**ECE 8527: Introduction to  
Machine Learning and Pattern Recognition**

# HW No. 10: Nonparametric Classifiers, ROC Curves and AUC

Using data set no. 10, implement Random Forests (RNF) and Support Vector Machines (SVM) using standard Python (or MATLAB) packages. Plot performance on the eval set as a function of the number of support vectors on one plot, and as a function of the number of decision trees on a second plot. Also include tables showing performance on /train, /dev and /eval. Select the best operating point for each algorithm.

Next, for QDA (class-dependent PCA), SVM and RNF, plot a receiver operating characteristic (ROC) for each on the same plot for the /eval set. Analyze the performance of these classifiers using the results of these plots. Add a table that shows AUC for these three algorithms in /eval.

To learn more about ROC curves, read this tutorial ([ROC Curve and AUC](https://developers.google.com/machine-learning/crash-course/classification/roc-and-auc#:~:text=An%20ROC%20curve%20(receiver%20operating,False%20Positive%20Rate)) and these Wiki pages ([Confusion Matrix](https://en.wikipedia.org/wiki/Confusion_matrix), [Sensitivity and Specificity](https://en.wikipedia.org/wiki/Sensitivity_and_specificity), [Precision and Recall](https://en.wikipedia.org/wiki/Precision_and_recall)) We will revisit these metrics for the final course project.