Modeling Network-level Traffic Flow Transitions on Sparse Data

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1. What’s the problem?
Modeling traffic state transitions

What are the current state and previous states?

Heuristic models

ML models

ARIMA, KNN, SVR

RNN/CNN

GNN: STGCN/ASTGCN/ASTGNN/DCRNN

2. Why do we need predictive 1.5?

Predictions made by a traffic prediction system, might affect the route people take, or the traffic signal control actions, which changes the traffic in return

• More traffic operations can be considered
• More exterior data like weather conditions can be considered
• Sometimes actions are not known and need to be inferred.

3. Method: Dynamic graph, Transition function, and Iterative training (DTIGNN)

Imputation and transition model should be inherently one model

Input: full data at time t

Output: observed data at time t and t-1

Transition model

Imputation model

3.1 Transition-based Spatial Temporal GNN

Calculate the latent traffic volume based on Transportation equations

Using GAT-based/GCN-based Module to model Temporal-Spatial dependency

4. Experiments

Code and data can be found at: