UNIVERSITY OF MISSOURI-KANSAS CITY

Python and Deep Learning

 # Lab 4 Assignment

Team Members:

Pragathi Thammaneni

Sridevi Mallipudi

Introduction:

The key objective of this assignment is to focus on text classification with CNN model, RNN/LSTM models and image classification using CNN model tensor flow deep learning library**.**

Objectives:

To code for the 4 questions by implementing the below concepts**.**

- Text classification - CNN model
- Text classification – RNN /LSTM model
- Hyperparameters of CNN
- Hyperparameters of RNN / LSTM model
- Comparison between the results of CNN vs RNN / LSTM
- Image Classification -CNN model

Approaches /Methods:

Using Python 3.6, PyCharm (Community edition)

Workflow &Datasets/Parameters and Evaluation:

The below each question will follow different approaches to solve. Coding is done to perform the evaluation of each individual snippet to execute the datasets which are provided as the input parameters.

1. Implement the text classification with CNN model, with a new dataset which is not used in the class
2. Implement the text classification with RNN/LSTM model, with a new dataset which is not used in the class
3. Compare the results of CNN and RNN/LSTM models, for the text classification (same dataset for 2 models to compare) and describe, which model is best for the text classification based on your results
4. Implement the image classification with CNN model, with a new dataset which is not used in the class (E.g. CIFAR 10 dataset)

Question 1:

1. Implement the text classification with CNN model, with a new dataset which is not used in the class

Solution:

CNN Text Classification:

In machine learning, a convolutional neural network is a class of deep, feed-forward artificial neural networks, to analyzing visual imagery and text processing. CNNs use a variation of perceptions designed to acquire minimal preprocessing.

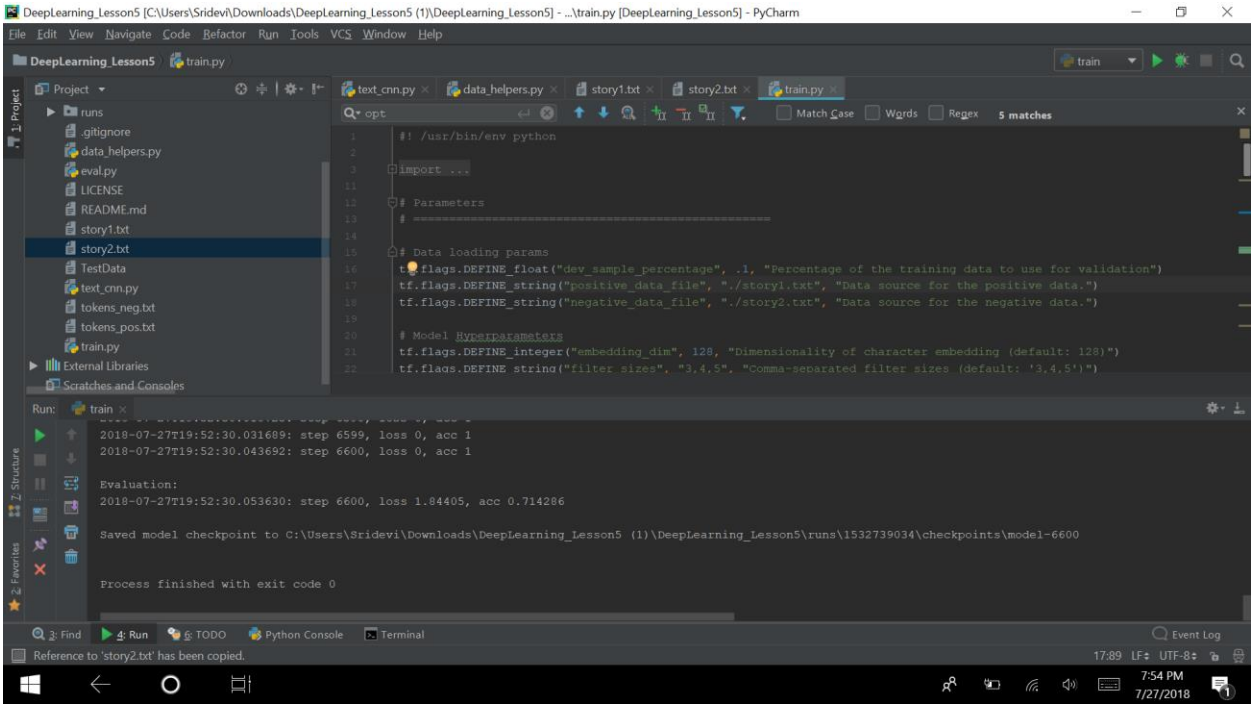
This snippet code provides the above implementation

