

Modeling multistage uncertainty with Time Series Foundation Models and Doob decomposition

mercredi 30 juillet 2025 11:30 (25 minutes)

Time Series Foundation Models, like ChatGPT for language, are trained on vast amounts of curated time series data and can produce a sequence of high-quality predictions from a single input sequence. Can we apply Time Series Foundation Models to the challenge of generating multistage scenario trees?

This talk explores a method based on Doob's observation that every discrete-time stochastic process is equal to the sum of a predictive process and a martingale. It is a natural idea to use Time Series Foundation Models for the predictive part. The missing piece, of course, is the martingale.

Martingale ideas are a well-known part of the stochastic programming playbook. They underpin the progressive hedging algorithm of Rockafellar and Wets, and in options pricing problems (real and financial) the optimal dual solution is related to a martingale.

This talk presents some basic principles and some experiments into the construction of martingales from time series data, and the coupling of the martingale to a TSFM-generated predictive process. Finally, for the problem of evaluating options for flexibility, it may turn out that constructing martingales is actually a solution algorithm.

Author: KING, Alan (IBM Research)

Co-auteurs: MESSINA, Enza (University of Milano-Bicocca); ZHANG, Hongyu (University of Southampton); FERRARIO, Tommaso (University of Milano-Bicocca)

Orateur: KING, Alan (IBM Research)

Classification de Session: Mini-symposium

Classification de thématique: Mini-symposium: Modeling flexibility: new developments