

# ENGS/QBS 108 Fall 2017 Assignment 3

Due October 17, 2017

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**Problem:  $K$ -Means Clustering [65 points].** In this problem, you will explore and attempt to solve a realistic machine learning problem. The [Porto Seguro dataset](#) includes a number of anonymized features of vehicle drivers collected over the course of a year, as well as a target flag indicating whether the driver filled an insurance claim during the year. Your task is to predict whether a driver will fill an insurance claim given their feature vector.

1. [10 points] Data analysis is an important first step. Proceed to explore this problem's dataset by addressing the following:
  - (a) What are the dimensions of the training and testing datasets?
  - (b) Plot a histogram for
2. [20 points] Apply SVMs to the problem:
  - (a) Separate the training data into a  $k$ -fold cross validation testing framework for  $k=10$ .
  - (b) Train SVM models using your validation framework. Try a few different kernels. What kernel yields the best performance?
  - (c) Apply your best model to the testing set. Report your classification accuracy.
3. [25 points] Apply a (simple) deep neural net to the problem:
  - (a) Construct a deep neural network (layers? convolution?)
  - (b) Train your model. Report your performance on the training data.
  - (c) Apply your model to the testing set. Report your classification accuracy.