Data Set:

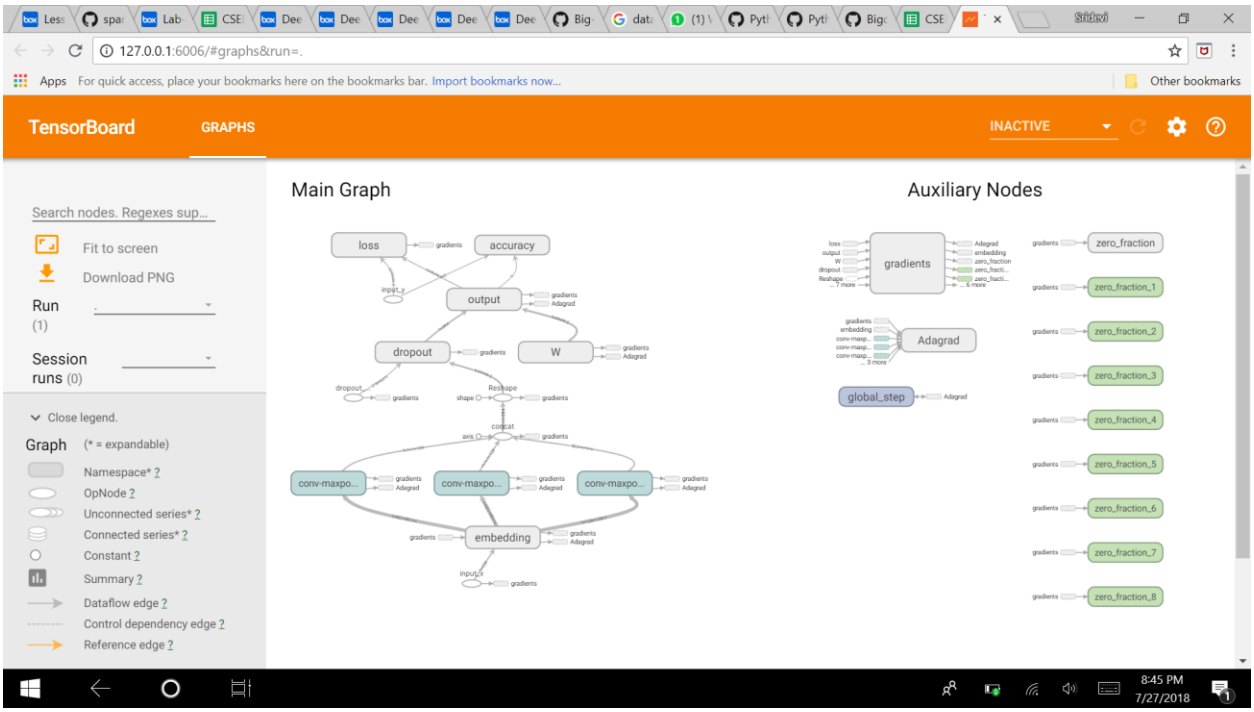
Story1.txt

Story2.txt

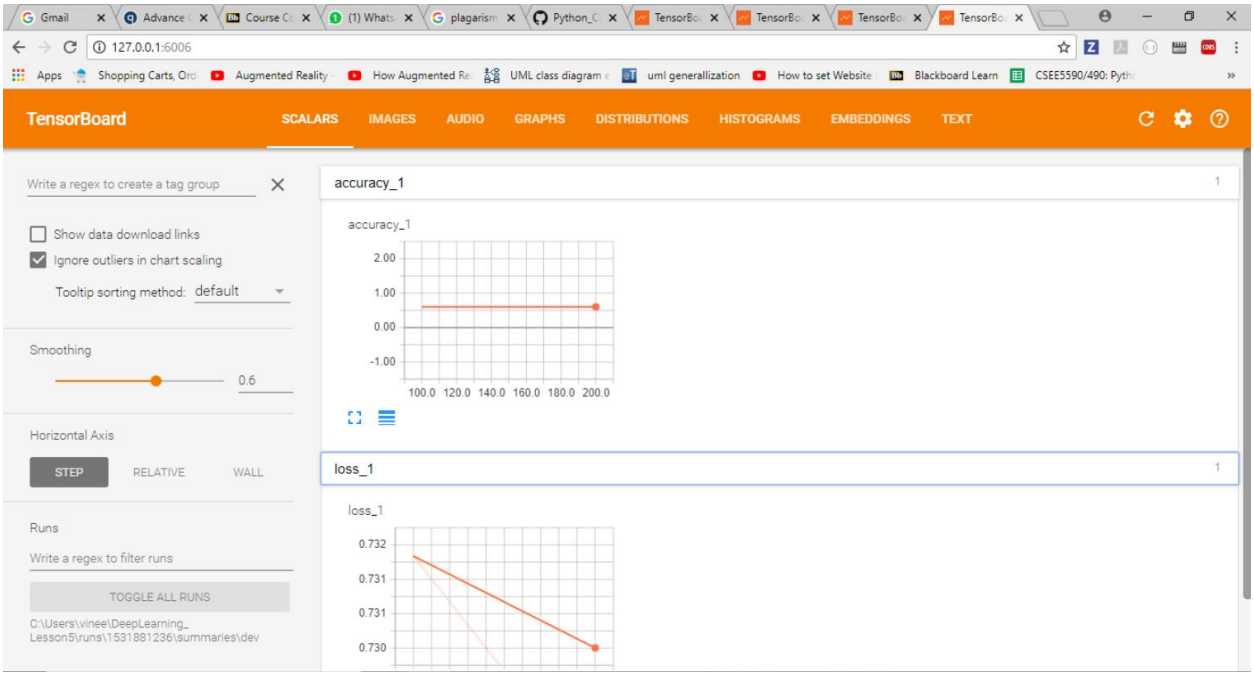
