Studies in Fuzziness and Soft Computing

Pankaj Gupta Mukesh Kumar Mehlawat Masahiro Inuiguchi Suresh Chandra

# Fuzzy Portfolio Optimization

Advances in Hybrid Multi-criteria Methodologies



Oscar Castillo, Patricia Melin

Fuzzy Portfolio Optimization Pankaj Gupta, Mukesh Kumar Mehlawat, Masahiro Inuiguchi, Suresh Chandra, 2014-03-17 This monograph presents a comprehensive study of portfolio optimization an important area of quantitative finance Considering that the information available in financial markets is incomplete and that the markets are affected by vagueness and ambiguity the monograph deals with fuzzy portfolio optimization models At first the book makes the reader familiar with basic concepts including the classical mean variance portfolio analysis Then it introduces advanced optimization techniques and applies them for the development of various multi criteria portfolio optimization models in an uncertain environment The models are developed considering both the financial and non financial criteria of investment decision making and the inputs from the investment experts The utility of these models in practice is then demonstrated using numerical illustrations based on real world data which were collected from one of the premier stock exchanges in India The book addresses both academics and professionals pursuing advanced research and or engaged in practical issues in the rapidly evolving field of Optimization and Decision Science: Operations Research, Inclusion and Equity Paola portfolio optimization Cappanera, Matteo Lapucci, Fabio Schoen, Marco Sciandrone, Fabio Tardella, Filippo Visintin, 2023-07-15 This volume collects peer reviewed short papers presented at the Optimization and Decision Science conference ODS 2022 held in Florence Italy from August 30th to September 2nd 2022 organized by the Global Optimization Laboratory within the University of Florence and AIRO the Italian Association for Operations Research The book includes contributions in the fields of operations research optimization problem solving decision making and their applications in the most diverse domains Moreover a special focus is set on the challenging theme Operations Research inclusion and equity The work offers 30 contributions covering a wide spectrum of methodologies and applications Specifically they feature the following topics i Variational Inequalities Equilibria and Games ii Optimization and Machine Learning iii Global Optimization iv Optimization under Uncertainty v Combinatorial Optimization vi Transportation and Mobility vii Health Care Management and viii Applications This book is primarily addressed to researchers and PhD students of the operations research community However due to its interdisciplinary content it will be of high interest for other closely related research communities *Neutrosophic Sets and Systems, vol.* 50/2022 Florentin Smarandache, Mohamed Abdel-Basset, Said Broumi, 2022-06-01 Neutrosophic Sets and Systems has been created for publications on advanced studies in neutrosophy neutrosophic set neutrosophic logic neutrosophic probability neutrosophic statistics that started in 1995 and their applications in any field such as the neutrosophic structures developed in algebra geometry topology etc Neutrosophy is a new branch of philosophy that studies the origin nature and scope of neutralities as well as their interactions with different ideational spectra This theory considers every notion or idea together with its opposite or negation and with their spectrum of neutralities in between them i e notions or ideas supporting neither

