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ML
UA-06

Title: Multilayer Neural Network Model.

Problem Statement: Download the dataset of National Institute of Diabetes and Digestive & Kidney Diseases from below link:
https://raw.githubusercontent.com/jbrownlee/Datasets/master/pima-indians-diabetes.data.csv.

The dataset has a total of 9 attributes where the last attribute is "Class attribute" having value 0 & 1. (1 = "Positive for Diabetes", 0 = "Negative")

a) Load the dataset in the program. Define the ANN model with Keras. Define at least two hidden layers. Specify the ReLU function as activation function for the hidden layer and Sigmoid for the output layer.
b) Compile the model with necessary parameters. Set the number of epoches & batch sizes. and fit the model.
c) Evaluate the performance of the model for different values of epoches & batch sizes.
d) Evaluate model performance using different activation function visualize the model using ANN visualizer.

Objective: Neural network, a computer program that operates in a manner inspired by natural

neural network in the brain. The objective of such artificial neural networks is to perform such cognitive functions as problem solving and machine learning.

Theory:

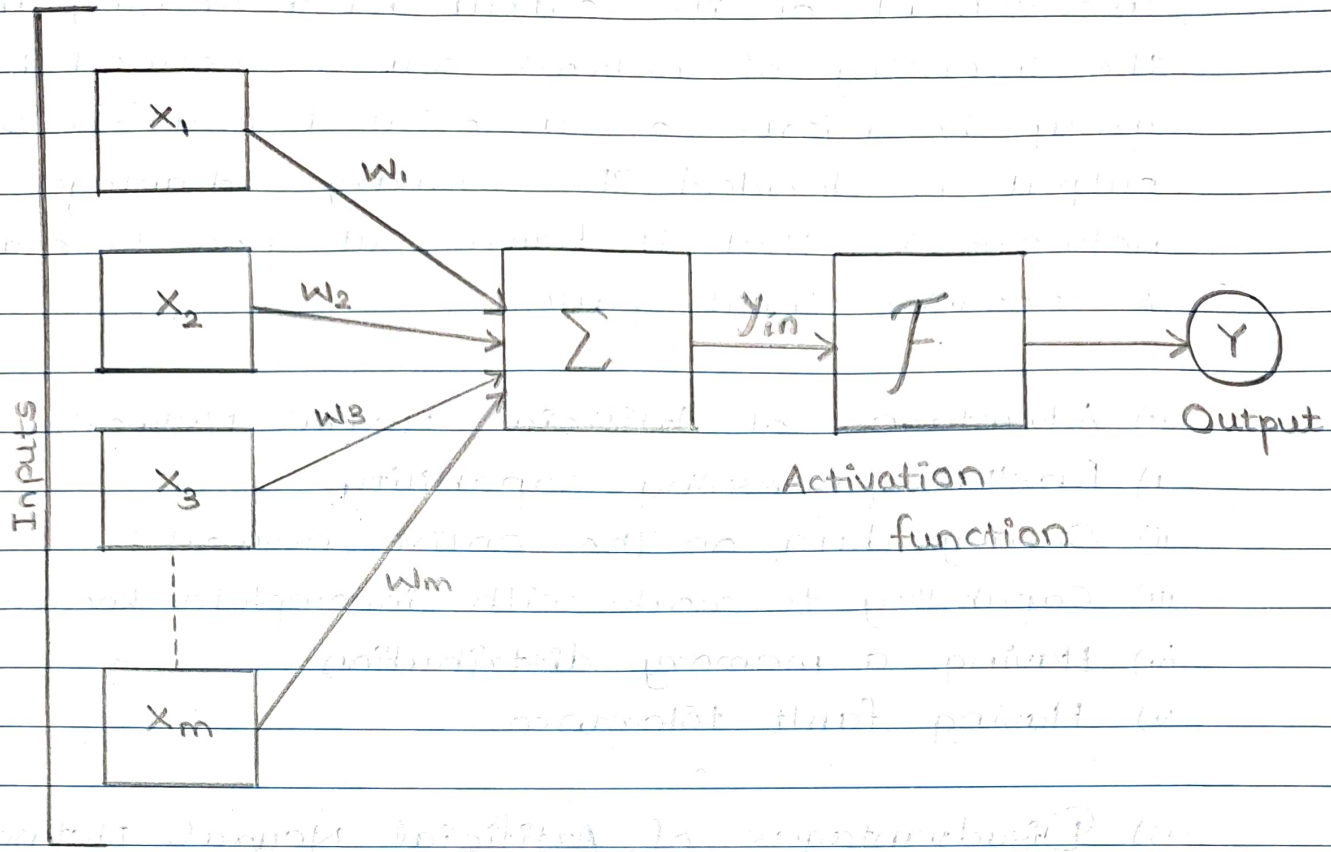
Neural networks are parallel computing devices which is basically an attempt to make a computer model of the brain. The main objective is to develop a system to perform various computational tasks faster than the traditional systems.

1) Artifical Neural Network:

→ ANN is an efficient computing system whose central theme is borrowed from the analogy of biological neural networks. ANNs are also named as "Artificial Neural Systems" or "Parellal Distributed Processing System" or "Connectionist System". ANN acquires a large collection of units that are interconnected in some pattern to allow communication between the units. This units, also refered to as nodes or neurons, are simple processors which operate in parallel.

2) Model of Artificial Neural Network:

→ The following diagram represents the general model of ANN followed by its processing.



For the above general model of artificial neural networks the net input can be calculated as:

$y_{in} = x_1 \cdot w_1 + x_2 w_2 + x_3 w_3 + \ldots + x_m w_m$

$y_{in} = x_1 \cdot w_1 + x_2 w_2 + x_3 w_3 + \ldots + x_m w_m$, i.e., Net i/p.

$y_{in} = \sum_i m_i x_i \cdot w_i$

$y_{in} = \sum_i m x_i \cdot w_i$

The output can be calculated by applying the activation function over the net input calculated.

3) Feed-Forward ANN:

→ A feed-forward network is a basic neural network consisting of an input layer, an output layer, & at least one layer of a neuron. Through

assessment of its output by reviewing its input, the intensity of network can be noticed based on group behaviour of associated neurons & the output is decided. The primary advantage of this network is that it figure out how to evaluate & recognize input patterns.

4) Advantages of Artificial Neural Network:
i) Parellal processing capability.
ii) Storing data on the entire network.
iii) Capability to work with incomplete knowledge.
iv) Having a memory distribution.
v) Having fault tolerance.

5) Disadvantages of Artificial Neural Network:
i) Assurance of proper network structure.
ii) Unrecognized behaviour of the network.
iii) Hardware dependencies.
iv) Difficulty of com showing issue to network.
v) Duration of network is unknown.

Conclusion: Multilayer perceptrons are the most commonly used types of neural networks, using the back propagation algorithm for training, they can be used for a wide range of applications, from the functional approximation to prediction in various fields, such as estimating load of calculating system or modeling evaluation of chemical reaction of polymerization, described by complex system of differential equations.