Output Screenshot:



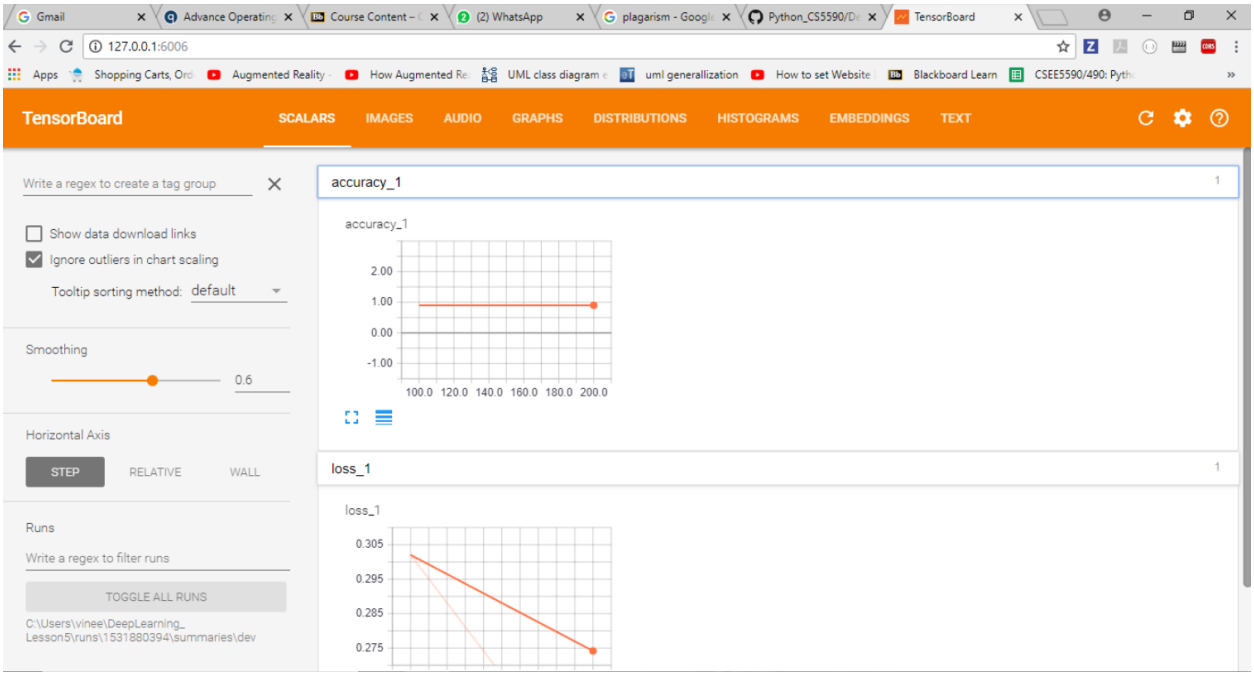
Tensor board Graph:



