

图形图像处理

二值分解压缩和Consensus算法

傅迎华¹,陈玮²,付东翔²

1. 上海理工大学计算机与电气学院

2.

摘要: 奇异值分解(SVD)是一种流行的用于高维数据压缩的方法,二值分解是奇异值分解的一种简化形式。实现二值分解的主要算法有两种:迭代启发式算法和贪婪算法。但这两种算法都不是很理想的算法:迭代启发式算法在很多情况下不能保证收敛性,贪婪算法不满足大型数值矩阵分解的需要。采用了一种新的算法来实现二值分解:Consensus的算法。Consensus算法可在渐进多项式时间内找到一般图中的极大二分团。对于某些二分图,该算法的复杂度是多项式时间的。实验结果表明,当迭代启发式算法不起作用时,Consensus算法是一种很好的求解二值分解的方法。该算法远比贪婪算法的效率高,且具有稳定收敛性。

关键词: Consensus算法 模块化输入一致性算法 二值分解 奇异值分解 迭代启发式算法 秩一估计

Binary factorization compression and Consensus algorithm

Abstract: In graphics, Singular Value Decomposition (SVD) is a popular method that has been used for compressing high dimensional data. Binary factorization is a simplified variant of SVD. There are two methods for binary factorization compression: the iterative heuristic and greedy algorithm. However, both of them are not very favorable in applications. The iterative heuristic does not guarantee the convergence in most cases and greedy algorithm cannot fit the need of large-scale matrices factorization. In this paper a new method was used for binary factorization compression: Consensus algorithm. Consensus algorithm is a brand-new approach to enumerating all the maximal bicliques for a given graph, which is proved to be an NP-complete problem and can give the solution in incremental polynomial time. For some bipartite graphs, the time complexity is polynomial. Experiments show that when the iterative heuristic does not work, consensus algorithm is a good method for binary factorization and ensures the stability.

Keywords: Consensus algorithm Modular Input Consensus Algorithm (MICA) binary factorization Singular Value Decomposition (SVD) iterative heuristic algorithm rank-one approximation

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通讯作者: 傅迎华

作者简介:

作者Email: janeat9902@gmail.com

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