For this assignment, you will use *LogisticRegression\_NN\_Python\_Assignment.ipynb* to run logistic regression using a neural network structure.

**STUDY OBJECTIVES:**

You will implement all the building blocks of a neural network and use these building blocks to construct a neural network that performs image and text classification. By completing this assignment, you should be able to:

1. Develop an intuition for how an overall neural network is structured and built
2. Write NN functions such as forward propagation, backward propagation, logistic loss, etc. that can help you decompose your code and ease the process of building a neural network
3. Initialize and update parameters according to your desired structure
4. Get a concrete idea of how a NN can be used to solve real-world applications such as image and text classification

**IMPORTANT NOTE**:

The other python notebook file in the "Homework" folder "Week2\_Python\_Basics.ipynb" is to prepare you with the basic Python elements that may be applied and referenced in completing your assignment. Studying that code is not required but is highly recommended.

**DELIVERABLES:**

**Part 1 (4 pts)**. Conceptual understanding of ANN workflow

1. Study the tutorial thoroughly, conduct the exercise in Python notebook:

<https://www.bogotobogo.com/python/scikit-learn/Artificial-Neural-Network-ANN-1-Introduction.php>

1. Out of the following core concepts of DL, select two and explain step-by-step “what” each is and “how” it is conducted mathematically and programmatically
   1. [Bias-variance tradeoff](https://www.bogotobogo.com/python/scikit-learn/scikit_machine_learning_Bias-variance-Tradeoff.php)
   2. [Forward Propagation](https://www.bogotobogo.com/python/scikit-learn/Artificial-Neural-Network-ANN-2-Forward-Propagation.php)
   3. [Gradient Descent](https://www.bogotobogo.com/python/scikit-learn/Artificial-Neural-Network-ANN-3-Gradient-Descent.php)
   4. [Backward Propagation](https://www.bogotobogo.com/python/scikit-learn/Artificial-Neural-Network-ANN-2-Forward-Propagation.php)
   5. [Overfitting & Regularization](https://www.bogotobogo.com/python/scikit-learn/Artificial-Neural-Network-ANN-7-Overfitting-Regularization.php)

**Part 2 (8 pts)**. Python implementation of ANN of Logistic Regression

1. Python image classification code in Python notebook (*LogisticRegression\_NN\_Python\_Assignment.ipynb*) to fill in all the coding lines as required
2. Write a one-page report elaborating on the main algorithmic procedure you have completed in doing this excise, particularly targeting at the study objectives (the four points stated above)

Note: This assignment does not require the use of GPU. You may complete the assignment using your local machine or you may use Google Colaboratory. However, we encourage you to try using Google Cloud platform and get familiar with it.