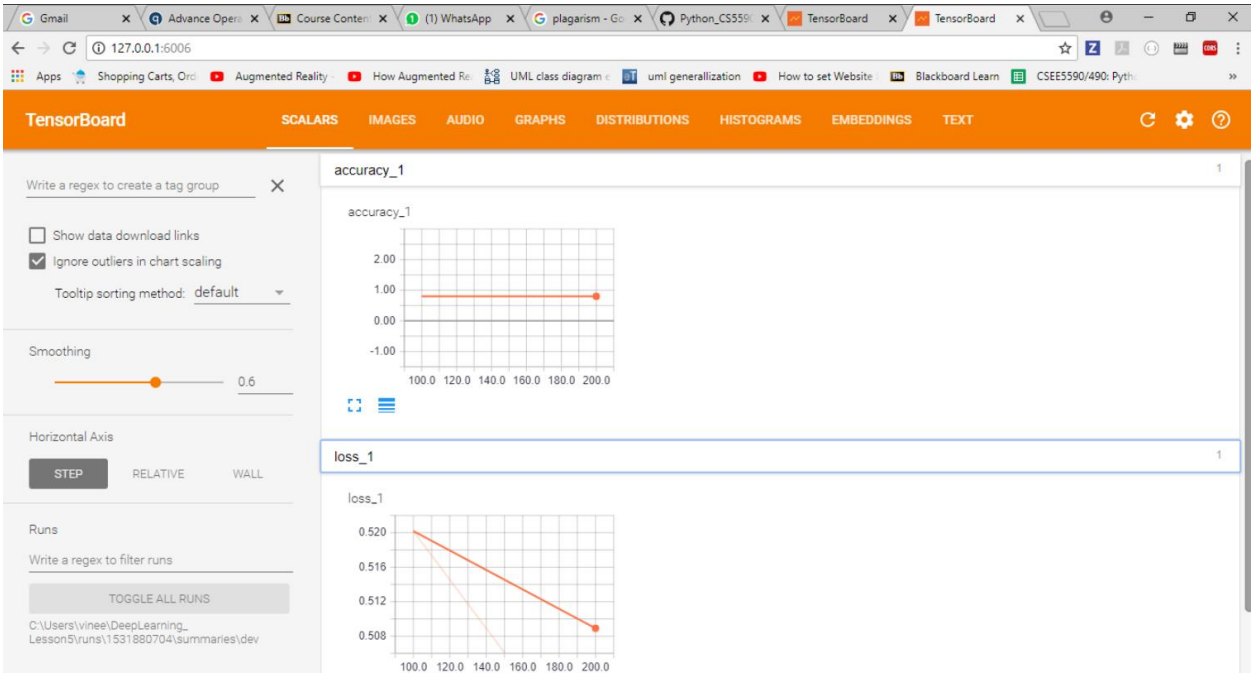
RMS Pro Loss and Accuracy:



