

Programming Exercise 2

Due on 23rd November

Pick a classification dataset from the LIBSVM repository:

<http://www.csie.ntu.edu.tw/~cjlin/libsvmtools/datasets/>

Tasks:

1. Partition the dataset into a training set and a validation set. Run a decision tree algorithm on the training set to generate a decision tree. Validate the decision tree on the validation dataset and report the total classification error (i.e. 0/1 error). Repeat the experiment with a different partition of training set/validation set. Are the resulting decision trees different? Explain why. **We have to plot the tree**
2. Run SVM to train a classifier, using a radial basis function as a kernel function. Apply cross-validation to evaluate different combinations of values of the model parameters (box constraint C and kernel parameter γ). How sensitive is the cross-validation error to changes in C and γ ? Choose the combination of C and γ that minimizes the cross-validation error, train the SVM on the entire dataset and report the total classification error. **3D grid and plot the mesh**
3. Train a Multi-Layer perceptron using the cross-entropy loss with ℓ_2 regularization (weight decay penalty). In other words, the activation function equals the logistic function. Plot curves of the training and validation error as a function of the penalty strength. How do the curves behave? Explain why.

Training error should decrease as we grow training set. The more we penalize the solution, the more complexity we add

You have to deliver the source code for each section. You are free to use the programming language/library of your choice.

There is a relationship between regularization and complexity of the model. We have to represent it with the plot