Traffic Prediction with Raw Data Utilization and Context Building

Authors : Zhou Yang, Heli Sun, Jianbin Huang, Jizhong Zhao, Shaojie Qiao

Abstract: Traffic prediction is essential in a multitude of ways in modern urban life. The researchers of earlier work in this domain carry out the investigation chiefly with two major focuses: (1) the accurate forecast of future values in multiple time series and (2) knowledge extraction from spatial-temporal correlations. However, two key considerations for traffic prediction are often missed: the completeness of raw data and the full context of the prediction timestamp. Concentrating on the two drawbacks of earlier work, we devise an approach that can address these issues in a two-phase framework. First, we utilize the raw trajectories to a greater extent through building a VLA table and data compression. We obtain the intra-trajectory features with graph-based encoding and the intertrajectory ones with a grid-based model and the technique of back projection that restore their surrounding high-resolution spatial-temporal environment. To the best of our knowledge, we are the first to study direct feature extraction from raw trajectories for traffic prediction and attempt the use of raw data with the least degree of reduction. In the prediction phase, we provide a broader context for the prediction timestamp by taking into account the information that are around it in the training dataset. Extensive experiments on several well-known datasets have verified the effectiveness of our solution that combines the strength of raw trajectory data and prediction context. In terms of performance, our approach surpasses several state-of-the-art methods for traffic prediction.

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Keywords : traffic prediction, raw data utilization, context building, data reduction

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