

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:

**A Randomized Generalized
Low-Rank Approximations of
Matrices Algorithm for High
Dimensionality Reduction and Image
Compression**

邀请人: 白中治 研究员

报告时间: 2021 年 9 月 11 日 (周六)
上午 11:00-12:00

报告工具: 腾讯会议 ID: (830 860 639)

Abstract:

High-dimensionality reduction techniques are very important tools in machine learning and data mining. The method of generalized low rank approximations of matrices (GLRAM) is a popular technique for dimensionality reduction and image compression. However, it suffers from heavily computational overhead in practice, especially for data with high dimension. In order to reduce the cost of this algorithm, we propose a randomized GLRAM algorithm based on randomized singular value decomposition (RSVD). The theoretical contribution of our work is threefold. First, we discuss the decaying property of singular values of the matrices during iterations of the GLRAM algorithm, and provide a target rank required in the RSVD process from a theoretical point of view. Second, we establish the relationship between the reconstruction errors generated by the standard GLRAM algorithm and the randomized GLRAM algorithm. It is shown that the reconstruction errors generated by the former and the latter are comparable, even if the solutions are computed inaccurately during iterations. Third, the convergence of the randomized GLRAM algorithm is investigated. Numerical experiments on some real-world data sets illustrate the superiority of our proposed algorithm over its original counterpart and some state-of-the-art GLRAM-type algorithms.

欢迎大家参加！