



Assignment - 11

my companion 43309

- * Aim → Create and visualize Neural Network for the given data using Python.

- * Theory →

- Introduction of Neural Networks:

A neural network is a series of algorithms that endeavors to recognize underlying relationships in a set of data, through a process that ~~operates~~ mimics the way human brain works.

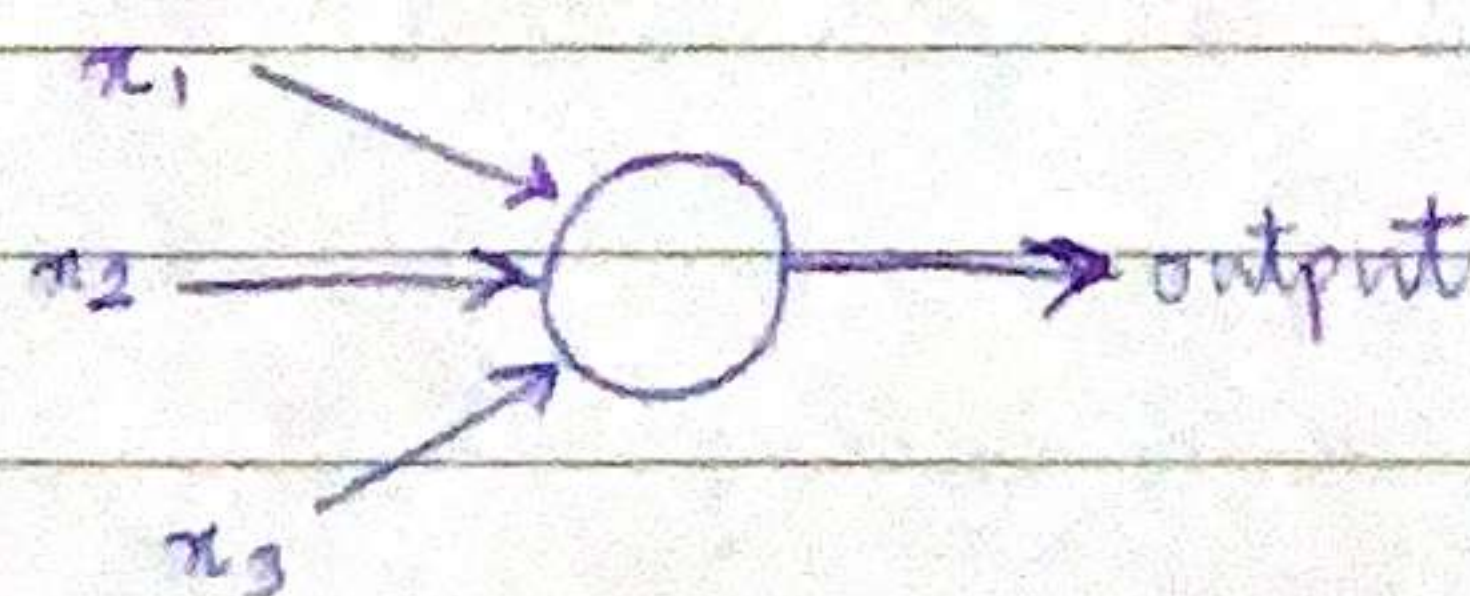
It takes several input processes through multiple hidden layers and returns the result using an output layer. This result estimation process is technically known as Forward Propagation. We compare the result with actual output. The task is to make the output of neural network, as close to the actual output. Each of these neurons are contributing some errors to final output.

We try to minimize the weight/value of neurons, those are contributing more to the error and this happens while travelling back to the neurons of the neural network and finding where the error lies. This process is known as Back Propagation. Weights are updated to minimize the error from each neuron.

In order to reduce these number of iterations to minimize the error, the neural networks use a common algorithm known as Gradient Descent which helps to optimize the task quickly and efficiently.

- Perception:

The basic formula unit of a neural network is a perception. A perception can be understood as anything that takes multiple inputs and produces one output.





3 ways of creating input output relationship -

- i) By directly combining the input and computing the output
- ii) Next, add weights to the inputs
- iii) Add bias.

Linear representation of input will look like $\rightarrow w_1x_1 + w_2x_2 + w_3x_3 + b$

• Activation Function:

Takes the sum of weighted input ($w_1x_1 + w_2x_2 + w_3x_3 + b$) as an argument, and returns the output of the neuron.

