# Portfolio Optimization In R Arxiv

"Written by two renowned experts in the field, the books under review contain a thorough and insightful treatment of the fundamental underpinnings of various aspects of stochastic processes as well as a wide range of applications. Providing clear exposition, deep mathematical results, and superb technical representation, they are masterpieces of the subject of stochastic analysis and nonlinear filtering....These books...will become classics." --SIAM REVIEW

This two-volume set, LNCS 12565 and 12566, constitutes the refereed proceedings of the 6th International Conference on Machine Learning, Optimization, and Data Science, LOD 2020, held in Siena, Italy, in July 2020. The total of 116 full papers presented in this two-volume post-conference proceedings set was carefully reviewed and selected from 209 submissions. These research articles were written by leading scientists in the fields of machine learning, artificial intelligence, reinforcement learning, computational optimization, and data science presenting a substantial array of ideas, technologies, algorithms, methods, and applications.

Discover foundational and advanced techniques in quantitative equity trading from a veteran insider In Quantitative Portfolio Management: The Art and

Science of Statistical Arbitrage, distinguished physicist-turned-quant Dr. Michael Isichenko delivers a systematic review of the quantitative trading of equities, or statistical arbitrage. The book teaches you how to source financial data, learn patterns of asset returns from historical data, generate and combine multiple forecasts, manage risk, build a stock portfolio optimized for risk and trading costs, and execute trades. In this important book, you'll discover: Machine learning methods of forecasting stock returns in efficient financial markets How to combine multiple forecasts into a single model by using secondary machine learning, dimensionality reduction, and other methods Ways of avoiding the pitfalls of overfitting and the curse of dimensionality, including topics of active research such as "benign overfitting" in machine learning The theoretical and practical aspects of portfolio construction, including multi-factor risk models, multi-period trading costs, and optimal leverage Perfect for investment professionals, like quantitative traders and portfolio managers, Quantitative Portfolio Management will also earn a place in the libraries of data scientists and students in a variety of statistical and quantitative disciplines. It is an indispensable guide for anyone who hopes to improve their understanding of how to apply data science, machine learning, and optimization to the stock market.

This open access book presents the first comprehensive overview of general

methods in Automated Machine Learning (AutoML), collects descriptions of existing systems based on these methods, and discusses the first series of international challenges of AutoML systems. The recent success of commercial ML applications and the rapid growth of the field has created a high demand for off-the-shelf ML methods that can be used easily and without expert knowledge. However, many of the recent machine learning successes crucially rely on human experts, who manually select appropriate ML architectures (deep learning architectures or more traditional ML workflows) and their hyperparameters. To overcome this problem, the field of AutoML targets a progressive automation of machine learning, based on principles from optimization and machine learning itself. This book serves as a point of entry into this quickly-developing field for researchers and advanced students alike, as well as providing a reference for practitioners aiming to use AutoML in their work.

The first comprehensive account of the theory of mass transportation problems and its applications. In Volume I, the authors systematically develop the theory with emphasis on the Monge-Kantorovich mass transportation and the Kantorovich-Rubinstein mass transshipment problems. They then discuss a variety of different approaches towards solving these problems and exploit the rich interrelations to several mathematical sciences - from functional analysis to

probability theory and mathematical economics. The second volume is devoted to applications of the above problems to topics in applied probability, theory of moments and distributions with given marginals, queuing theory, risk theory of probability metrics and its applications to various fields, among them general limit theorems for Gaussian and non-Gaussian limiting laws, stochastic differential equations and algorithms, and rounding problems. Useful to graduates and researchers in theoretical and applied probability, operations research, computer science, and mathematical economics, the prerequisites for this book are graduate level probability theory and real and functional analysis.