nor The and ideas together are referred to as Neutrosophy is a generalization of Hegel's dialectics the last one is based on and only According to this theory every idea tends to be neutralized and balanced by and ideas as a state of equilibrium In a classical way are disjoint two by two But since in many cases the borders between notions are vague imprecise Sorites it is possible that and of course have common parts two by two or even all three of them as well Neutrosophic Set and Neutrosophic Logic are generalizations of the fuzzy set and respectively fuzzy logic especially of intuitionistic fuzzy set and respectively intuitionistic fuzzy logic Recent Advances in Theory and Methods for the Analysis of High Dimensional and High Frequency Financial Data Norman R. Swanson, Xiye Yang, 2021-08-31 Recently considerable attention has been placed on the development and application of tools useful for the analysis of the high dimensional and or high frequency datasets that now dominate the landscape The purpose of this Special Issue is to collect both methodological and empirical papers that develop and utilize state of the art econometric techniques for the analysis of such data Effective Investments on Capital Markets Waldemar Tarczyński, Kesra Nermend, 2019-07-17 This proceedings volume presents current research and innovative solutions into capital markets particularly in Poland Featuring contributions presented at the 10th Capital Market Effective Investments CMEI 2018 conference held in Mi dzyzdroje Poland this book explores the future of capital markets in Poland as well as comparing it with the capital markets of other developed regions around the world Divided into four parts the enclosed papers provide a background into the theoretical foundations of capital market investments explores different approaches both classical and contemporary to investment decision making analyzes the behaviors of investors using experimental economics and behavioral finance and explores practical issues related to financial market investments including real case studies In addition each part of the book begins with an introductory chapter written by thematic editors that provides an outline of the subject area and a summary of the papers presented **Advances in Best-Worst Method** Jafar Rezaei, Matteo Brunelli, Majid Mohammadi, 2023-01-31 This book presents recent advances in the theory and application of the Best Worst Method BWM It includes selected papers from the Third International Workshop on Best Worst Method BWM2022 held in Delft the Netherlands from 9 to 10 June 2022 The book provides valuable insights on why and how to use BWM in a diverse range of applications including health energy supply chain management and engineering Moreover it highlights the use of BWM in different settings including individual decision making vs group decision making and with complete information vs incomplete and uncertain information Academics and practitioners whose work involves multi criteria decision making and decision analysis will particularly benefit from the papers gathered here Complex Systems: Solutions and Challenges in Economics, Management and Engineering Christian Berger-Vachon, Anna María Gil Lafuente, Janusz Kacprzyk, Yuriy Kondratenko, José M. Merigó, Carlo Francesco Morabito, 2017-10-31 This book presents an authoritative collection of contributions reporting on fuzzy logic and decision theory together with applications and case studies in economics and management science Dedicated to Professor Jaume Gil Aluja in recognition of his pioneering work

the book reports on theories methods and new challenges thus offering not only a timely reference guide but also a source of new ideas and inspirations for graduate students and researchers alike **Fuzzy Optimization** Weldon A. Lodwick, 2012-09-05 Optimization is an extremely important area in science and technology which provides powerful and useful tools and techniques for the formulation and solution of a multitude of problems in which we wish or need to to find a best possible option or solution The volume is divided into a coupe of parts which present various aspects of fuzzy optimization some related more general issues and applications Fuzzy Portfolio Optimization Yong Fang, Kin Keung Lai, Shouyang Wang, 2008-09-20 Most of the existing portfolio selection models are based on the probability theory Though they often deal with the uncertainty via probabilistic proaches we have to mention that the probabilistic approaches only partly capture the reality Some other techniques have also been applied to handle the uncertainty of the nancial markets for instance the fuzzy set theory Zadeh 1965 In reality many events with fuzziness are characterized by probabilistic approaches although they are not random events. The fuzzy set theory has been widely used to solve many practical problems including nancial risk management By using fuzzy mathematical approaches quan tative analysis qualitative analysis the experts knowledge and the investors subjective opinions can be better integrated into a portfolio selection model. The contents of this book mainly comprise of the authors research results for fuzzy portfolio selection problems in recent years In addition in the book the authors will also introduce some other important progress in the eld of fuzzy portfolio optimization Some fundamental issues and problems of po folioselectionhavebeen studied systematically and extensively by the authors to apply fuzzy systems theory and optimization methods A new framework for investment analysis is presented in this book A series of portfolio sel tion models are given and some of them might be more e cient for practical applications. Some application examples are given to illustrate these models by using real data from the Chinese securities markets Fuzzy Multi-Criteria Decision Making Cengiz Kahraman, 2008-08-09 In trying to make a satisfactory decision when imprecise and multicriteria situations are involved a decision maker has to use a fuzzy multicriteria decision making method Fuzzy Multi Criteria Decision Making MCDM presents fuzzy multiattribute and multiobjective decision making methodologies by distinguished MCDM researchers In summarizing the concepts and results of the most popular fuzzy multicriteria methods using numerical examples this work examines all the fuzzy multicriteria methods recently developed such as fuzzy AHP fuzzy TOPSIS interactive fuzzy multiobjective stochastic linear programming fuzzy multiobjective dynamic programming grey fuzzy multiobjective optimization fuzzy multiobjective geometric programming and more Each of the 22 chapters includes practical applications along with new developments results This book may be used as a textbook in graduate operations research industrial engineering and economics courses It will also be an excellent resource providing new suggestions and directions for further research for computer programmers mathematicians and scientists in a variety of disciplines where multicriteria decision making is needed Recent Advances in Interval Type-2 Fuzzy Systems Oscar Castillo, Patricia Melin, 2012-04-23

