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THE HONG KONG UNIVERSITY OF SCIENCE & TECHNOLOGY

Department of Mathematics

PHD STUDENT SEMINAR

CTSDiff: Controllable Time – Varying Statistics Diffusion for Multi-Assets Financial Time Seriess

By

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Abstract

Synthetic financial data are increasingly used for back-testing, scenario analysis, and privacy-preserving research, yet most existing generators either ignore cross-asset interactions or offer no mechanism to adjust their statistical strength. We introduce CTSDiff, a controllable diffusion framework that replaces the unit covariance in both the forward process and the reverse-time loss with an anisotropic Gaussian whose covariance is a rolling correlation matrix estimated from recent market data. This joint noise–loss substitution injects realistic cross-asset structure—such as spread stationarity and cointegration—into every diffusion step, while the resulting Mahalanobis loss delivers gradients aligned with the desired dependence. By scaling the correlation matrix, users can continuously amplify or attenuate these properties at generation time without retraining.

Date : 15 May 2025, Thursday

Time : 11:00am

Venue : Room 4475 (Lifts 25/26)

All are Welcome!