With the aim to sequentially determine optimal allocations across a set of assets, Online Portfolio Selection (OLPS) has significantly reshaped the financial investment landscape. Online Portfolio Selection: Principles and Algorithms supplies a comprehensive survey of existing OLPS principles and presents a collection of innovative strategies that leverage machine learning techniques for financial investment. The book presents four new algorithms based on machine learning techniques that were designed by the authors, as well as a new back-test system they developed for evaluating trading strategy effectiveness. The book uses simulations with real market data to illustrate the trading strategies in action and to provide readers with the confidence to deploy the strategies

themselves. The book is presented in five sections that: Introduce OLPS and formulate OLPS as a sequential decision task Present key OLPS principles, including benchmarks, follow the winner, follow the loser, pattern matching, and meta-learning Detail four innovative OLPS algorithms based on cutting-edge machine learning techniques Provide a toolbox for evaluating the OLPS algorithms and present empirical studies comparing the proposed algorithms with the state of the art Investigate possible future directions Complete with a back-test system that uses historical data to evaluate the performance of trading strategies, as well as MATLAB® code for the back-test systems, this book is an ideal resource for graduate students in finance, computer science, and statistics. It is also suitable for researchers and engineers interested in computational investment. Readers are encouraged to visit the authors' website for updates: http://olps.stevenhoi.org.

This present book includes a set of selected revised and extended versions of the best papers presented at the 11th International Joint Conference on Computational Intelligence (IJCCI 2019) held in Vienna, Austria, from 17 to 19 September 2019. The authors focus on three outstanding fields of Computational Intelligence through the selected panel, namely Evolutionary Computation, Fuzzy Computation and Neural Computation. Besides presenting the recent advances

of the selected areas, the book aims to aggregate new and innovative solutions for confirmed researchers and, on the other hand, to provide a source of information and/or inspiration for young interested researchers or learners in the ever-expanding and current filed of Computational Intelligence. It constitutes a precious provision of knowledge for individual researchers as well as represents a valuable sustenance for collective use in academic libraries (of universities and engineering schools) relating innovative techniques in various fields of applications.

Algorithmic decision theory is a new interdisciplinary research area that aims to bring together researchers from di?erent ?elds such as decision theory, d- crete mathematics, theoretical computer science and arti?cial intelligence, in order to improve decision support in the presence of massive databases, com- natorial structures, partial and/or uncertain information and distributed, p- sibly interoperating, decision makers. Such problems arise in several real-world decision-making scenarios such as humanitarian logistics, epidemiology, risk assessment and management, e-government, electronic commerce, and rec- mender systems. In 2007, the EU-funded COST Action IC0602 on Algorithmic Decision T- ory was started, networking a number of researchers and research laboratories around Europe (and beyond). The COST Action IC0602 now gathers

over 100 participants from more than 30 countries (including non-COST countries such as Australia, South Africa and the USA). For more details see www.algodec.org. Within the Action, and in cooperation with the EURO Working Group on Pr- erences,
itwasdecidedtostartanewseriesofconferencesonalgorithmicdecision theory, the goal being to provide a forum for researchers interested in this area. This volume contains the papers presented at ADT 2009, the ?rst Inter- tional Conference on Algorithmic Decision Theory. The conference was held in SanServolo, a smallislandintheVenetianLagoon, onOctober20-23,2009.The programoftheconferenceincludedoralpresentations, posters, invitedtalks, and tutorials (for more information see www.adt2009.org).

This monograph collects in one place the basic de?nitions, a careful description of the model, and discussion of how convex optimization can be used in multi-period trading, all in a common notation and framework.

The six-volume set LNCS 12742, 12743, 12744, 12745, 12746, and 12747 constitutes the proceedings of the 21st International Conference on Computational Science, ICCS 2021, held in Krakow, Poland, in June 2021.* The total of 260 full papers and 57 short papers presented in this book set were carefully reviewed and selected from 635 submissions. 48 full and 14 short papers were accepted to the main track from 156 submissions; 212 full and 43 short papers were accepted to the workshops/ thematic tracks from 479 submissions. The papers

were organized in topical sections named: Part I: ICCS Main Track Part II: Advances in High-Performance Computational Earth Sciences: Applications and Frameworks; Applications of Computational Methods in Artificial Intelligence and Machine Learning; Artificial Intelligence and High-Performance Computing for Advanced Simulations; Biomedical and Bioinformatics Challenges for Computer Science Part III: Classifier Learning from Difficult Data; Computational Analysis of Complex Social Systems; Computational Collective Intelligence; Computational Health Part IV: Computational Methods for Emerging Problems in (dis-)Information Analysis; Computational Methods in Smart Agriculture; Computational Optimization, Modelling and Simulation; Computational Science in IoT and Smart Systems Part V: Computer Graphics, Image Processing and Artificial Intelligence; Data-Driven Computational Sciences; Machine Learning and Data Assimilation for Dynamical Systems; MeshFree Methods and Radial Basis Functions in Computational Sciences; Multiscale Modelling and Simulation Part VI: Quantum Computing Workshop; Simulations of Flow and Transport: Modeling, Algorithms and Computation; Smart Systems: Bringing Together Computer Vision, Sensor Networks and Machine Learning; Software Engineering for Computational Science; Solving Problems with Uncertainty; Teaching Computational Science; Uncertainty Quantification for Computational Models *The conference was held virtually.

