

MASTER'S THESIS PRESENTATION

Data Assimilation for Graph Neural Networks: A Case Study of Highway Traffic Time Series Prediction

WHEN

April 29, 2022**12:30 PM**

WHERE

Zoom Meeting

For ZOOM presentations, details will be provided in an email announcement for this seminar.

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In this talk, we briefly outline the fundamental principles of data assimilation and how these methods can be utilized in applications where data can be represented in terms of a graph structure. The newly developed Auto-differentiable Ensemble Kalman Filter (AD-EnKF) framework is a specific technique of data assimilation that has shown to be advantageous in a variety of applications, and this method is the focus of this presentation. In particular, AD-EnKF is of great use when observations are missing or distorted, which is a problem in many real-world datasets. By learning a latent representation of the data with associated error parameters, this method allows for full prediction on incomplete data. This issue of incompleteness is particularly prevalent in traffic data, so as a case study, we model traffic speed data from the California highway system. We paired the AD-EnKF training framework with the state-of-the-art traffic time series model called the Adaptive Graph Convolutional Recurrent Network (AGCRN) in order to produce predictions of traffic speeds at each location. Using this large-scale traffic dataset, we compare the performance of AGCRN trained using AD-EnKF versus AGCRN trained using conventional backpropagation. We outline further directions that can be explored to generalize this method, such as relaxing the implicit assumption that the variance of the data remains constant over time.

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