



THE HONG KONG UNIVERSITY OF SCIENCE & TECHNOLOGY

Department of Mathematics

**SEMINAR ON STATISTICS AND
DATA SCIENCE**

Sequential Predictive Conformal Inference for Time Series

By

Dr. Chen XU and Prof. Yao XIE

Georgia Institute of Technology

Abstract

We present a new distribution-free conformal prediction algorithm for sequential data (e.g., time series), called the sequential predictive conformal inference (SPCI). We specifically account for the nature that time series data are non-exchangeable, and thus many existing conformal prediction algorithms are not applicable. The main idea is to adaptively re-estimate the conditional quantile of non-conformity scores (e.g., prediction residuals), upon exploiting the temporal dependence among them. More precisely, we cast the problem of conformal prediction interval as predicting the quantile of a future residual, given a user-specified point prediction algorithm. Theoretically, we establish asymptotic valid conditional coverage upon extending consistency analyses in quantile regression. Using simulation and real-data experiments, we demonstrate a significant reduction in interval width of SPCI compared to other existing methods under the desired empirical coverage.

Biography

Short bio: Chen Xu is currently a 4th year Operations Research PhD at Georgia Tech ISyE, where he is supervised by Prof. Yao Xie. His current research interests are two-fold. (1) Uncertainty quantification for machine learning models. Specifically, advance conformal prediction as a distribution-free method for arbitrarily complex deep models, especially in the context of time-series modeling. (2) Generative models through flow-based neural networks. Specifically, develop scalable computational tools for problems at the intersection of statistics and optimization, including extensions to high-dimensional optimal transport, distributionally robust optimization, and differential privacy. He has published in top machine learning conferences (e.g., ICML 2021 oral, NeurIPS 2023 spotlight) and journals (e.g., IEEE TPAMI 2023, IEEE JSAIT).

Date : 20th November 2023

Time : 9:00p.m.-10:00p.m.

Join Zoom Meeting: <https://hkust.zoom.us/j/97485522529>

Passcode: mafs6010z

All are Welcome!