The multi-volume set LNAI 12975 until 12979 constitutes the refereed proceedings of the European Conference on Machine Learning and Knowledge Discovery in Databases, ECML PKDD 2021, which was held during September 13-17, 2021. The conference was originally planned to take place in Bilbao, Spain, but changed to an online event due to the COVID-19 pandemic. The 210 full papers presented in these proceedings were carefully reviewed and

selected from a total of 869 submissions. The volumes are organized in topical sections as follows: Research Track: Part I: Online learning; reinforcement learning; time series, streams, and sequence models; transfer and multi-task learning; semi-supervised and few-shot learning; learning algorithms and applications. Part II: Generative models; algorithms and learning theory; graphs and networks; interpretation, explainability, transparency, safety. Part III: Generative models; search and optimization; supervised learning; text mining and natural language processing; image processing, computer vision and visual analytics. Applied Data Science Track: Part IV: Anomaly detection and malware; spatio-temporal data; e-commerce and finance; healthcare and medical applications (including Covid); mobility and transportation. Part V: Automating machine learning, optimization, and feature engineering; machine learning based simulations and knowledge discovery; recommender systems and behavior modeling; natural language processing; remote sensing, image and video processing; social media.
The two-volume set LNAI 12084 and 12085 constitutes the thoroughly refereed proceedings of the 24th Pacific-Asia Conference on Knowledge Discovery and Data Mining, PAKDD 2020, which was due to be held in Singapore, in May 2020. The conference was held virtually due to the COVID-19 pandemic. The 135 full papers presented were carefully reviewed and selected from 628 submissions. The papers present new ideas, original research results, and practical development experiences from all KDD related areas, including data mining, data warehousing, machine learning, artificial intelligence, databases, statistics, knowledge engineering, visualization, decision-making systems, and the emerging applications. They are organized in the following topical sections: recommender systems; classification; clustering; mining social networks; representation learning and embedding; mining behavioral data; deep

learning; feature extraction and selection; human, domain, organizational and social factors in data mining; mining sequential data; mining imbalanced data; association; privacy and security; supervised learning; novel algorithms; mining multi-media/multi-dimensional data; application; mining graph and network data; anomaly detection and analytics; mining spatial, temporal, unstructured and semi-structured data; sentiment analysis; statistical/graphical model; multi-source/distributed/parallel/cloud computing.

This book focuses on information geometry manifolds of structured data/information and their advanced applications featuring new and fruitful interactions between several branches of science: information science, mathematics and physics. It addresses interrelations between different mathematical domains like shape spaces, probability/optimization & algorithms on manifolds, relational and discrete metric spaces, computational and Hessian information geometry, algebraic/infinite dimensional/Banach information manifolds, divergence geometry, tensor-valued morphology, optimal transport theory, manifold & topology learning, and applications like geometries of audio-processing, inverse problems and signal processing. The book collects the most important contributions to the conference GSI'2017 – Geometric Science of Information.

In recent years portfolio optimization and construction methodologies have become an increasingly critical ingredient of asset and fund management, while at the same time portfolio risk assessment has become an essential ingredient in risk management. This trend will only accelerate in the coming years. This practical handbook fills the gap between current university instruction and current industry practice. It provides a comprehensive computationally-oriented treatment of modern portfolio optimization and construction methods using the powerful

NUOPT for S-PLUS optimizer.

Artificial intelligence (AI) has grown in presence in asset management and has revolutionized the sector in many ways. It has improved portfolio management, trading, and risk management practices by increasing efficiency, accuracy, and compliance. In particular, AI techniques help construct portfolios based on more accurate risk and return forecasts and more complex constraints. Trading algorithms use AI to devise novel trading signals and execute trades with lower transaction costs. AI also improves risk modeling and forecasting by generating insights from new data sources. Finally, robo-advisors owe a large part of their success to AI techniques. Yet the use of AI can also create new risks and challenges, such as those resulting from model opacity, complexity, and reliance on data integrity.

