## HU Extension Assignment 11 E63 Big Data Analytics

### Handed out: 11/10/2017 Due by 4:00 PM EST on Saturday, 11/18/2017

You are welcome to implement TensorFlow problems in this problem set in any of supported languages.

**Problem 1.** Consider provided Jupyter notebook Summaries and NameScopes.ipynb. Add one more output summay. For example, calculate the rolling mean of all one dimensional tensors passed as arguments of run\_graph function. Provide working notebook and images of your graphs and calculated summaries. In the Word document presented as your solution provide snippets of additional or modified code. **(15%)**

**Problem 2**. Consider the attached file logistic\_regression\_mnist.py. Search through TensorFlow API documentation and the Internet and describe for us what is the meaning and purpose of functions used in step 5 and step 6. Demonstrate that you can run the code successfully. Fetch for us the TensorBoard Graph. Vary parameter batch\_size through values: 8, 64, 128, 256 and report and plot changes in the execution time and accuracy. Keep other parameters the same as in the original program. Similarly, vary parameter learning\_rate through values 0.001, 0.005, 0.01, 0.02 and 0.05. Report and plot changes in the execution time and accuracy. **(25%)**

**Problem 3**. Fetch Iris Dataset from <https://archive.ics.uci.edu/ml/datasets/Iris> and make attached Python script, softmax\_irises.py work. You might have to upgrade the script to TF 1.x API. Generate TensorBoard graph of the process and use scalar summary to presenting variation of the loss function during the training process. Report the results of the evaluation process. **(35%)**

**Problem 4.** Analyze all relevant and non-obvious individual steps in the script, softwmax\_irises.py by examining their inputs and outputs. When convenient, use existing Iris Dataset. When convenient, you are welcome to provide your own inputs. Please examine and describe actions of functions and operations within those functions:

* combine\_inputs(), line 13
* inference(), line 17
* read\_csv(), line 25
  + decode\_csv() line 34
  + train.shuffle\_batch(), line 37
* inputs(), line 43
  + label\_number = tf.to\_int32(…), line 49
  + features = tf.transpose(..), line 57
* evaluate(), line 67
  + predicted = tf.cast(tf.arg\_max(inference(X), 1).., line 69
  + tf.reduce\_mean(tf.cast(tf.equal(predicted,Y),.,line 71
* threads = tf.train.start\_queue\_runners(sess=sess, coord=coord).., line 85

Please describe the effect of every function or command by providing an illustrative input and output set of values and well as a brief narrative. Please rely on TensorFlow API as much as possible. **(%25)**

Please, describe every step of your work and present all intermediate and final results in a Word document. Please, copy past text version of all essential command and snippets of results into the Word document with explanations of the purpose of those commands. We cannot retype text that is in JPG images. Please, always submit a separate copy of the original, working scripts and/or class files you used. Sometimes we need to run your code and retyping is too costly. Please include in your MS Word document only relevant portions of the console output or output files. Sometime either console output or the result file is too long and including it into the MS Word document makes that document too hard to read. PLEASE DO NOT EMBED files into your MS Word document. For issues and comments visit the class Discussion Board.