

# Preface

Many real-world problems are actually optimization problems and it is our long standing quest to address these real-world optimization problems by means of techniques from diverse fields. Theories and techniques for canonical mathematical optimization have been well studied for centuries and play a leading role in solving optimization problems. Nevertheless, most if not all network issues are essentially hard optimization problems which very often cannot be well solved by traditional mathematical optimization techniques. The performances of canonical methods deteriorate rapidly especially when the real problems involve many optimization objectives and the number of decision variables is large.

In order to remedy the drawbacks of canonical optimization techniques, computational intelligence, a class of artificial intelligence techniques, has come into being and is widely recognized as a promising computing paradigm. Evolutionary computation, an important branch of computational intelligence, emerges and tremendous efforts have been done to design many kinds of efficient evolutionary algorithms for solving diverse hard optimization problems. Apart from evolutionary computation, other computational intelligence techniques such as swarm intelligence, meta-heuristics, and artificial neural networks have all find their niche in the optimization field.

This book makes efforts to delineate in detail the existing state-of-the-art methods based on computational intelligence for addressing issues related to complex network structures. Using computational intelligence techniques to address network issues may facilitate smart decisions making by providing multiple options to choose from, while conventional methods can only offer a decision maker a single suggestion.

Meanwhile, evolutionary computation provides a promising outlet toward network issues and in turn network structure patterns may provide novel inspiration toward the design of next-generation computational intelligence techniques.

As a comprehensive text, the contents of the whole book cover most emerging topics of both network structures analytics and evolutionary computation, including theories, models, algorithm design, and experimental exhibitions. This book summarizes the researches achievements on the topics by the authors, their postgraduate

students and their alumni ever since 2008. Offering a rich blend of theories and practices, the book is suitable for students, researchers, and practitioners interested in network analytics and computational intelligence, both as a textbook and as a reference work.

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