Multivariate time-series prediction of mobility data

Motivation

Donkey Republic is a bicycle sharing company which operates, among other places, in the Copenhagen metropolitan area. Given that they would like to guarantee the availability of bikes for their customers it is vital that their bicycle “hubs” are adequately stocked and appropriately placed. However, since the bicycles are moving around the city with day-to-day traffic it would be very interesting for Donkey Republic to have some kind of reliable way to model the flow of bike traffic with the predicted drop off locations to get a better picture of this spatio-temporal demand.

Background

For this project, we have access to data from Donkey Republic regarding the pickup and dropoff locations of users when they rent bikes through the app.

Milestones

We have divided the project into some milestones in order to stay organized along the way. We plan to start by getting some understanding of the data by creating some visualizations, after which we will use this understanding to appropriately segment and preprocess the data for the neural network [1]. After the relevant features have been prepared we’ll attempt to build some very basic classifiers in order to develop a baseline for comparison. At this point, the iterative design begins where we will experiment with different machine learning techniques in order to develop our mode [2]l. Finally, we would like to make a comparison of the different model versions both in terms of relevant features as well as deep learning strategies and model architectures.

1: understanding the data and the problem to formulate possible solutions;
2: preprocessing the data to make it ready to work with [1];
3: building a simple baseline model for benchmarking;
4: building an improved model [2];
5: iterate on the improved model to get the best possible solution;
6: benchmarking baseline vs full model
7: document everything and prepare presentation

References

[1] Lloyd, Stuart P. "Least squares quantization in PCM." Information Theory, IEEE Transactions on 28.2 (1982): 129-137.
[2] R. G. Krishnan, U. Shalit, D. Sontag, "Deep Kalman filters", *NIPS 2016 Workshop: Advances in Approximate Bayesian Inference*, pp. 1-7, 2016.