

Spectral Clustering, Ordering and Ranking



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Data mining methods are essential for analyzing the ever-growing massive quantities of data. Data clustering is one of the key data mining techniques. In recent years, spectral clustering has been developed as an effective approach to data clustering. It starts with well-motivated objective functions; optimization eventually leads to eigenvectors as the solutions, with many clear and interesting algebraic properties. Spectral clustering, ordering and ranking extensively uses matrix-based methods and algorithms. This approach is amenable to vigorous analysis and is benefiting from a treasury of knowledge of linear algebra and applied mathematics accumulated through the centuries. This exposition presents recent advances in this new subfield. New concepts are carefully developed and practical examples are extensively utilized to illustrate the ideas. A key feature are the mathematical proofs outlined throughout the text in reasonable detail which highlight the rigorous and principled quality of spectral clustering. A concise introduction to data clustering methods is followed by advanced spectral clustering, ordering and ranking topics which then lead to applications in web and text mining and genomics. An Appendix covering the preliminaries makes this text self-contained. This book is aimed at senior undergraduate and graduate students in computer science, applied mathematics and statistics and researchers and practitioners in machine learning, data mining,

multivariate statistics, matrix computation, web analysis, text mining, bioinformatics.

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目录:

[Spectral Clustering, Ordering and Ranking 下载链接1](#)

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