The Hong Kong University of Science and Technology

Seminar on Business Data Science

Department of ISOM

Manifold Fitting: An Overview and Its Applications in Stock Commentaries

by

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Date: 12 November 2025 (Wednesday)
Time: 11:00am – 12:00nn
Venue: Room 4047 (LSK Business Building)

Abstract

The rapid growth of unstructured financial text, such as investor stock commentaries, presents both challenges and opportunities for modelling in quantitative finance. A key difficulty lies in extracting meaningful structures from such data to support tasks like classification, clustering, and behaviour modelling. The manifold fitting problem, originating from Whitney's work in the 1930s, provides a geometric framework for addressing these challenges. It asks when a smooth low-dimensional manifold can approximate a given data set and how well this approximation can be quantified in terms of distance and smoothness. In this talk, I will explore the manifold fitting problem, highlighting its modern insights and implications. As the manifold hypothesis-exploring non-Euclidean structures-remains a cornerstone of data science, further exploration of the manifold fitting problem is essential within the contemporary data science community. This discussion will be informed by recent work by Yao, Yau, and other co-authors, alongside ongoing research.

Bio

Zhigang Yao is a tenured Associate Professor in the Department of Statistics and Data Science at the National University of Singapore. Since 2022, he has also been a visiting faculty member at the Center for Mathematical Sciences and Applications at Harvard University. In addition, he holds visiting professorships at the Yau Mathematical Sciences Center at Tsinghua University and at the Shanghai Institute of Mathematical Sciences and Interdisciplinary Science (SIMIS), where he leads the group on the Interface of Data Science and Geometry. Yao's primary research interests are in statistical inference for complex data. In recent years, his focus has shifted towards Non-Euclidean Statistics and low-dimensional manifold fitting. He is dedicated to advancing the emerging field at the intersection of geometry and statistics. Along with his collaborators, Yao has proposed novel methods and theories that extend traditional principal component analysis (PCA) to Riemannian manifolds, including principal flows, sub-manifolds, and principal boundaries. These innovations offer new manifold fitting theories designed to address the limitations of conventional statistical methods by incorporating the geometric structure of data.

All interested are welcome!

For details, please contact ISOM Department.