This book reviews current state of the art methods for building intelligent systems using type 2 fuzzy logic and bio inspired optimization techniques Combining type 2 fuzzy logic with optimization algorithms powerful hybrid intelligent systems have been built using the advantages that each technique offers This book is intended to be a reference for scientists and engineers interested in applying type 2 fuzzy logic for solving problems in pattern recognition intelligent control intelligent manufacturing robotics and automation This book can also be used as a reference for graduate courses like the following soft computing intelligent pattern recognition computer vision applied artificial intelligence and similar ones We consider that this book can also be used to get novel ideas for new lines of re search or to continue the lines of research proposed by the **Fuzzy Optimization** Miguel Delgado, 1994 Applied Decision Support with Soft Computing Xinghuo Yu, 2012-12-06 Soft computing has provided sophisticated methodologies for the development of intelligent decision support systems Fast advances in soft computing technologies such as fuzzy logic and systems artificial neural networks and evolutionary computation have made available powerful problem representation and modelling paradigms and learning and optimisation mechanisms for addressing modern decision making issues This book provides a comprehensive coverage of up to date conceptual frameworks in broadly perceived decision support systems and successful applications Different from other existing books this volume predominately focuses on applied decision support with soft computing Areas covered include planning management finance and administration in both the private and public sectors of Multiple Criteria Decision Making Techniques in Fuzzy Domain Laxminarayan Sahoo, Tapan Senapati, Ronald R. Yager, 2022-12-01 This edited book discusses creative and recent developments of fuzzy systems and its real life applications of multiple criteria decision making Keeping on the existing fuzzy sets and recent developed fuzzy sets viz intuitionistic fuzzy Pythagorean fuzzy Fermatean fuzzy Hesitant fuzzy and multiple criteria decision approaches this book is committed to probing the soft computing techniques and fuzzy multiple criteria decision making in favour of fuzzy intelligent system and business analytics It also addresses novel development of fuzzy set theory as well as real life applications of fuzzy systems It presents challenging and useful real world applications based on problems of decision making in various fields The modelling and solution procedures of such real world problems will be provided concisely although all topics start with a more developed resolution The contributory chapters will be based on the vast research experiences of the authors in real world decision making problems. This book provides readers with a valuable conspectus of several decision making problems as a reference for researchers and industrial practitioners in this field This book will broadly cover recent development of fuzzy systems and its applications of multiple criteria decision making in the areas of management and production manufacturing management selections problems group decision making transportation and logistics inventory control systems and interval technique fuzzy technique uncertainty of the above mentioned areas Pairwise Comparison Matrices and their Fuzzy **Extension** Jana Krejčí, 2019-02-08 This book offers the first comprehensive and critical literature review of fuzzy pairwise

comparison methods derived from methods originally developed for crisp pairwise comparison matrices It proposes new fuzzy extensions of these methods and provides a detailed study of the differences and analogies between all the reviewed methods as well as a detailed description of their drawbacks with the help of many numerical examples In order to prevent the drawbacks related to the reviewed fuzzy pairwise comparison methods the book introduces constrained fuzzy arithmetic in fuzzy extension of the pairwise comparison methods It proposes new fuzzy pairwise comparison methods based on constrained fuzzy arithmetic and critically compares them with the reviewed methods It describes the application of the newly developed methods to incomplete large dimensional pairwise comparison matrices showcased in a real life case study Written for researchers graduate and PhD students interested in multi criteria decision making methods based on both crisp and fuzzy pairwise comparison matrices this self contained book offers an overview of cutting edge research and all necessary information to understand the described tools and use them in real world applications **Recent Developments** in Fuzzy Logic and Fuzzy Sets Shahnaz N. Shahbazova, Michio Sugeno, Janusz Kacprzyk, 2020-03-05 This book provides a timely and comprehensive overview of current theories and methods in fuzzy logic as well as relevant applications in a variety of fields of science and technology Dedicated to Lotfi A Zadeh on his one year death anniversary the book goes beyond a pure commemorative text Yet it offers a fresh perspective on a number of relevant topics such as computing with words theory of perceptions possibility theory and decision making in a fuzzy environment Written by Zadeh s closest colleagues and friends the different chapters are intended both as a timely reference guide and a source of inspiration for scientists developers and researchers who have been dealing with fuzzy sets or would like to learn more about their potential for their future research Applications of Fuzzy Optimization and Fuzzy Decision Making Vassilis C Gerogiannis, 2021-10-26 The aim of the Special Issue Applications of Fuzzy Optimization and Fuzzy Decision Making is to expand the applicability of fuzzy optimization and decision making for solving various types of problems in the areas of economics business engineering management operations research etc Any experimental research or empirical study of theoretical developments in fuzzy optimization and decision making is highly welcome Additionally research papers presenting solution methods and or studying their computational complexity and proposing new algorithms to solve fuzzy optimization and decision making problems in an effective and efficient manner are also welcome We are looking forward to receive innovative approaches that apply in practical settings state of the art mathematical algorithmic techniques from fuzzy technology computational intelligence and soft computing methodologies with the aim to offer robust solutions for complex optimization and decision making problems characterized by non probabilistic uncertainty vagueness ambiguity and hesitation Such type of papers will address the suitability validity and advantages of using fuzzy technologies and the enhancement of them using intelligent methods to treat real life problems from various disciplines **Evolving Fuzzy** Systems - Methodologies, Advanced Concepts and Applications Edwin Lughofer, 2011-01-19 In today s real world

