



THE HONG KONG UNIVERSITY OF SCIENCE & TECHNOLOGY

Department of Mathematics

PHD STUDENT SEMINAR

**Model Selection and Parameter Estimation of
Gaussian Mixture Models**

By

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Abstract

Mixture models are widely employed across various fields to model data and signals originating from sub-populations or distinct sources. Among these models, the Gaussian mixture model (GMM) has emerged as one of the most extensively studied and widely applied models. In this talk, we discuss the challenge of learning one-dimensional Gaussian mixture models (GMMs) with a specific focus on estimating both the model order and the mixing distribution from i.i.d. samples. We introduce the computational resolution limit (CRL), a novel concept that helps quantify the lower bound on the sampling complexity for exactly recovering the model order. Notably, this concept can also be extended to the estimation of the GMM means. We propose an algorithm that leverages Fourier measurements to estimate both the model order and the mixing distribution. Our analysis shows that the algorithm's sampling complexity matches the established lower bound, confirming its optimality. Numerical experiments further demonstrate that our approach outperforms conventional methods in terms of efficiency and accuracy. Both the concept and algorithm can be extended to the high-dimensional GMMs.

Date : 13 May 2025 (Tuesday)

Time : 4:00pm

Venue : Room 1409 (near Lifts 25/26)

All are Welcome!