ROBOT LEARNING

EXCERCISE- ENSEMBLE METHODS

SUMMER SEMESTER 2021

<https://fbe-gitlab.hs-weingarten.de/mat-iki/slam-mat/-/tree/master/svm>

**Problem 1**

In this problem you will work with high-noise dataset and implement a Ensemble Method of Bagging (using Scikit ibrary) to train a Regressor on the dataset. Look for out hints at: <https://scikit-learn.org/stable/modules/generated/sklearn.ensemble.BaggingRegressor.html>. The dataset in this case has to be generated by use with help of given function in part(a).

1. Generate and visualise a dataset with 500 points of the form (x,y) where x,y are real numbers. Given are the condition that x should range between [-5,5] having uniform distribution. Outputs y = f(x)+noise: where and Noise is sample is sampled from normal distribution with zero mean and 0.1 standard deviation.
2. Implement the Bagging Regressor (with Ensemble size of 10) and compare the prediction error with normal Regressor. For this task you may consider using, Decision Tree regressor (with depth = 3) and try to average the prediction error over 5 repititions. Note that for each repitition, you should use a different training-testing split of the complete dataset to train and validate models.

**Problem 2**

In this problem you will implement a Ensemble Boosting technique (using Scikit ibrary) to train a Regressor on the same dataset as in Problem 1. Look for out hints at: [https://scikit-learn.org/stable/modules/ensemble.html#adaboost](https://scikit-learn.org/stable/modules/ensemble.html" \l "adaboost). We will again be using Decision Tree Regressor for this problem.

1. Implement a Boosting Regressor with an Ensemble size of *n=25* and compare the Mean Prediction Error with normal Regressor. For this task you may consider using, Decision Tree regressor (with depth = 3).

**Problem 3**

Ensemble methods usually tend to work with high variance regressors. Have a look at this article :

<https://towardsdatascience.com/bagging-on-low-variance-models-38d3c70259db>