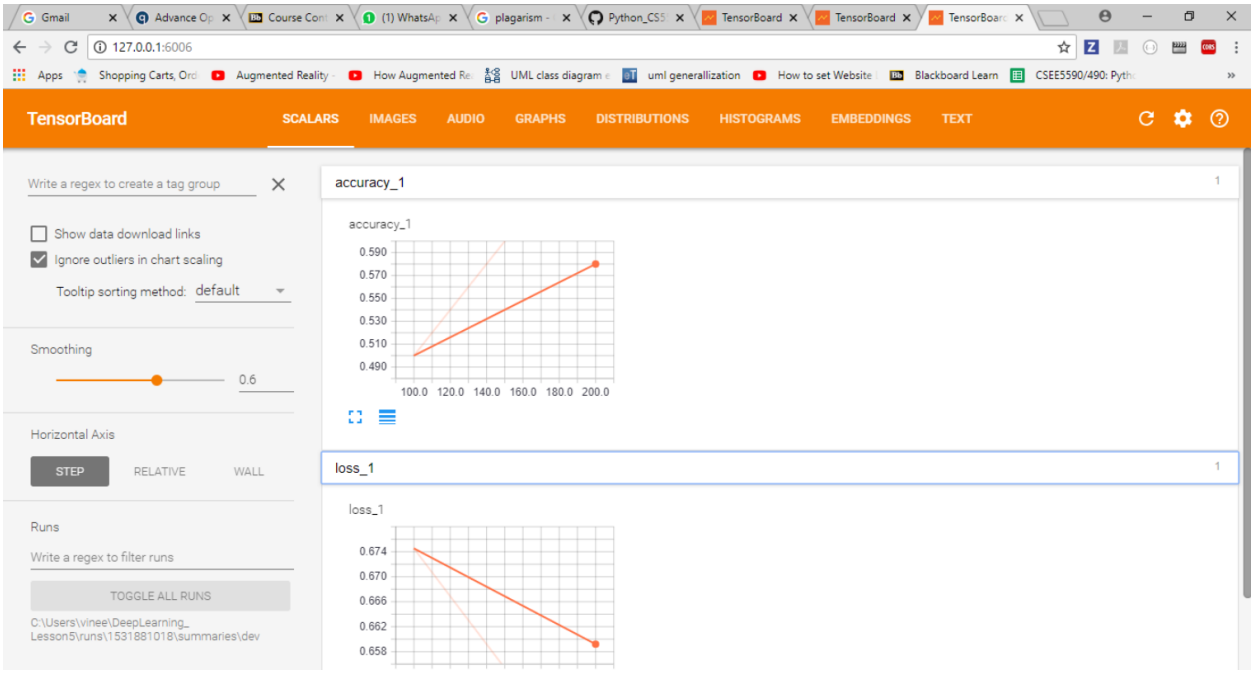
Adam Loss and Accuracy:



Adagrade Loss and Accuracy:



Gradient Descent Loss and Accuracy:



Question 2:

