

# Deep Learning Lab 4

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## Introduction:

TensorFlow models are very common but fairly complicated to train with high accuracy even with high level programming language such as python as it includes accomplishing variety of statistical operations for big datasets. However, with using the TensorFlow module it became very easy to process and deal with. Especially when the need to change the hyperparameters to reach the required performance or accuracy. In this assignment we are dealing with a TensorFlow model by using the logistic regression that is applied on a sample dataset called MNIST which is provided by the TensorFlow module too. We will monitor the accuracy change with changing the values of the hyperparameters. Also, we will use the TensorBoard to graphically illustrate the TensorFlow graph.

## Objective:

Analyzing a TensorFlow model with logistic regression. With python we can use the TensorFlow module that is able to generate the sessions samples. Also, we are using the TensorBoard to illustrate the graph. Finally, we will study the impact of the hyperparameters value changing on the analysis accuracy.

The objective for each task:

- 1- Implementing the logistic regression in the TensorFlow model with using the MNIST sample data set.
- 2- Showing the resultant graph on the TensorBoard to provide visualized understanding for the computations and data flows in our model.
- 3- Changing the hyperparameters values and explain the impact of the change.

## Approaches/Methods:

The theoretical approach is by using the logistic regression on a TensorFlow model that is the MNIST data set.

The programmatical approach is by let the python program download the data set from the official website and then read it in terms of tensors so we can run them in sessions.

## Workflow:

- 1- Loading the MNIST dataset.
- 2- Parse and read the dataset.
- 3- Include the data as sessions in loop to start run it.
- 4- These sessions will maintain training the data and optimizing it.
- 5- Provide the reached accuracy.
- 6- While the sessions are looping, the program is logging the data interactions in an event handler, so it can be used in the last step to illustrate the tensor graph using the TensorBoard.

## Datasets:

We used the MNIST dataset which comes with one of the data samples of the Tensorflow python module. This dataset is database of handwritten digits. It has a training set of 60,000 examples, and a test set of 10,000 examples. The digits have been size-normalized and centered in a fixed-size image.

## Parameters:

- 1- Learning Rate
- 2- Training Epoch
- 3- Batch Size
- 4- Display Step

## Evaluation & Discussion:

As the model running, it is being trained and optimized based on the hyperparameters values that are impacting the training and learning speed. they also change the model accuracy and the processing speed which will affect the machine resources utilization. The model processing and its results are shown in the screenshots in the assignment page on GitHub.

## Conclusion

The TensorFlow module provides a very handful collection of tools to deal with TensorFlow models. The model accuracy can be affected by the hyperparameters values. However, the TensorFlow graph does not change with the hyperparameters values.

## References

- [https://en.wikipedia.org/wiki/MNIST\\_database](https://en.wikipedia.org/wiki/MNIST_database)
- [https://www.tensorflow.org/api\\_docs/python/tf/contrib/training/HParams](https://www.tensorflow.org/api_docs/python/tf/contrib/training/HParams)
- <http://yann.lecun.com/exdb/mnist/>
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