Foreword

Indisputably in the oceans of data surrounding us, clustering has gained a central position as a conceptual and algorithmic framework that helps the user make sense of data and reveal some underlying structure that is hidden behind overwhelming streams of numbers.

There are thousands of clustering techniques one can encounter in the literature. We will be seeing far more methods arising over the passage of time. Just the recent search using Google Scholar (dated November 18, 2008) has returned about 1,510,000 hits. This number speaks to the dynamics and omnipresence of the clustering paradigm and its numerous applications.

What we have started seeing more vividly are the two fundamental clustering challenges one has to deal with in an effective manner. First, it becomes apparent that clustering is a processes guided by several objectives (objective functions) rather than a single and somewhat isolated goal. This has led us to the concept of multiobjective clustering. Likewise we have started to realize that to make clustering more user-centric, one needs to fully accommodate some prior domain knowledge and this line of pursuit has resulted in a so-called knowledge-based clustering. Second, there is an acute need for optimization tools that are of *global* nature and in this way may help realize a comprehensive search which is of structural as well as of parametric character. The role evolutionary computing has been already acknowledged in this particular context yet there is a large unexplored research territory where we can anticipate a great deal of interesting findings.
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The treatise authored by Professors Das, Abraham, and Konar tackles a very fundamental and practically highly relevant research topic: how to make clustering more efficient and very much in rapport with the reality of multifaceted data and diversified needs of the end users. The notion of metaheuristics used in the title of the book is very much reflective of its very content.

The reader is carefully navigated through the efficacies of clustering, evolutionary optimization and a hybridization of the both. The exposure of the material is lucid. Quite complicated concepts are presented in a clear and convincing way which can be attributed to the expertise of Professors Das, Abraham, and Konar. While Evolutionary Computing has been recognized as a viable optimization platform, it has been noted quite early that a number of well-known techniques such as e.g., Genetic Algorithms and Evolutionary Algorithms come with a substantial computational overhead which becomes difficult to accept in case of problems of higher dimensionality. From this standpoint, the alternative of Differential Evolution (DE) pursued by the authors is indeed a very fortunate choice.

In the exposure of the material, the authors have achieved a sound balance between the theory and practice. We witness a wealth of fundamental and far reaching results, especially when it comes to the analysis of the dynamics of Differential Evolution. We can appreciate the applied facets of the monograph where the algorithmic setting established in the book stresses applicability or leads directly to interesting and well-rounded applications in data analysis.

All in all, this is not only a very timely and badly needed volume but also an outstanding, comprehensive and authoritative treatise of the important subject of metaheuristics clustering.

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