

# Preface

Nowadays, for both business operations and engineering applications, there are huge amounts of data that can overwhelm computing resources of large-scale systems. These “big data” provide new opportunities to improve decision making and address risk for individuals as well as organizations. For example, the presence of market and sales data will yield better inventory planning for retail companies; massive and timely financial data will help improve portfolio management; the security holes of the Internet and the availability of data affect cryptography and privacy. Undoubtedly, utilizing big data smartly can enhance decision making. However, how to use and incorporate data into the decision making framework to yield a scientifically sound optimal decision is a challenging topic.

Motivated by the importance of big data and the respective challenges in optimization and control, we have compiled and developed this edited volume on scientific innovations and reviews in optimization, control, and resilience management in the big data era.

This book includes several important parts, namely, (1) Reviews on Optimization and Control Theories, (2) Reviews on Optimization and Control Applications, (3) Financial Optimization Analysis, (4) Operations Analysis, and (5) Concluding Remarks. All the featured papers are peer-refereed, and the specific topics covered include the following:

- Optimization and control for systems in the big data era: an introduction
- Dual control in big data era
- Time inconsistency and self-control optimization
- Quadratic convex reformulations for integer and mixed-integer quadratic programs
- Measurements of financial contagion
- Asset-liability management in continuous time
- Modern cryptography from the World War II era to the big data era
- Supply risk in the new business era
- A parameterized method for optimal multi-period portfolio selection

- Sparse and multiple risk measures approach for data-driven portfolio optimization
- Multistage optioned portfolio selection
- Multi-period portfolio selection with stochastic investment horizon
- A new model and method for order selection problems in flow-shop production
- Quick response fashion supply chains in the big data era
- Optimization and control for systems in the big data era: concluding remarks and future research.

We would like to take this opportunity to express our hearty thanks to Matthew Amboy and John Wolfe of Springer for their kindest support. We are indebted to all the reviewers who have provided timely review reports on the manuscripts. We are grateful for all the authors who have contributed their important and interesting research to this book.

This book is dedicated to our mentor Professor Duan Li, the Patrick Huen Wing Ming Professor of Systems Engineering and Engineering Management at The Chinese University of Hong Kong, to honor his great achievements in both systems control and optimization and celebrate his 65th birthday in July 2017. In the bottom of our hearts, he is always a distinguished scholar, a kind gentleman, an excellent professor, and an outstanding teacher. We are very proud of being his students. As a remark, the royalty received by the editorial team from this book project is 100% fully donated to Department of Systems Engineering and Engineering Management, The Chinese University of Hong Kong.

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 Charlottesville, VA, USA  
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 November 2016

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Optimization and Control for Systems in the Big-Data  
Era

Theory and Applications

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(Eds.)

2017, X, 280 p. 34 illus., 30 illus. in color., Hardcover

ISBN: 978-3-319-53516-6