Proximal Algorithms discusses proximal operators and proximal algorithms, and illustrates their applicability to standard and distributed convex optimization in general and many applications of recent interest in particular. Much like Newton's method is a standard tool for solving unconstrained smooth optimization problems of modest size, proximal algorithms can be viewed as an analogous tool for nonsmooth, constrained, large-scale, or distributed versions of these problems. They are very generally applicable, but are especially well-suited to problems of substantial recent interest involving large or high-dimensional datasets. Proximal methods sit at a higher level of abstraction than classical algorithms like Newton's method: the base operation is evaluating the proximal operator of a function, which itself involves solving a small convex optimization problem. These subproblems, which generalize the problem of projecting a point onto a convex set, often admit closed-form solutions or can be solved very quickly with standard or simple specialized methods. Proximal Algorithms discusses different

interpretations of proximal operators and algorithms, looks at their connections to many other topics in optimization and applied mathematics, surveys some popular algorithms, and provides a large number of examples of proximal operators that commonly arise in practice. Portfolio Optimization with Different Information Flow recalls the stochastic tools and results concerning the stochastic optimization theory and the enlargement filtration theory.The authors apply the theory of the enlargement of filtrations and solve the optimization problem. Two main types of enlargement of filtration are discussed: initial and progressive, using tools from various fields, such as from stochastic calculus and convex analysis, optimal stochastic control and backward stochastic differential equations. This theoretical and numerical analysis is applied in different market settings to provide a good basis for the understanding of portfolio optimization with different information flow. Presents recent progress of stochastic portfolio optimization with exotic filtrations Shows you how to apply the tools of the enlargement of filtrations to resolve the optimization problem Uses tools from various fields from enlargement of filtration theory, stochastic calculus, convex analysis, optimal stochastic control, and backward stochastic differential equations

Financial Risk Modelling and Portfolio Optimization with R, 2nd Edition Bernhard Pfaff, Invesco Global Asset Allocation, Germany A must have text for risk modelling and portfolio optimization using R. This book introduces the latest techniques advocated for measuring financial market risk and portfolio optimization, and provides a plethora of R code examples that enable the reader to replicate the results featured throughout the book. This edition has been extensively revised to include new topics on risk surfaces and probabilistic utility optimization as well as an extended introduction to R language. Financial Risk Modelling and Portfolio Optimization with

R: Demonstrates techniques in modelling financial risks and applying portfolio optimization techniques as well as recent advances in the field. Introduces stylized facts, loss function and risk measures, conditional and unconditional modelling of risk; extreme value theory, generalized hyperbolic distribution, volatility modelling and concepts for capturing dependencies. Explores portfolio risk concepts and optimization with risk constraints. Is accompanied by a supporting website featuring examples and case studies in R. Includes updated list of R packages for enabling the reader to replicate the results in the book. Graduate and postgraduate students in finance, economics, risk management as well as practitioners in finance and portfolio optimization will find this book beneficial. It also serves well as an accompanying text in computer-lab classes and is therefore suitable for self-study.
This book includes papers on intelligent expert systems and sustainability applications in the areas of data science, image processing, wireless communication, risk assessment, healthcare, intelligent social network mining, and energy. The recent growth of sustainability leads to a progressively new era of computing, where its design and deployment leverages significant impact on the intelligent systems research. Moreover, the sustainability technologies can be effectively used in the progressive deployment of various network-enabled technologies like intelligent sensors, smart cities, wearable technologies, robotics, web applications and other such Internet technologies. The thrust of this book is to publish the state-of-the-art research articles that deals with the design, development, implementation and testing of the intelligent expert systems and also to provide an overview of the sustainable management of these systems.
This is a graduate textbook on the principles of linear inverse problems, methods of their

