**ELEG 6913-P17: Deep Learning**

**Spring 2017**

**Department of Electrical and Computer Engineering**

**Prairie View A&M University**

**Project 2**

1. Image classification is to automatically label images with predefined categories. Deep learning methods have dramatically improved the state-of-the-art in image classification by learning representations of images with multiple levels of abstraction. The target of this project is to construct a convolutional neural network (CNN) based image classifier. Image data set containing 120 classes for the project is available at <http://vision.stanford.edu/aditya86/ImageNetDogs/>.
2. Choose 2 classes of images randomly from the image data set to build the data set 1.
3. Segment the data set 1 into training, validation, and testing sets.
4. Employ CNN to build a binary image classifier (CBC) on training and validation sets.
5. Evaluate CBC on testing set by calculating classification accuracies.
6. Segment the image data set into training, validation, and testing sets.
7. Repeat everything in (d-e). In this step, you will gain a CNN based multi-class classifier (CMC).
8. Divide the image data set into many binary class subsets. For example, if the image data set includes 3 classes, namely, a, b, and c, then we can divide the set into three subsets {a, b}, {a, c}, and {b, c}.
9. Repeat everything in (c-e) on these subsets with **Spark**. For example, if you have three subsets {a, b}, {a, c}, and {b, c}, you should complete everything in (c-e) on different nodes in **Spark**, simultaneously.
10. Summarize your observations and conclusions.

**Requirements:**

1. Project 2 must be accomplished with **Tensorflow**[[1]](#footnote-1) and *Python* by yourself.
2. Submit your codes, experimental results, and a summary (not less than 5 pages) on time

**Bonus Section:**

*If you can implement and evaluate “CNN Based Multi-class Image Classification via One-vs.-rest strategy”[[2]](#footnote-2),[[3]](#footnote-3) on the image data set with* ***Spark*** *for this project, you will obtain* *extra 20%* *scores. Requirements:*

1. *Comparing results between this method and CMC*
2. *Comparing Speed between this method and CMC*

**Submit your programs and supporting documents as one zip file in ecourses by May 01, 2017.**

1. <https://www.tensorflow.org/> [↑](#footnote-ref-1)
2. <https://en.wikipedia.org/wiki/Multiclass_classification> [↑](#footnote-ref-2)
3. <https://www.coursera.org/learn/machine-learning/lecture/68Pol/multiclass-classification-one-vs-all> [↑](#footnote-ref-3)