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Spectral Temporal Graph Neural Network for Multivariate

Time-series Forecasting

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Multivariate time-series forecasting plays a crucial role in many real-world applications. It is a challenging problem as one needs to consider both intra-series temporal correlations and inter-series correlations simultaneously. Recently, there have been multiple works trying to capture both correlations, but most, if not all of them only capture temporal correlations in the time domain and resort to pre-defined priors as inter-series relationships.

In this paper, we propose Spectral Temporal Graph Neural Network (StemGNN) to further improve the accuracy of multivariate time-series forecasting. StemGNN captures inter-series correlations and temporal dependencies jointly in the spectral domain. It combines Graph Fourier Transform (GFT) which models inter-series correlations and Discrete Fourier Transform (DFT) which models temporal dependencies in an end-to-end framework. After passing through GFT and DFT, the spectral representations hold clear patterns and can be predicted effectively by convolution and sequential learning modules. Moreover, StemGNN learns interseries correlations automatically from the data without using pre-defined priors. We conduct extensive experiments on ten real-world datasets to demonstrate the effectiveness of StemGNN.