IT416: Topics in Deep Learning

Assignment 2 : Getting Started with Forward Propagation in Neural Networks

---

Instructor : Ahlad Kumar

TA : Subham Nagar

5th September 2020

1   Learning Outcome

At the end of this assignment you will learn how to apply Forward Propagation from scratch to see the mathematics behind a neural network. Also we will work on some way of how to analyse observations which will help in future sessions.

2   Problem Description

Implement Forward Propagation on two different Datasets (MNIST and Boston Housing)

3   Implementation

3.1   Exercise

- Implement a 5-layer Neural Network (3 Hidden Layers) as depicted in 2.1.

- Activation functions for hidden layers and output layers can be chosen as per your choice. Play around with Sigmoid , Softmax , RELU and TanH functions. Comment on the observations

- Use different Batch Sizes and analyse how the accuracy is changing. For Boston Housing Dataset, use Mean Square Error as the Performance Metric.

- Also play around with different sizes of Hidden Layers and see the difference you get. Comment on it.

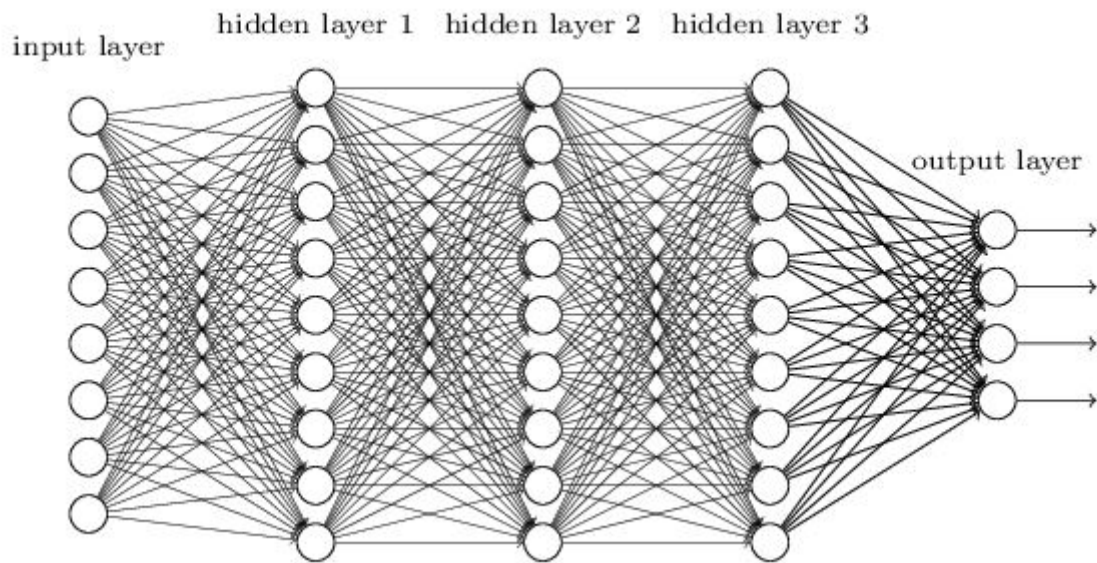- Design a Confusion Matrix depicting the outputs you got

Figure 2.1: Neural Network Architecture

3.2 Instructions

- You need to implement the above Neural Network Forward Propagation Step in Tensor-flow 2.0 . **Do not use Keras library or pytorch inbuilt functions**.

- Keras Library can **only** be used for downloading MNIST Dataset.

- Also design Neural Network for Boston Housing Dataset. You can get this too from Keras Library. As this will be a regression task, use MSE or any other Metric which is ideally used for Regression Tasks.

4 REFERENCES

- https://keras.io/api/datasets/

5 SUBMISSION

- You have to submit your assignment in Google Colab notebook (.ipynb file) with proper comments and explanation of your approach.

- Your filename should be named as **LabAssignment1_StudentId** . If your id is 202011001 then filename will be **LabAssignment1_202011001.ipynb**

- The submission deadline for this assignment is **6th September 2020 11 pm**