2. Implement the text classification with RNN/LSTM model, with a new dataset which is not used in the class

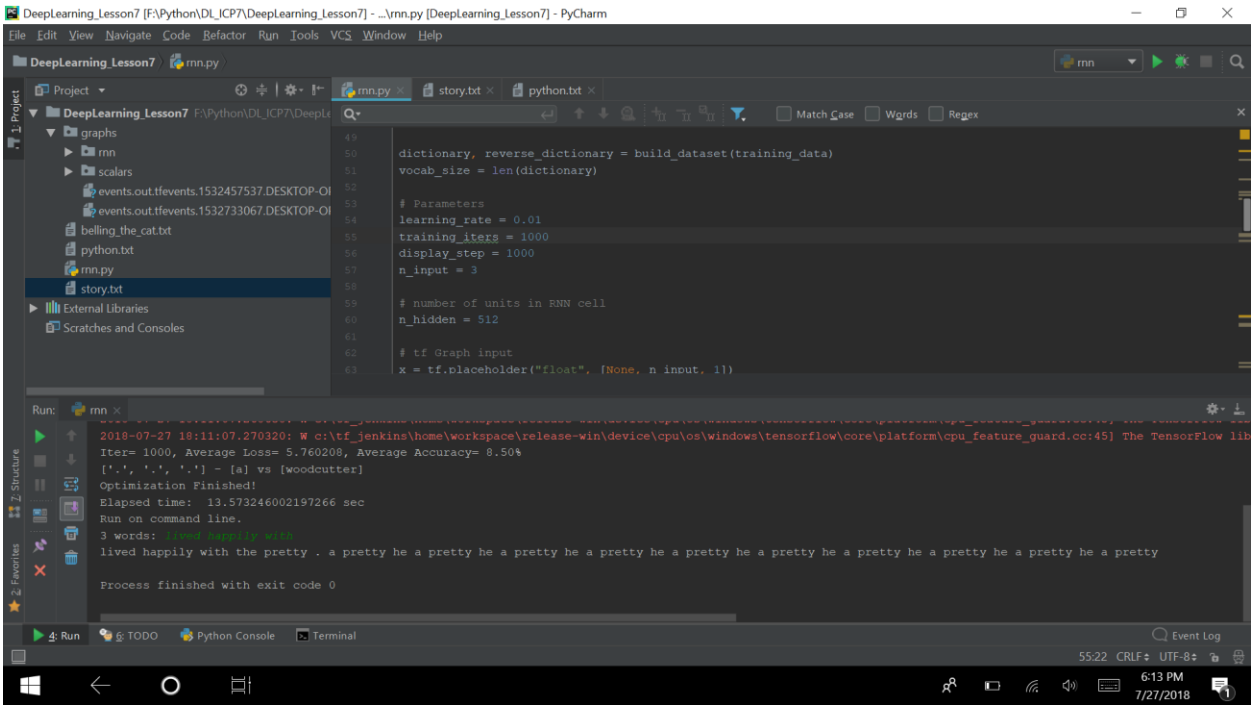
RNN Text Classification:

A recurrent neural network (RNN) is a class of artificial neural network where connections between nodes form a directed graph along a sequence. This allows it to exhibit dynamic temporal behavior for a time sequence. Unlike feedforward neural networks, RNNs can use their internal state (memory) to process sequences of inputs.

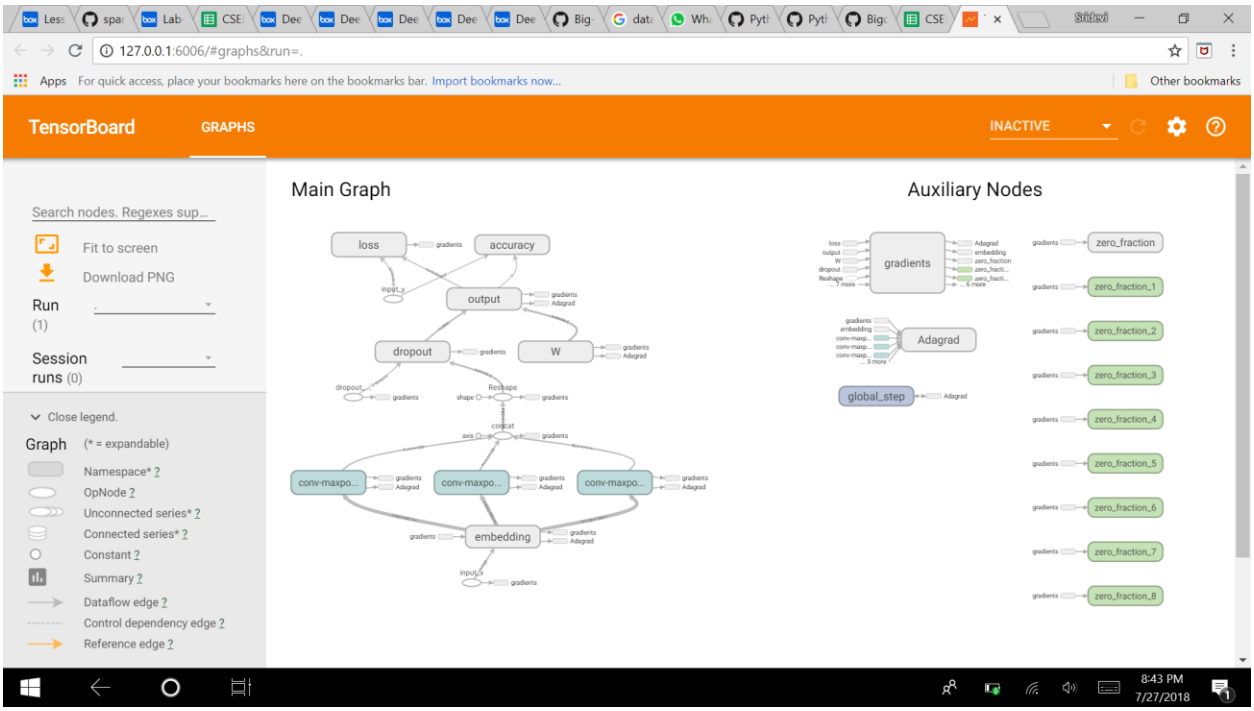
Data Set:

