TU Clausthal

Abschlussvortrag Research Track

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https://webconf.tu-clausthal.de/b/jor-a6p-een

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"Influence of grid topology and cell size on taxi demand prediction"

Ride-sharing services with the meaning of sharing a journey with other passengers have grown recently intending to better utilize vehicle capacity. Thereby presenting the potential to reduce the travel cost and, CO2 emissions. To optimize ride-sharing services, providers redistribute idle taxis based on the predicted future passenger demand. For this prediction, multiple neural network building blocks - like convolutional neural network (CNN) or long-short term memory (LSTM) layers - and combinations of them have been used. In these approaches, replacing degree-based coordinates for the pickup locations via the indices of a grid is common. However, we observed that various grid cell sizes and grid cell topologies are used by different approaches without sufficient explanation.

In this work, we want to consider the grid topologies square, triangle, and hexagon and various grid cell sizes - from 250m to 1000m - to study their influence on CNN - and LSTM-based demand prediction, models. To evaluate this influence, we reconstruct an existing CNN and additionally build an, - LSTM and CNN model. Before examining the influence of grid cell size and topology on the prediction precision, we enable fair comparison by bringing the results of different grid cell sizes in a uniform form. In comparison, the self-constructed CNN model achieves the best results. As the grid cell size is decreased, better results are obtained for the evaluation metrics mean absolute error (MAE), mean squared error (MSE), and root mean squared error (RMSE). Therefore, a model with more trainable parameters and one trained on a dataset with finer achieves a higher prediction precision.

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