



THE HONG KONG UNIVERSITY OF SCIENCE & TECHNOLOGY

Department of Mathematics

PHD STUDENT SEMINAR

**A Fourier Approach to the Parameter Estimation Problem
for Gaussian Mixture Models**

By

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Abstract

We study the parameter estimation problem of Gaussian mixture models (GMMs). Given i.i.d. samples drawn from the mixture, we propose an efficient algorithm to recover the parameters of the model. The consistency of the estimator is derived. Compared to classic algorithms, the proposed algorithm does not require prior knowledge of the number of Gaussian components or good initial guesses. We also reveal that there exists a fundamental limit to the problem of estimating the number of Gaussian components or model order in the mixture model if the number of i.i.d. samples is finite. For the case of a single variance, we show that the model order can be successfully estimated only if the minimum separation distance between the component means exceeds a certain threshold value and can fail if below. We derive a lower bound for this threshold value, referred to as the computational resolution limit, in terms of the number of i.i.d. samples, the variance, and the number of Gaussian components. Several numerical results are provided.

Date : 3 May 2024 (Friday)

Time : 10:00am

Venue : Room 5510 (Lifts 25/26)

All are Welcome!