

中央研究院統計科學研究所

學術演講

講題：Advanced Bayesian Hierarchical Spatiotemporal Models and Sparse Temporal Fusion Transformers

演講人：Prof. Hsin-Hsiung Huang (黃信雄 副教授)
Department of Statistics and Data Science, University of Central Florida

時間：2024-06-17(Mon) 10:30-12:00

地點：Auditorium, B1F, Institute of Statistical Science; The tea reception will be held at 10:10.

備註：Online live streaming through Cisco Webex will be available.

Abstract

In this presentation, I will discuss recent breakthroughs in Bayesian spatial and temporal modeling, focusing on two innovative methodologies: Bayesian Hierarchical Models for storm surge prediction and the Sparse Temporal Fusion Transformer Nearest Neighbor Gaussian Process (STFT-NNGP) for forecasting geopolitical events in the GDELT database. The first part of the talk will introduce a Bayesian Hierarchical Model that utilizes a latent temporal Gaussian process with a spike-and-slab prior, significantly enhancing environmental influence predictions beyond traditional autoregressive methods. This model effectively processes storm surge data using key predictors such as transformed wind components and advanced fitting techniques like the Polya-Gamma scheme, specifically adapted for Florida's surge weather data. The second part will explore the STFT-NNGP model, designed to address the complexities of multi-step forecasting for time series with sparse data. Integrating the Temporal Fusion Transformer with Variational Nearest Neighbor Gaussian Processes, the STFT-NNGP has shown exceptional accuracy and efficiency in the 2023 Algorithms for Threat Detection competition. The seminar will cover the integration of these models, their practical applications through case studies, and their transformative impact on spatiotemporal forecasting.



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