Proposal

•What does your system do? What are its inputs and outputs?

The system tunes the hyperparameters of models designed for time-series data, such as linear regression or LSTM networks by using reinforcement learning (RL). The input will be different sources of time-series data such as features extracted from stock, crypto or EEG data, as well as some bounded hyperparameter search space as the state space of the RL model used to refine the prediction model. The output will be a time-series prediction model with a sub-selection of features and a selection of parameters such as number of coefficients that provides the best prediction for the given data. The reward function of this system will be designed according to some accuracy metric of the model on a validation dataset. We would like to try this process in a simple model first such as linear regression, and if we were to succeed, test it out in a more complex model such as LSTM.

•If your system solves a real-world problem, describe it.

Tuning the hyperparameters of a model is one of the hardest problems in ML. We want to test if reinforcement learning can provide a better solution than a naive and exhaustive grid-search within the hyperparameter space.

•How will you measure the success of your system?

The accuracy with which it is able to predict time series measurements as compared with using grid search to find the best set of parameters for training.

•What dataset(s) are you using?

Kaggle has stock data on companies such as Apple and Amazon. Yahoo and TradingView have bitcoin data from 2014. We have some EEG databases available as well, although they might not be strictly time-series data.

•What are the challenges of building the system?

RL requires that the model is trained to test the reward. For this the models need to be small so that we can go through the many iterations of RL. Defining how to limit the feature and hyperparameter space in a way that can be handled by RL is another challenge

•What is the phenomenon in the data that you are trying to capture?

We are trying to predict/forecast trends in time-series data by training models whose architecture has been designed with RL. We are also trying to learn how the performance of a given model (e.g., a LSTM) varies for different parameter choices.