Story.txt

Output Screenshot:



Tensor board Graph:



Question 3:

3. Compare the results of CNN and RNN/LSTM models, for the text classification (same dataset for 2 models to compare) and describe, which model is best for the text classification based on your results

Solution:

Comparison table for CNN and RNN text classifications with different optimizers.

		CNN	RNN
Adam	Accuracy	0.714286	7.20%
	Loss	1.84405	5.599935
Agrade	Accuracy	0.571429	6.90%
	Loss	0.776604	4.870349
GradientDescent	Accuracy	0.857143	4.20%
	Loss	0.240004	6.731285
RMSPro	Accuracy	0.857143	8.50%
	Loss	0.26343	5.760208

From the observations we could say that for both CNN and RNN RMS Pro Optimizer is giving better accuracy and less loss. By comparing the results from above table with respect to Loss, we could say that CNN outperformed compared to RNN.

Question 4:

4. Implement the image classification with CNN model, with a new dataset which is not used in the class (E.g. CIFAR 10 dataset)

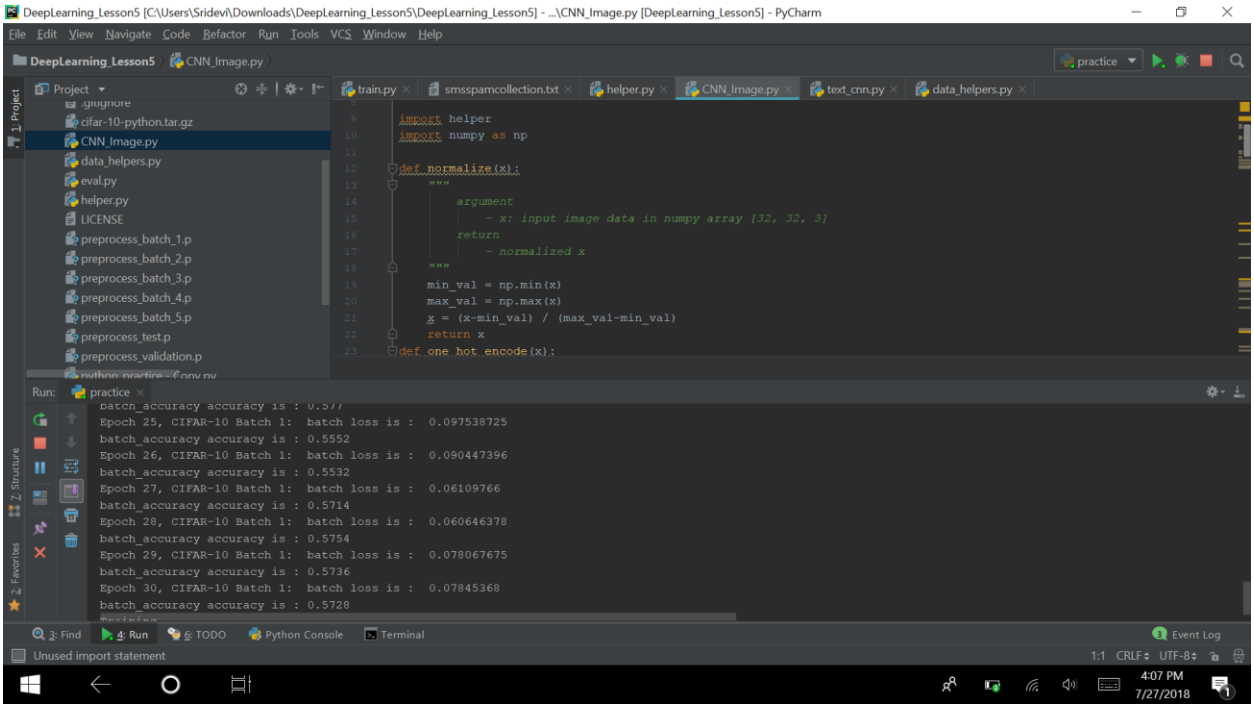
CNN Classification:

