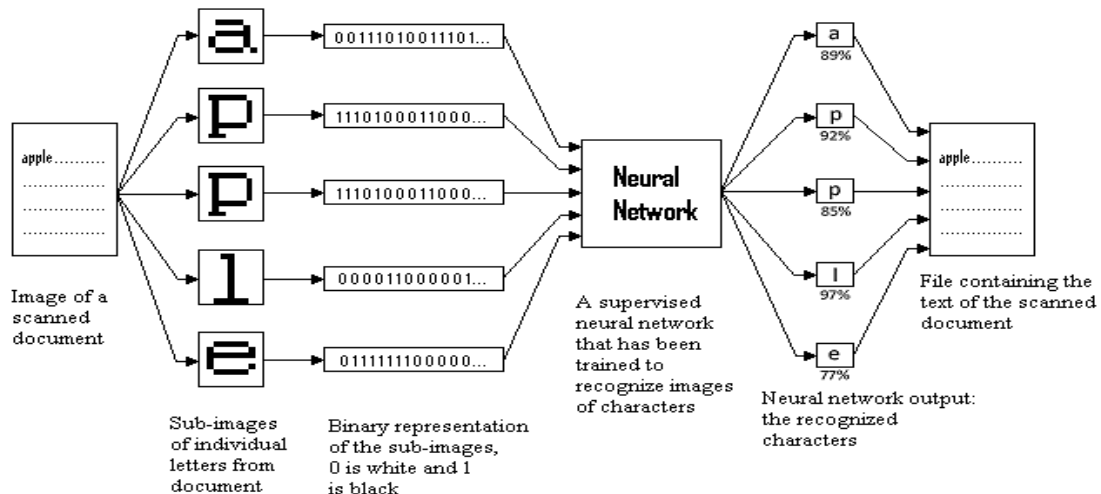
Fig. 4 Handwritten Character Recognition

2.Signature Classification

To verify that the signature of a person is fake or not we use Artificial Neural Networks. By this we can build signature authentication system.
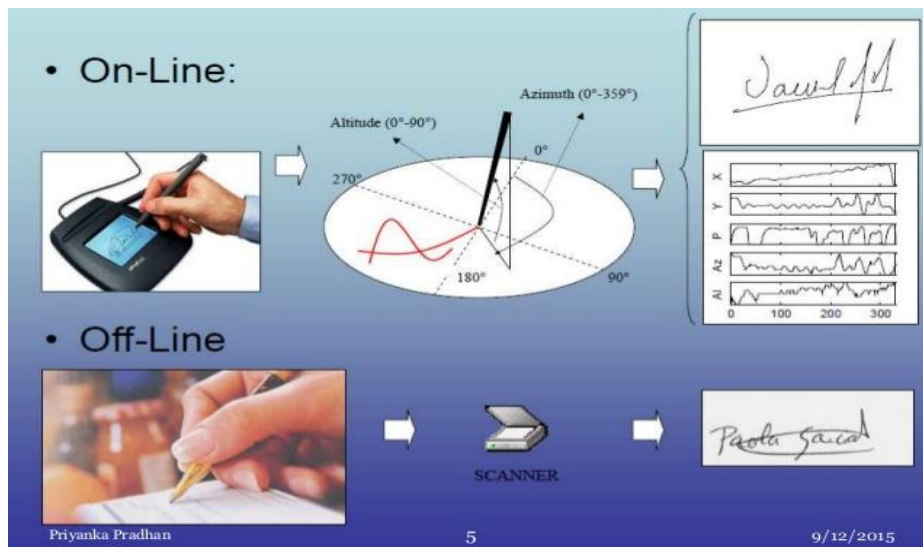

Fig. 5 Signature Classification

3. Facial Recognition

Convolutional Neural Networks which is a type of Artificial Neural Network is used to recognize faces based on the person's identity.
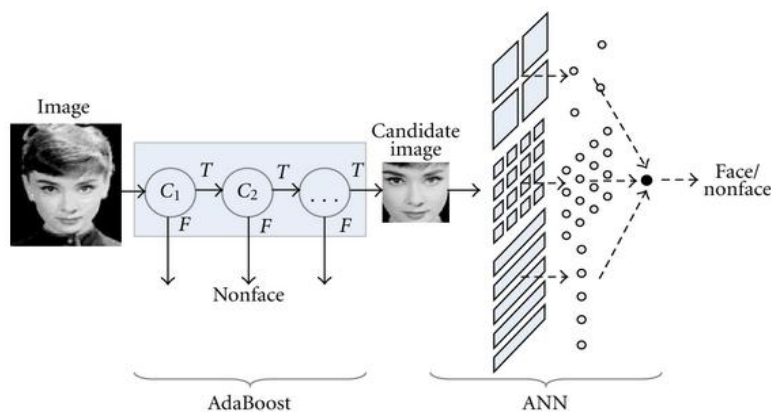

Fig. 6 Facial Recognition

4. Speech Recognition

Artificial Neural Networks are also used for speech recognition. It is based on Hidden Markov Models.
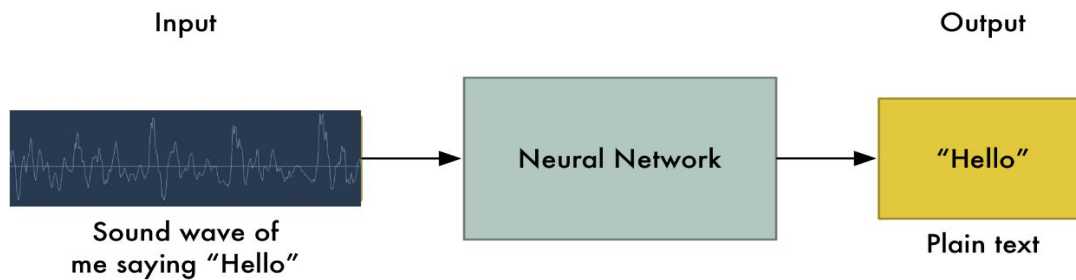

Fig. 7 Speech Recognition

V.   CONCLUSION

Artificial Neural Networks are the mathematical operations which are used in the present trending technologies. As it is not so effective than human brain as it will have some errors which are to be corrected. Building this Artificial Neural Networks is an inspiration from the human brain.

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