

Exercise Sheet 4

Submission by Monday 25th 16:00 via Moodle.

Corrections due by Thursday 28th 16:00 via Moodle.

Format for all questions: individual Jupyter notebooks .ipynb.

1 Classifiers in sklearn (4 points)

The aim of this exercise is to familiarise yourself with some of the classifiers implemented in sklearn by applying them to a 2D classification task.

On the course website you find *classifier_dataset.ipynb* which allows you to generate point-clouds with labels ± 1 .

- Using such datasets, build classifiers with `svm.svc`, `DecisionTreeClassifier`, `RandomForestClassifier`, `AdaBoostClassifier`.
- Using default parameters, check their performance on your pointcloud by checking their score and visualising their classification boundaries.
- Comment on how your results for the `DecisionTreeClassifier` change when varying the *maxdepth*.

2 XOR in Keras (3+1 points)

On the last exercise sheet we have seen that a single layer Perceptron cannot accommodate the XOR function. Show that by utilising a single hidden layer with sigmoid activation functions, XOR can be realised.

- Implement this network utilising Keras.
- What is the minimum number of hidden units needed in this network?
- What are the network parameters after training?
- ★ Could there be significantly different results depending on the weight initialisation?