In machine learning, a convolutional neural network is a class of deep, feed-forward artificial neural networks, to analyzing visual imagery and text processing. CNNs use a variation of perceptions designed to acquire minimal preprocessing.

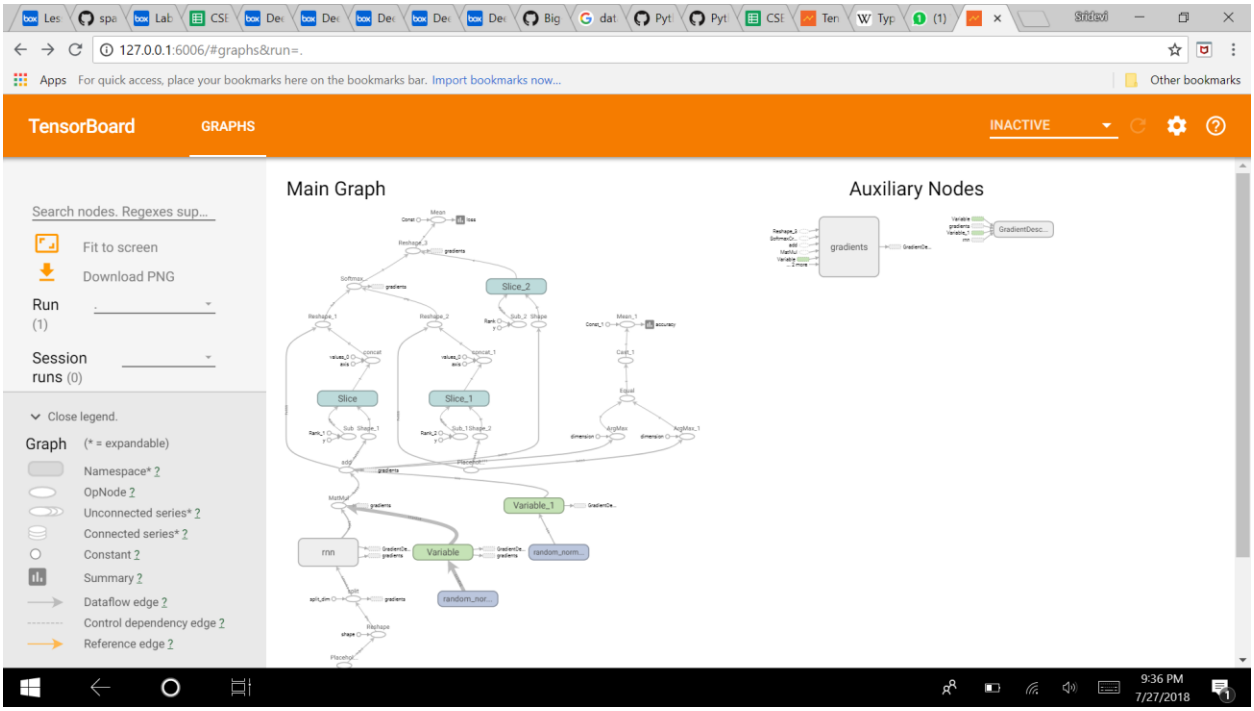
Data set:

Cifar-10

Output Screenshot:



Tensor board Graph:



Conclusion:

As stated the above workflow with certain set of parameters is followed in solving the execution by implementing the core and basic concepts of the deep learning

Source code https://github.com/PragathiThammaneni/Python-and-deep-Learning/tree/master/Labs/Lab%204

Video Link: https://youtu.be/qbNcMybAgR4 (In the video we represented the tensor board but not display at is multi windows in xbox)

Wiki Link: https://github.com/PragathiThammaneni/Python-and-deep-Learning/wiki/Lab-4-Assignment