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Bayesian Clustering for Portfolio Credit Risk

In this work, we develop a Bayesian clustering approach to address the limitations of traditional credit risk models used in loan portfolios, which typically group loans into predefined homogeneous buckets based on observable characteristics like credit ratings or industries. Our method leverages time series data of predicted default probabilities to dynamically cluster loans, allowing for a more flexible assignment of loans to multiple buckets through weighted vectors, rather than restricting them to a single category.

By integrating Bayesian inference, we estimate posterior distributions for the weight matrices, correlations, and default probabilities, which provides a more nuanced understanding of portfolio risk. We demonstrate the feasibility of this approach through simulated data and real-world credit risk data, analyzing its impact on key risk measures such as value at risk and expected shortfall. The results indicate that our method improves the accuracy of portfolio loss simulations, providing a robust framework for managing credit risk.

The talk is based on joint work with Bohdan Horak (University of Alberta).