Exercise 4 Report: AutoML

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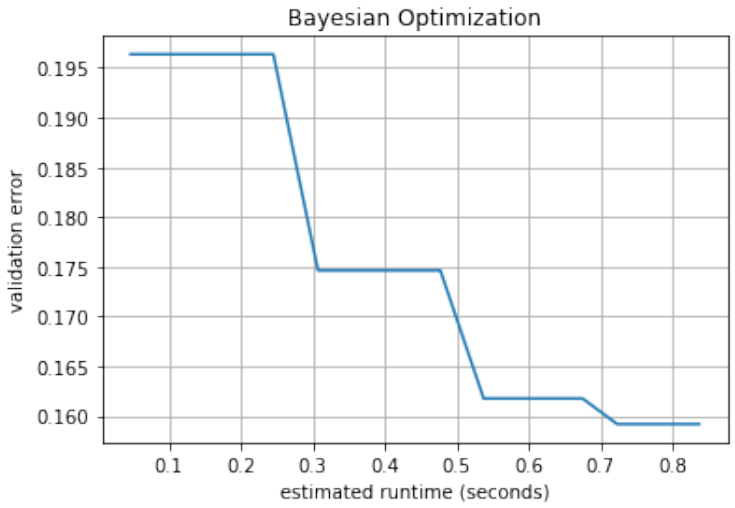
1 Introduction

Firstly, got familiar with Emukit through the tutorial. Used Emukit throughout the whole exercise, mostly for sampling a random configuration of our parameter space by using *.getsamples()*, but also for the acquisition function and the optimizer in Bayesian Optimization

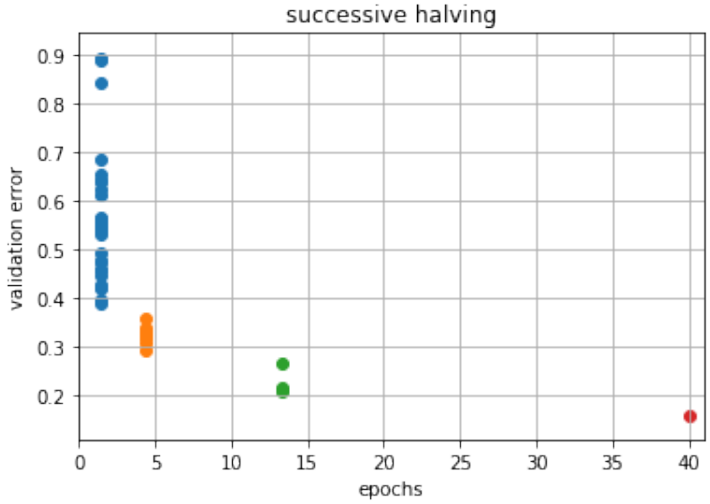
Exercise 1 - Bayesian Optimization

Finished implementing Bayesian Optimization by optimizing the acquisition function, evaluating the objective function and finally updating the model.



Exercise 2 - Hyperband

Got familiar with Hyperband and successive halving through the tutorial by Kevin Jamieson. Implemented random sampling with Emukit and finished the successive halving inner loop and hyperband outer loop.



Exercise 3 - BOHB

Implemented the KDE using KDEMultivariate from statsmodels.
Random sampled a new training point from one of the good configs by using each of the hyperparameter values as the mean and the KDE bandwidth as the standard deviation.
Applied acquisition function to the vector (used Expected Improvement) and kept best vector.

In the update function we split the data points into good and bad configurations and fitted the KDE for the current budget, but only once we had enough points at hand.

So we basically implemented the BO part of BOHB as the Hyperband/successive halving part was more or less the same as Hyperband.

As it can be seen in the plot, the model based configurations are on average better than random sampled configurations.