Homework 4, due October 3rd, 11:59pm

September 28, 2017

1. Implement the TISP variable selection method for classification (as described in page 12 of the Regularized Loss course notes), or regression (described in page 10), with the hard-thresholding penalty. Take special care to **normalize each column** of the X matrix to have zero mean and variance 1 and to use the same mean and standard deviation that you used for normalizing the train set also for normalizing the test set.

a) Using the `Gisette` data, train a TISP classifier on the training set, starting with $\mathbf{w}^{(\mathbf{0})} = \mathbf{0}$, with 100 iterations. Find appropriate λ-s to obtain approximately $10, 30, 100, 300$ features. Plot the misclassification error vs the number of selected features. Report in a table these misclassification errors on the training and test set, the corresponding numbers of selected features and the value of λ. (6 points)

b) On any of the other six **binary classification** datasets or the two **regression** datasets, using the training and test sets specified in the syllabus, repeat point a), adding the misclassification errors to the table from a). (1-3 points each as specified in the syllabus)