Project proposal - Time Series Forecasting with GNNs

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The ability to accurately predict future values is crucial for informed decision-making across various industries. With this project we aim to explore the concept of GNNs and how they can be used to solve time series forecasting tasks. In particular, we aim to understand why and how GNNs can be used to solve such tasks by providing a high level theoretical explanation of how to integrate together time series and graphs.

Finally, we plan to leverage the theoretical concepts developed in the first step to an empirical problem. We are really interested in exploring how these frameworks can be applied to real-time urban traffic forecasting.

The dataset we plan to use are two highway traffic datasets PeMSD4 and PeMSD8 from California. The datasets collect flow, speed and occupy measured with more the 100 IoT sensors in real time every 30 seconds.

The usage of GNNs will allow us to capture the spatial characteristics of such a network and to use these to improve the forecasted value for each node.

Similar work: https://paperswithcode.com/dataset/pemsd8

Dataset loader PeMSD8: https://github.com/wanhuaiyu/ASTGCN

GNNs for time series: https://github.com/KimMeen/Awesome-GNN4TS