



Middle East Technical University
Electrical-Electronics Engineering Department



EE 583 Pattern Recognition Homework 3

Due Date: **15.11.2020**, 23:55 via odtuclass.metu.edu.tr

Using MATLAB, attempt the questions below:

- 1) Execute the **Train SVM Classifier** example at <https://www.mathworks.com/help/stats/fitcsvm.html> *step-by-step* via “Try This Example” option in your internet browser (or you may execute it in your local MATLAB software by using “View MATLAB Command”). For the utilized `fisheriris` data set, for all its features (out of 4) find the pair of features (e.g. feature pairs (1,2), (1,3), (1,4), (2,3),...) with minimum number of support vectors that discriminate *versicolor* from *setosa* class. **Comment on the results.**
- 2) Execute the **Cross-validate SVM** example at <https://www.mathworks.com/help/stats/fitcsvm.html> *step-by-step* via “Try This Example” option in your internet browser (or you may execute it in your local MATLAB software by using “View MATLAB Command”). **Repeat this cross-validation scenario** for `fisheriris` data set, while using its all 4 features to discriminate *versicolor* from *setosa* class. **Repeat the cross-validation test for *Leave-one-out cross-validation* rather than default 10-folds. Compare the results.**
- 3) Execute **Multi-class SVM** example at <https://www.mathworks.com/help/stats/fitcsvm.html> *step-by-step* via “Try This Example” option in your internet browser (or you may execute it in your local MATLAB software by using “View MATLAB Command”). **Repeat this part for the features 1&2, *Sepal length and width* rather than the feature 3&4, *Petal length and width*. Show the support vectors on the plots. Comment on the discriminative properties of these features.**
- 4) Execute **Optimize an SVM Classifier** example at <https://www.mathworks.com/help/stats/optimize-an-svm-classifier-fit-using-bayesian-optimization.html> *step-by-step* via “Try This Example” option in your internet browser (or you may execute it in your local MATLAB software by using “View MATLAB Command”). **List which parameters of SVM can be utilized to optimize the overall performance.**