approximate solution, and practical application in imaging. The level of mathematical treatment is kept as low as possible to make the book suitable for a wide range of readers from different backgrounds in science and engineering. Mathematical prerequisites are first courses in analysis, geometry, linear algebra, probability theory, and Fourier analysis. The authors concentrate on presenting easily implementable and fast solution algorithms. With examples and exercises throughout, the book will provide the reader with the appropriate background for a clear understanding of the essence of inverse problems (ill-posedness and its cure) and, consequently, for an intelligent assessment of the rapidly growing literature on these problems. Machine learning (ML) is progressively reshaping the fields of quantitative finance and algorithmic trading. ML tools are increasingly adopted by hedge funds and asset managers, notably for alpha signal generation and stocks selection. The technicality of the subject can make it hard for non-specialists to join the bandwagon, as the jargon and coding requirements may seem out of reach. Machine Learning for Factor Investing: R Version bridges this gap. It provides a comprehensive tour of modern ML-based investment strategies that rely on firm characteristics. The book covers a wide array of subjects which range from economic rationales to rigorous portfolio back-testing and encompass both data processing and model interpretability. Common supervised learning algorithms such as tree models and neural networks are explained in the context of style investing and the reader can also dig into more complex techniques like autoencoder asset returns, Bayesian additive trees, and causal models. All topics are illustrated with self-contained R code samples and snippets that are applied to a large public dataset that contains over 90 predictors. The material, along with the content of the book, is available online so that readers can reproduce and enhance the

examples at their convenience. If you have even a basic knowledge of quantitative finance, this combination of theoretical concepts and practical illustrations will help you learn quickly and deepen your financial and technical expertise.

Modern Portfolio Theory explores how risk averse investors construct portfolios in order to optimize market risk against expected returns. The theory quantifies the benefits of diversification. Modern Portfolio Theory provides a broad context for understanding the interactions of systematic risk and reward. It has profoundly shaped how institutional portfolios are managed, and has motivated the use of passive investment management techniques, and the mathematics of MPT is used extensively in financial risk management. Advances in Portfolio Construction and Implementation offers practical guidance in addition to the theory, and is therefore ideal for Risk Mangers, Actuaries, Investment Managers, and Consultants worldwide. Issues are covered from a global perspective and all the recent developments of financial risk management are presented. Although not designed as an academic text, it should be useful to graduate students in finance. *Provides practical guidance on financial risk management *Covers the latest developments in investment portfolio construction *Full coverage of the latest cutting edge research on measuring portfolio risk, alternatives to mean variance analysis, expected returns forecasting, the construction of global portfolios and hedge portfolios (funds)

The book analyzes how modern portfolio theory and dynamic term structure models can be applied to government bond portfolio optimization problems. The author studies the necessary adjustments, examines the models with regard to the plausibility of their results and compares the outcomes to portfolio selection techniques used by practitioners. Both single-period and

continuous-time bond portfolio optimization problems are considered.

Praise for Robust Portfolio Optimization and Management "In the half century since Harry Markowitz introduced his elegant theory for selecting portfolios, investors and scholars have extended and refined its application to a wide range of real-world problems, culminating in the contents of this masterful book. Fabozzi, Kolm, Pachamanova, and Focardi deserve high praise for producing a technically rigorous yet remarkably accessible guide to the latest advances in portfolio construction." --Mark Kritzman, President and CEO, Windham Capital Management, LLC "The topic of robust optimization (RO) has become 'hot' over the past several years, especially in real-world financial applications. This interest has been sparked, in part, by practitioners who implemented classical portfolio models for asset allocation without considering estimation and model robustness a part of their overall allocation methodology, and experienced poor performance. Anyone interested in these developments ought to own a copy of this book. The authors cover the recent developments of the RO area in an intuitive, easy-to-read manner, provide numerous examples, and discuss practical considerations. I highly recommend this book to finance professionals and students alike." --John M. Mulvey, Professor of Operations Research and Financial Engineering, Princeton University

Surveys the theory and history of the alternating direction method of multipliers, and discusses its applications to a wide variety of statistical and machine learning problems of recent interest, including the lasso, sparse logistic regression, basis pursuit, covariance selection, support vector machines, and many others.

