Experiment No 2

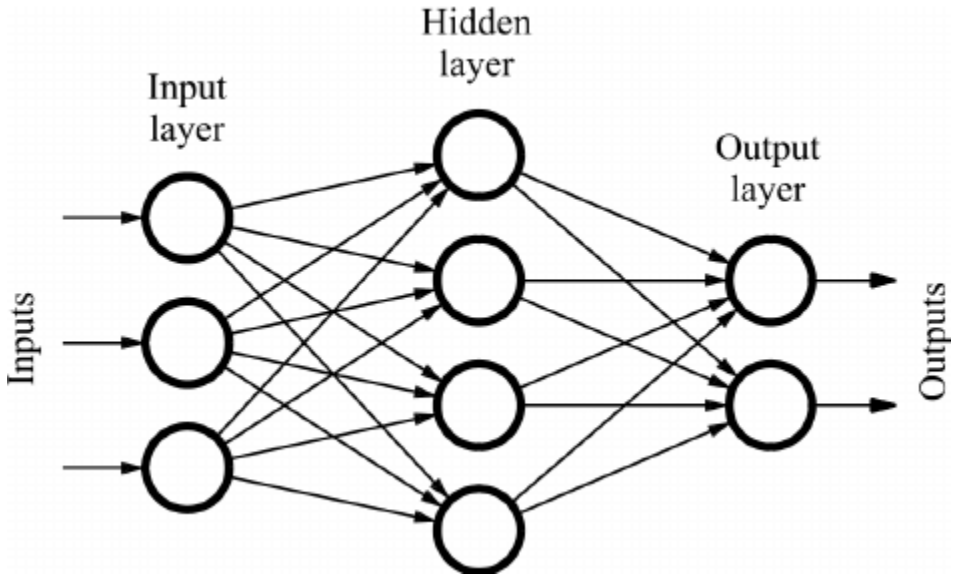
Aim : Implementing Feedforward neural networks with Keras and TensorFlow

a. Import the necessary packages
b. Load the training and testing data (MNIST)
c. Define the network architecture using Keras
d. Train the model using SGD
e. Evaluate the network
f. Plot the training loss and accuracy

Performance (2)	Understanding (2)	Regularity (2)	Presentation (2)	Timely completion(2)	Total (10)	Sign

Theory:

A Feed Forward Neural Network is an artificial neural network in which the connections between nodes do not form a cycle. The opposite of a feed forward neural network is a recurrent neural_network, in which certain pathways are cycled. The feed forward model is the simplest form of neural network as information is only processed in one direction. While the data may pass through multiple hidden nodes, it always moves in one direction and never backwards.



Basic structure of a Feed Forward (FF) Neural Network

Layer of input

It contains the neurons that receive input. The data is subsequently passed on to the next tier. The input layer's total number of neurons is equal to the number of variables in the dataset.

Hidden layer

This is the intermediate layer, which is concealed between the input and output layers. This layer has a large number of neurons that perform alterations on the inputs. They then communicate with the output layer. This layer houses hidden nodes, each containing an activation function. Neural Network with multiple hidden layers is known as Deep Neural Network.

Output layer

It is the last layer and is depending on the model's construction. Additionally, the output layer is the expected feature, as you are aware of the desired outcome.

Neurons weights

Weights are used to describe the strength of a connection between neurons. The range of a weight's value is from 0 to 1.

MNIST dataset

In this assignment to implement Feedforward neural networks we'll use the well-known MNIST dataset to train and test our model. MNIST stands for "Modified National Institute of Standards and Technology". It is a dataset of 70,000 handwritten images. Each image is of 28x28 pixels i.e. about 784 features. Each feature represents only one pixel's intensity i.e. from 0(white) to 255(black). This database is further divided into 60,000 training and 10,000 testing images.

Conclusion: Thus, we have implemented the Image classification using feed forward neural network model. During the execution of each epochs, our model accuracy increases and our model loss decreases, that is good since our model gains confidence with its predictions.

1. The two losses (loss and val_loss) are decreasing and the accuracy (accuracy and val_accuracy)are increasing. So this indicates the model is trained in a good way.
2. The val_accuracy is the measure of how good the predictions of your model are. So In this case, it looks like the model is well trained after 10 epochs.