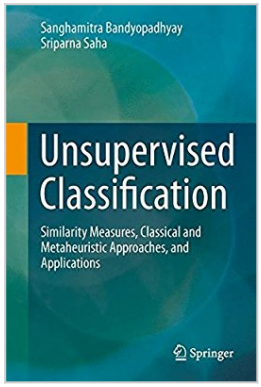

Unsupervised Classification: Similarity Measures, Classical and Metaheuristic Approaches, and Applications

By Sanghamitra Bandyopadhyay, Sriparna Saha

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Clustering is an important unsupervised classification technique where data points are grouped such that points that are similar in some sense belong to the same cluster. Cluster analysis is a complex problem as a variety of similarity and dissimilarity measures exist in the literature.

This is the first book focused on clustering with a particular emphasis on symmetry-based measures of similarity and metaheuristic approaches. The aim is to find a suitable grouping of the input data set so that some criteria are optimized, and using this the authors frame the clustering problem as an optimization one where the objectives to be optimized may represent different characteristics such as compactness, symmetrical compactness, separation between clusters, or connectivity within a cluster. They explain the techniques in detail and outline many detailed applications in data mining, remote sensing and brain imaging, gene expression data analysis, and face detection.

The book will be useful to graduate students and researchers in computer science, electrical engineering, system science, and information technology, both as a text and as a reference book. It will also be useful to researchers and practitioners in industry working on pattern recognition, data mining, soft computing, metaheuristics, bioinformatics, remote sensing, and brain imaging.

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Editorial Review

Review

From the reviews:

“The book focuses on emerging metaheuristic approaches to unsupervised classification, with an emphasis on a symmetry-based definition of similarity. … I found this book very appealing. I also thought of it as very valuable for my preoccupations towards the real-world application of unsupervised classification to medical imaging. I thus believe that, when reading this book, junior as well as experienced researchers will find many new challenging theoretical and practical ideas.” (Catalin Stoean, zbMATH, Vol. 1276, 2014)

“The book views clustering as a (multiobjective) optimization problem and tackles it with metaheuristics algorithms. More interestingly, the authors of this book propose the exploitation of the concepts of point and line symmetry to define new distances to be used in clustering techniques. … researchers in the field will surely appreciate it as a good reference on the use of the symmetry notion in clustering.” (Nicola Di Mauro, Computing Reviews, July, 2013)

From the Back Cover

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About the Author
Prof. Sanghamitra Bandyopadhyay has many years of experience in the development of soft computing techniques. Among other awards and positions, she has received senior researcher Humboldt Fellowships, and she is a regular visitor to the DKFZ (German Cancer Research Centre) and to European and North American universities, collaborating in multidisciplinary teams on applications in the areas of computational biology and bioinformatics. Among other awards Prof. Bandyopadhyay received the prestigious Shanti Swarup Bhatnagar Prize in Engineering Sciences in 2010, she is a Fellow of the National Academy of

Sciences of India and she is a Fellow of the Indian National Academy of Engineering. Dr. Sriparna Saha is an assistant professor in the Indian Institute of Technology Patna. Among her positions and awards, she was a postdoctoral researcher in Trento and in Heidelberg, and she received the Google India Women in Engineering Award in 2008. Her research interests include multiobjective optimization, evolutionary computation, clustering, and pattern recognition.

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