Take a more active role in strategic asset allocation Goals-Based Wealth Management

is a manual for protecting and growing client wealth in a way that changes both the services and profitability of the firm. Written by a 35-year veteran of international wealth education and analysis, this informative guide explains a new approach to wealth management that allows individuals to take on a more active role in the allocation of their assets. Coverage includes a detailed examination of the goals-based approach, including what works and what needs to be revisited, and a clear, understandable model that allows advisors to help individuals to navigate complex processes. The companion website offers ancillary readings, practice management checklists, and assessments that help readers secure a deep understanding of the key ideas that make goals-based wealth management work. The goals-based wealth management approach was pioneered in 2002, but has seen a slow evolution and only modest refinements largely due to a lack of wide-scale adoption. This book takes the first steps toward finalizing the approach, by delineating the effective and ineffective aspects of traditional approaches, and proposing changes that could bring better value to practitioners and their clients. Understand the challenges faced by the affluent and wealthy Examine strategic asset allocation and investment policy formulation Learn a model for dealing with the asset allocation process Learn why the structure of the typical advisory firm needs to change High-net-worth individuals face very specific challenges. Goals-Based Wealth Management focuses on how those challenges can be overcome while adhering to their goals, incorporating constraints, and working within

the individual's frame of reference to drive strategic allocation of their financial assets. Stochastic Recursive Algorithms for Optimization presents algorithms for constrained and unconstrained optimization and for reinforcement learning. Efficient perturbation approaches form a thread unifying all the algorithms considered. Simultaneous perturbation stochastic approximation and smooth fractional estimators for gradient- and Hessian-based methods are presented. These algorithms: • are easily implemented; • do not require an explicit system model; and • work with real or simulated data. Chapters on their application in service systems, vehicular traffic control and communications networks illustrate this point. The book is self-contained with necessary mathematical results placed in an appendix. The text provides easy-to-use, off-the-shelf algorithms that are given detailed mathematical treatment so the material presented will be of significant interest to practitioners, academic researchers and graduate students alike. The breadth of applications makes the book appropriate for reader from similarly diverse backgrounds: workers in relevant areas of computer science, control engineering, management science, applied mathematics, industrial engineering and operations research will find the content of value.

The composition of portfolios is one of the most fundamental and important methods in financial engineering, used to control the risk of investments. This book provides a comprehensive overview of statistical inference for portfolios and their various applications. A variety of asset processes are introduced, including non-Gaussian

stationary processes, nonlinear processes, non-stationary processes, and the book provides a framework for statistical inference using local asymptotic normality (LAN). The approach is generalized for portfolio estimation, so that many important problems can be covered. This book can primarily be used as a reference by researchers from statistics, mathematics, finance, econometrics, and genomics. It can also be used as a textbook by senior undergraduate and graduate students in these fields.

This book is a compilation of recent articles written by leading academics and practitioners in the area of risk-based and factor investing (RBFI). The articles are intended to introduce readers to some of the latest, cutting edge research encountered by academics and professionals dealing with RBFI solutions. Together the authors detail both alternative non-return based portfolio construction techniques and investing style risk premia strategies. Each chapter deals with new methods of building strategic and tactical risk-based portfolios, constructing and combining systematic factor strategies and assessing the related rules-based investment performances. This book can assist portfolio managers, asset owners, consultants, academics and students who wish to further their understanding of the science and art of risk-based and factor investing. Contains up-to-date research from the areas of RBFI Features contributions from leading academics and practitioners in this field Features discussions of new methods of building strategic and tactical risk-based portfolios for practitioners, academics and students

Multi-robot Exploration for Environmental Monitoring: The Resource Constrained Perspective provides readers with the necessary robotics and mathematical tools required to realize the correct architecture. The architecture discussed in the book is not confined to environment monitoring, but can also be extended to search-and-rescue, border patrolling, crowd management and related applications. Several law enforcement agencies have already started to deploy UAVs, but instead of using teleoperated UAVs this book proposes methods to fully automate surveillance missions. Similarly, several government agencies like the US-EPA can benefit from this book by automating the process. Several challenges when deploying such models in real missions are addressed and solved, thus laying stepping stones towards realizing the architecture proposed. This book will be a great resource for graduate students in Computer Science, Computer Engineering, Robotics, Machine Learning and Mechatronics. Analyzes the constant conflict between machine learning models and robot resources Presents a novel range estimation framework tested on real robots (custom built and commercially available)

