

Book Title: Quantum Inspired Metaheuristics for Data Optimization and Analytics

Subtitle: Theory, Approaches, Advances, and Applications

Author(s) or Book Editor(s): Siddhartha Bhattacharyya, Aboul Ella Hassanien, Vaclav Snasel

Publisher: The Institution of Engineering and Technology (the IET) <http://www.theiet.org/>

Dear Colleagues,

The Institution of Engineering and Technology (The IET) has contracted us to edit this new edited book project (to be published both in print and electronic).

Outline for the book content: The motivation for this project stemmed from the fact that there are currently no in-depth books dedicated to the topic of Quantum Inspired Metaheuristics.

Quantum computing is fundamentally a synergistic combination of fields from quantum physics, classical information theory and computer science. Researchers have coupled the underlying principles of quantum computing into various metaheuristic structures to introduce different quantum-inspired algorithmic approaches. The prime motivation behind these tasks is to develop algorithms which have higher efficiency and usability compared to existing ones. Quantum Computers principally work on several quantum physical features. These could be used as an alternative to today's computers as they possess faster processing capabilities (even exponentially) than classical computers. In the context of image processing and image analysis, the features are extracted both from pictographic and non-numeric data.

A metaheuristic is a heuristic (partial search) algorithm that offers efficient optimization to real world problems. Recently scientists have found that hybrid metaheuristics (being a judicious combination of metaheuristics, algorithms from mathematical programming, constraint programming, or machine learning) be more robust and failsafe. Hybridization combines different metaheuristics where the combination supplements others to achieve the desired performance. Typical examples use fuzzy-evolutionary, neuro-evolutionary, neuro-fuzzy evolutionary, and rough-evolutionary approaches to name a few. Recently, chaos theory has also found wide applications in evolving efficient hybrid metaheuristics. The advent of the quantum computing paradigm has also given an impetus to evolving time-efficient hybrid metaheuristics, where the principles of quantum mechanics are conjoined successfully to enhance the real time performance of hybrid metaheuristics.

This book aims to bring together recent advances and trends in methodological approaches, theoretical studies, and mathematical and applied techniques related to quantum-inspired hybrid metaheuristics and their applications to engineering and scientific problems. The authors introduce different novel quantum-inspired metaheuristics for addressing glaring optimization problems

ranging from function optimization, data analysis (both discrete and continuous), economic load dispatch, jobshop scheduling, power system optimization, robotic control optimization, and signal processing with applications such as bioinformatics, biomedical imaging, environmental pollution remediation optimization and gene analysis to name a few. The authors also aim to emphasize the effectiveness of the proposed approaches over the existing approaches with illustrative examples and real-life case studies.

Target Audience: The main target audience are scientists, engineers and professionals involved in quantum inspired optimization. It will also be of interest to university students (Master and PhD level), postdocs and lecturers in Computer Science, Electrical Engineering, Information Sciences and Electronics and Communication Engineering.

We would like to invite you to join this exciting project as a chapter contributor. We would be grateful if you would contribute a chapter on the enlisted topics. You are welcome to suggest another topic/chapter title if you feel it would be more suitable. Each chapter should be around 20-25 pages each, and can be submitted as a Word or Latex File. The IET will send you additional information (templates, formatting, permission form, etc.) with the contributor's agreement once you have agreed to contribute to the book. The book is expected to have a total number of **25-30 pages** printed pages (based on approximately 550 words per page with a 20% allowance for figures and tables).

We have included a tentative schedule and list of topics below. If this is something you would consider, please send me the title of your chapter, a short description/abstract of the chapter content, and your full contact details to dr.siddhartha.bhattacharyya@gmail.com.

We will expect original content for this book with new material and results, not older already or soon to be published papers and chapters. You can of course reuse published material but the percentage of material reuse for the chapter should be less than 40%. The IET will run a piracy software on the full manuscript to control that you are including original material and will reject large amount of material that have already been published so please take this into consideration when writing your chapter.

We would appreciate your confirmation of participation by May 31, 2019. Please do not hesitate to contact us if you have any queries. We very much look forward to working with you towards the successful publication of this new book.

With thanks and best regards,

Siddhartha Bhattacharyya, RCC Institute of Information Technology, India
Aboul Ella Hassanien, Cairo University, Egypt
Vaclav Snasel, VSB-Technical University of Ostrava, Czech Republic

Proposed Schedule:

Chapter abstract submission: **May 31, 2019**

Notification of chapter abstract acceptance: **June 10, 2019**

First draft chapter submission to book editors: **August 31, 2019**

Chapter review by the book editors: **September 30, 2019**

Final corrections from the chapter authors: **November 15, 2019**

Final chapter acceptance notification: **November 30, 2019**

Delivery of the full manuscript to the publisher: **December 21, 2019**

Review of proofs by authors and editors: **March 21, 2020**

Publication: **June 30, 2020**

Topics include but not limited to the following.

- A. Quantum Inspired Metaheuristics**
 - a. Local search metaheuristics**
 - b. Constructive metaheuristics**
 - c. Population-based metaheuristics**
 - d. Hybrid metaheuristics**
- B. Bilevel quantum system based optimization**
- C. Multilevel quantum system based optimization**
- D. Entanglement induced optimization**
- E. W-state encoding of optimization algorithms**
- F. Applications**
 - a. Function Optimization**
 - b. Pattern Recognition and Image Analysis**
 - c. Robotic Swarms**
 - d. Task scheduling**
 - e. Job shop scheduling**
 - f. Economic load dispatch**
 - g. Portfolio Optimization**
 - h. Wireless Sensor Network Optimization**
 - i. Environmental Monitoring and Control**
 - j. Data Clustering**

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