World Academy of Science, Engineering and Technology
International Journal of Computer and Information Engineering
Vol:16, No:10, 2022

Leveraging the Power of Dual Spatial-Temporal Data Scheme for Traffic Prediction

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Abstract : Traffic prediction is a fundamental problem in urban environment, facilitating the smart management of various businesses, such as taxi dispatching, bike relocation, and stampede alert. Most earlier methods rely on identifying the intrinsic spatial-temporal correlation to forecast. However, the complex nature of this problem entails a more sophisticated solution that can simultaneously capture the mutual influence of both adjacent and far-flung areas, with the information of time-dimension also incorporated seamlessly. To tackle this difficulty, we propose a new multi-phase architecture, DSTDS (Dual Spatial-Temporal Data Scheme for traffic prediction), that aims to reveal the underlying relationship that determines future traffic trend. First, a graph-based neural network with an attention mechanism is devised to obtain the static features of the road network. Then, a multi-granularity recurrent neural network is built in conjunction with the knowledge from a grid-based model. Subsequently, the preceding output is fed into a spatial-temporal super-resolution module. With this 3-phase structure, we carry out extensive experiments on several real-world datasets to demonstrate the effectiveness of our approach, which surpasses several state-of-the-art methods.

Keywords : traffic prediction, spatial-temporal, recurrent neural network, dual data scheme
Conference Title : ICWAIM 2022 : International Conference on Web-Age Information Management
Conference Location : Barcelona, Spain
Conference Dates : October 20-21, 2022