applications there is an increasing demand of integrating new information and knowledge on demand into model building processes to account for changing system dynamics new operating conditions varying human behaviors or environmental influences Evolving fuzzy systems EFS are a powerful tool to cope with this requirement as they are able to automatically adapt parameters expand their structure and extend their memory on the fly allowing on line real time modeling This book comprises several evolving fuzzy systems approaches which have emerged during the last decade and highlights the most important incremental learning methods used The second part is dedicated to advanced concepts for increasing performance robustness process safety and reliability for enhancing user friendliness and enlarging the field of applicability of EFS and for improving the interpretability and understandability of the evolved models The third part underlines the usefulness and necessity of evolving fuzzy systems in several online real world application scenarios provides an outline of potential future applications and raises open problems and new challenges for the next generation evolving systems including human inspired evolving machines The book includes basic principles concepts algorithms and theoretic results underlined by illustrations It is dedicated to researchers from the field of fuzzy systems machine learning data mining and system identification as well as engineers and technicians who apply data driven modeling techniques in real world systems

Fuzzy Optimization, Decision-making and Operations Research Chiranjibe Jana, Madhumangal Pal, Ghulam Muhiuddin, Peide Liu, 2023-10-24 After developing fuzzy set theory many contributors focused their research on the extension of fuzzy sets and their computational methodologies strengthening modern science and technology In some real life phenomena the conventional methods and traditional fuzzy sets cannot be explained whereas the extension of fuzzy sets and effective new computing methods can explain it adequately This edited book presents a new view of fuzzy set measurement methods entitled Fuzzy Optimization Decision Making and Operations Research Theory and Applications which deals with different perspectives and areas of research All chapters are divided into three parts fuzzy optimization fuzzy decision making and fuzzy operation research The goal of this book is to provide a relevant methodological framework covering the core fields of fuzzy decision making method fuzzy optimization method fuzzy graphics method fuzzy operations research fuzzy optimization using graph theory fuzzy support systems and its real and industrial applications For many people fuzzy words industrial engineering and scientific meanings are still an advanced system for improving modern science and technology Although fuzzy logic can be applied to many different areas people do not know how different fuzzy approaches can be applied to various products currently on the market It is written for professionals who wish to share their expertise improve their findings and provide relevant information in the fields of fuzzy methods and their application in decision making optimization theory graph theory and operations research This book is aimed at experts and practitioners in the fields of fuzzy optimization fuzzy decision making and fuzzy operation research **Uncertainty Management with Fuzzy** and Rough Sets Rafael Bello, Rafael Falcon, José Luis Verdegay, 2019-02-21 This book offers a timely overview of fuzzy and

rough set theories and methods Based on selected contributions presented at the International Symposium on Fuzzy and Rough Sets ISFUROS 2017 held in Varadero Cuba on October 24 26 2017 the book also covers related approaches such as hybrid rough fuzzy sets and hybrid fuzzy rough sets and granular computing as well as a number of applications from big data analytics to business intelligence security robotics logistics wireless sensor networks and many more It is intended as a source of inspiration for PhD students and researchers in the field fostering not only new ideas but also collaboration between young researchers and institutions and established ones

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