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TRAFFIC DEMAND PREDICTION BASED ON DYNAMIC TRANSITION CONVOLUTIONAL NEURAL NETWORK

ABSTRACT

Precise traffic demand prediction could help government and enterprises make better management and operation decisions by providing them with data-driven insights. However, it is a nontrivial effort to design an effective traffic demand prediction method due to the spatial and temporal characteristics of traffic demand distributions, dynamics of human mobility, and impacts of multiple environmental factors. To handle these problems, a Dynamic Transition Convolutional Neural Network (DTCNN) is proposed for the purpose of precise traffic demand prediction. Particularly, a transition network is first constructed according to the citiwide historical departure and arrival records, where the nodes are virtual stations discovered by a density-peak based clustering algorithm and the edges of two nodes correspond to transition flows of two stations. Then, a dynamic transition convolution unit is designed to model the spatial distributions of the traffic demands, and to capture the evolution of the demand dynamics. Last, a unifying learning framework is provided to incorporate the spatiotemporal states of the traffic demands with environmental factors.