National Center for Theoretical Sciences

MINI-COURSE ON
MATHEMATICS IN MANIFOLD LEARNING

TIME 2023.7.21 10:00-17:10

VENUE ROOM SC4009-1, DEPARTMENT OF APPLIED MATHEMATICS, NATIONAL SUN YAT-SEN UNIVERSITY

SPEAKERS

YI-SHENG WANG	NATIONAL SUN YAT-SEN UNIVERSITY
CHIN-HUNG LIN	NATIONAL SUN YAT-SEN UNIVERSITY
SEÇKIN GUNSEN	NATIONAL SUN YAT-SEN UNIVERSITY
LIREN LIN	NATIONAL CHENG KUNG UNIVERSITY

EVENT WEBSITE

ORGANIZERS

CHIH-WEI CHEN	NATIONAL SUN YAT-SEN UNIVERSITY
RIVER CHIANG	NATIONAL CHENG KUNG UNIVERSITY

REGISTRATION (~7/10)

COURSE BACKGROUND & PURPOSES

Manifold learning (ML) encompasses much of the disciplines of geometry, computation, and statistics, and has become an important research topic in data analysis and statistical learning. Although students in (Applied) Math. Department have been equipped with related knowledge in solving ML problems, they still need an instruction to get into the field. Our course demonstrates how to use geodesics, barycentric coordinates, graph Laplacian and matrix theory, and homology groups to deal with data clustering. Our goal is to develop more data scientists who are equipped with solid background in mathematics.

COURSE OUTLINE & DESCRIPTIONS

The mini-course will introduce several fundamental algorithms in manifold learning: MDS (Multidimensional Scaling), LLE(Locally Linear Embedding), Laplacian Eigenmap, and TDA(Topological Data Analysis). We will focus on the theoretical properties of them. The prerequisite of this mini-course is linear algebra.

6 lectures will be provided, including 1 on MDS, 2 on LLE, 1 on Laplacian Eigenmap, 2 on TDA.