Although portfolio management didn’t change much during the 40 years after the seminal works of Markowitz and Sharpe, the development of risk budgeting techniques marked an important milestone in the deepening of the relationship between risk and asset management. Risk parity then became a popular financial model of investment after the global financial crisis in 2008. Today, pension funds and institutional investors

are using this approach in the development of smart indexing and the redefinition of long-term investment policies. Written by a well-known expert of asset management and risk parity, Introduction to Risk Parity and Budgeting provides an up-to-date treatment of this alternative method to Markowitz optimization. It builds financial exposure to equities and commodities, considers credit risk in the management of bond portfolios, and designs long-term investment policy. The first part of the book gives a theoretical account of portfolio optimization and risk parity. The author discusses modern portfolio theory and offers a comprehensive guide to risk budgeting. Each chapter in the second part presents an application of risk parity to a specific asset class. The text covers risk-based equity indexation (also called smart beta) and shows how to use risk budgeting techniques to manage bond portfolios. It also explores alternative investments, such as commodities and hedge funds, and applies risk parity techniques to multi-asset classes. The book's first appendix provides technical materials on optimization problems, copula functions, and dynamic asset allocation. The second appendix contains 30 tutorial exercises. Solutions to the exercises, slides for instructors, and Gauss computer programs to reproduce the book's examples, tables, and figures are available on the author's website.

This is the second in the two-volume series originating from the 2020 activities within the international scientific conference "Modern Methods, Problems and Applications of Operator Theory and Harmonic Analysis" (OTHA), Southern Federal University, Rostov-

on-Don, Russia. This volume focuses on mathematical methods and applications of probability and statistics in the context of general harmonic analysis and its numerous applications. The two volumes cover new trends and advances in several very important fields of mathematics, developed intensively over the last decade. The relevance of this topic is related to the study of complex multi-parameter objects required when considering operators and objects with variable parameters.

Taking the Lasso method as its starting point, this book describes the main ingredients needed to study general loss functions and sparsity-inducing regularizers. It also provides a semi-parametric approach to establishing confidence intervals and tests. Sparsity-inducing methods have proven to be very useful in the analysis of high-dimensional data. Examples include the Lasso and group Lasso methods, and the least squares method with other norm-penalties, such as the nuclear norm. The illustrations provided include generalized linear models, density estimation, matrix completion and sparse principal components. Each chapter ends with a problem section. The book can be used as a textbook for a graduate or PhD course.

The book is a monograph in the cross disciplinary area of Computational Intelligence in Finance and elucidates a collection of practical and strategic Portfolio Optimization models in Finance, that employ Metaheuristics for their effective solutions and demonstrates the results using MATLAB implementations, over live portfolios invested across global stock universes. The book has been structured in such a way that, even

novices in finance or metaheuristics should be able to comprehend and work on the hybrid models discussed in the book.

This book is aimed at students in communications and signal processing who want to extend their skills in the energy area. It describes power systems and why these backgrounds are so useful to smart grid, wireless communications being very different to traditional wireline communications.

The theory of Markov decision processes focuses on controlled Markov chains in discrete time. The authors establish the theory for general state and action spaces and at the same time show its application by means of numerous examples, mostly taken from the fields of finance and operations research. By using a structural approach many technicalities (concerning measure theory) are avoided. They cover problems with finite and infinite horizons, as well as partially observable Markov decision processes, piecewise deterministic Markov decision processes and stopping problems. The book presents Markov decision processes in action and includes various state-of-the-art applications with a particular view towards finance. It is useful for upper-level undergraduates, Master's students and researchers in both applied probability and finance, and provides exercises (without solutions).

This book constitutes the refereed proceedings of the 31th Canadian Conference on Artificial Intelligence, Canadian AI 2018, held in Toronto, ON, Canada, in May 2018. The 16 regular papers and 18 short papers presented together with 7 Graduate Student

Symposium papers and 4 Industry Track papers were carefully reviewed and selected from 72 submissions. The focus of the conference was on artificial intelligence research and advanced information and communications technology.

This book is a comprehensive collection of chapters focusing on the core areas of computing and their further applications in the real world. Each chapter is a paper presented at the Computing Conference 2021 held on 15-16 July 2021. Computing 2021 attracted a total of 638 submissions which underwent a double-blind peer review process. Of those 638 submissions, 235 submissions have been selected to be included in this book. The goal of this conference is to give a platform to researchers with fundamental contributions and to be a premier venue for academic and industry practitioners to share new ideas and development experiences. We hope that readers find this volume interesting and valuable as it provides the state-of-the-art intelligent methods and techniques for solving real-world problems. We also expect that the conference and its publications is a trigger for further related research and technology improvements in this important subject. .