

PHY 835: Exercise 4
Released Feb 24, 2021; Target Due Date: March 11, 2021

1. Classifiers in sklearn

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

On Canvas under “Files/Jupyter Notebooks/Ex4”, you find classifier dataset.ipynb which allows you to generate point-clouds with labels ± 1 .

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

2. XOR in Keras

In the last exercise, we have seen that a single layer Perceptron cannot accommodate the XOR function. Show that by utilizing a single hidden layer with sigmoid activation functions, XOR can be realized.

- a) Implement this network utilizing Keras.
- b) What is the minimum number of hidden units needed in this network?
- c) What are the network parameters after training?
- d) (Optional) Could there be significantly different results depending on the weight initialization?