

数学与系统科学研究院
计算数学所网络学术报告

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报告题目:

**New Algorithms for Trace-Ratio
Problem with Application to
High-Dimension and Large-Sample
Data Dimensionality Reduction**

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报告时间: 2021 年 9 月 11 日 (周六)
上午 10:00-11:00

报告工具: 腾讯会议 ID: (830 860 639)

Abstract:

Learning large-scale data sets with high dimensionality is a main concern in research areas including machine learning, visual recognition, information retrieval, to name a few. In many practical uses such as images, video, audio, and text processing, we have to face with high-dimension and large-sample data problems. The trace-ratio problem is a key problem for feature extraction and dimensionality reduction to circumvent the high dimensional space. However, it has been long believed that this problem has no closed-form solution, and one has to solve it by using some inner-outer iterative algorithms that are very time-consuming. Therefore, efficient algorithms for high-dimension and large-sample trace-ratio problems are still lacking, especially for dense data problems. In this work, we present a closed-form solution for the trace-ratio problem, and propose two algorithms to solve it. Based on the formula and the randomized singular value decomposition, we first propose a randomized algorithm for solving high-dimension and large-sample dense trace-ratio problems. For high-dimension and large-sample sparse trace-ratio problems, we then propose an algorithm based on the closed-form solution and solving some consistent under-determined linear systems. Theoretical results are established to show the rationality and efficiency of the proposed methods. Numerical experiments are performed on some real-world data sets, which illustrate the superiority of the proposed algorithms over many state-of-the-art algorithms for high-dimension and large-sample dimensionality reduction problems.

欢迎大家参加！