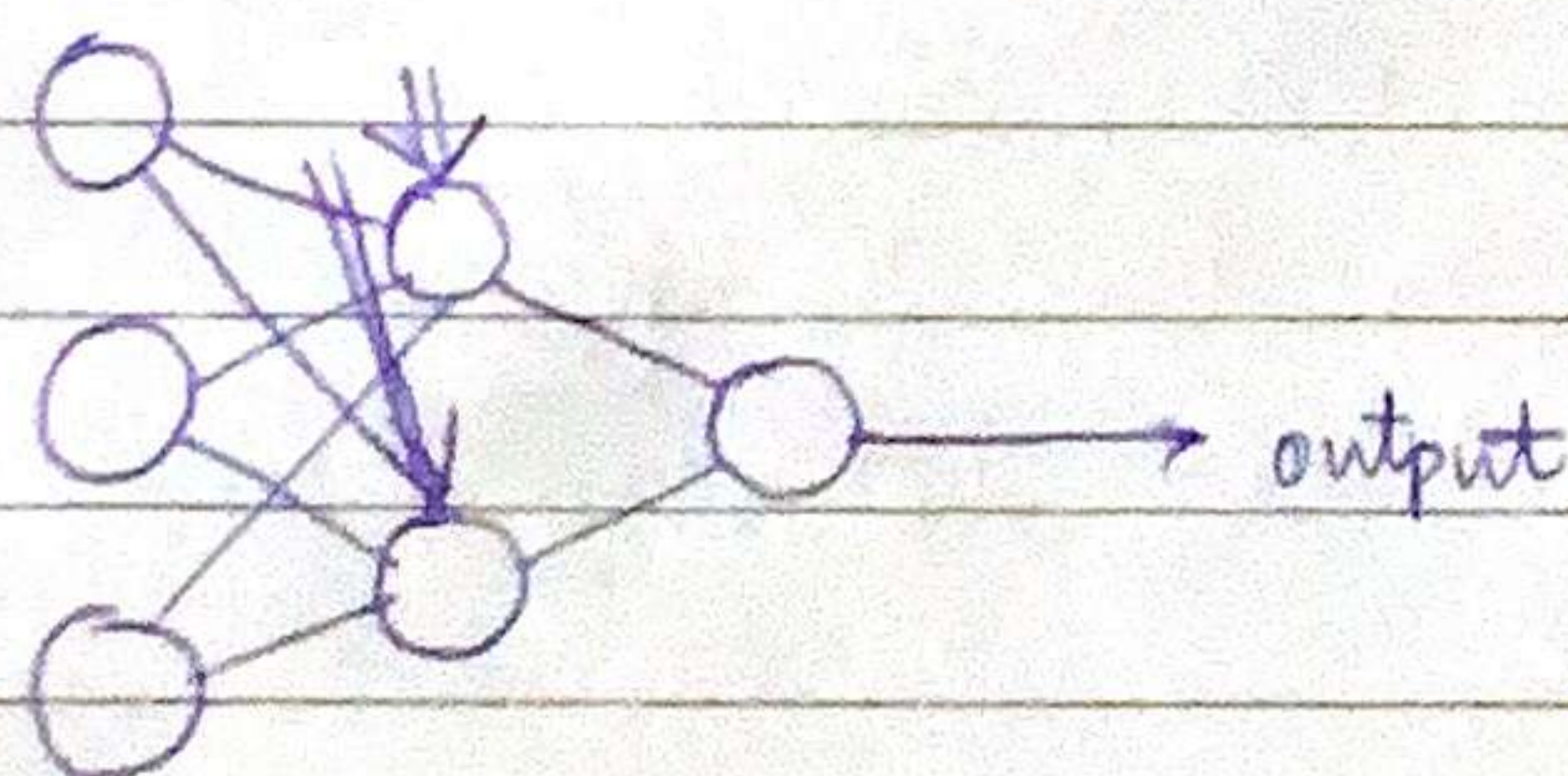
$$a = f\left(\sum_{i=0}^N w_i x_i\right)$$

The activation function is mostly used to make a non-linear transformation, which allows us to fit non linear hypothesis to estimate complex functions. There exist multiple activation functions like sigmoid, tanh etc.

• Epoch:

One round of forward and back propagation constitutes an epoch.

• Multi layer Perceptron:



— Connections with weights
 \Rightarrow Connections with biases

• Full Batch Gradient Descent:

As the name implies, it uses all the training data points to update each of the weights.

• Stochastic Gradient Descent:

It uses one or more samples, but never the entire training data to update the weights once.

* Conclusion \rightarrow Thus in this assignment, we learnt about neural networks, and applied it on cancer dataset.