

# portfolio optimization with excel

**portfolio optimization with excel** is a powerful approach to managing investments by maximizing returns while minimizing risk using Microsoft Excel's versatile tools. This method leverages Excel's built-in functions, data analysis capabilities, and add-ins to construct efficient portfolios tailored to specific investment goals. Investors and financial analysts can benefit from portfolio optimization with Excel by applying modern portfolio theory principles, such as the mean-variance optimization model, without the need for expensive software. This article covers the fundamentals of portfolio optimization, the step-by-step guide to using Excel, and advanced techniques to enhance portfolio performance. Additionally, it explores risk management strategies and practical tips for real-world application. The comprehensive overview ensures a solid understanding of how to implement portfolio optimization with Excel effectively.

- Understanding Portfolio Optimization
- Setting Up Data for Portfolio Optimization in Excel
- Using Excel Solver for Portfolio Optimization
- Advanced Techniques for Portfolio Optimization
- Risk Management and Performance Metrics in Excel

## Understanding Portfolio Optimization

Portfolio optimization is the process of selecting the best mix of assets to achieve the desired balance between risk and return. It is grounded in modern portfolio theory, which emphasizes diversification to reduce risk. The goal is to construct an optimal portfolio that offers the highest expected return for a given level of risk or the lowest risk for a given expected return. Portfolio optimization with Excel involves calculating expected returns, variances, covariances, and applying optimization algorithms to identify the ideal asset weights.

## Key Concepts in Portfolio Optimization

Before performing portfolio optimization with Excel, it is essential to understand several fundamental concepts:

- **Expected Return:** The weighted average of the potential returns of the assets in a portfolio.
- **Risk (Variance and Standard Deviation):** Measures of the volatility of asset returns, indicating uncertainty.

- **Covariance and Correlation:** Metrics that show how asset returns move relative to each other, crucial for diversification.
- **Efficient Frontier:** The set of optimal portfolios offering the highest expected return for a given risk level.

## Benefits of Portfolio Optimization with Excel

Excel provides a flexible and accessible platform for portfolio optimization due to its widespread availability and user-friendly interface. Utilizing Excel allows for customization, real-time data updates, and the ability to visualize results through charts and graphs. Moreover, Excel's Solver add-in enables users to solve complex optimization problems with constraints, making portfolio optimization practical and efficient for both beginners and professionals.

## Setting Up Data for Portfolio Optimization in Excel

Accurate data preparation is critical for effective portfolio optimization with Excel. The process begins with collecting historical price data or returns for the selected assets. Properly organizing this data facilitates the calculation of necessary statistics such as mean returns, variance, and covariance matrix, which are the foundation for optimization models.

## Gathering and Organizing Asset Data

To prepare data for portfolio optimization, follow these steps:

1. Obtain historical price data for each asset, preferably daily, weekly, or monthly closing prices.
2. Calculate periodic returns by computing the percentage change between consecutive prices.
3. Organize returns in columns, with each column representing an asset and rows representing time periods.
4. Calculate the average return for each asset using the AVERAGE function in Excel.
5. Compute the variance and covariance matrix using the VAR.P and COVARIANCE.P functions, respectively.

# Calculating Portfolio Statistics

Once the data is organized, calculate key portfolio statistics necessary for optimization:

- **Expected Portfolio Return:** The sum product of individual asset weights and their expected returns using the SUMPRODUCT function.
- **Portfolio Variance:** Calculated by multiplying the weight vector, covariance matrix, and the transpose of the weight vector.
- **Portfolio Standard Deviation:** The square root of portfolio variance, representing portfolio risk.

## Using Excel Solver for Portfolio Optimization

Excel's Solver add-in is a powerful optimization tool that can be used to determine the optimal asset allocation in portfolio optimization tasks. Solver adjusts asset weights to maximize or minimize an objective function, subject to constraints such as weight limits, budget constraints, and risk tolerance.

## Setting Up the Solver Model

To implement portfolio optimization with Excel Solver, follow these steps:

1. Define decision variables: Assign cells for asset weights, which Solver will adjust.
2. Set the objective function: Typically, maximize expected return or minimize portfolio variance.
3. Input constraints: Ensure the sum of weights equals 1 (full investment), weights are non-negative (no short selling unless allowed), and apply any additional constraints as needed.
4. Configure Solver to use the GRG Nonlinear solving method for optimization problems involving continuous variables.

## Example: Minimizing Portfolio Risk

An example scenario is minimizing portfolio variance:

- **Objective:** Minimize portfolio variance cell.
- **Decision Variables:** Asset weights cells.

- **Constraints:** Sum of weights equals 1, all weights greater than or equal to zero.

Once configured, running Solver will yield the asset allocation that minimizes risk while meeting the constraints.

## Advanced Techniques for Portfolio Optimization

Beyond basic optimization, portfolio optimization with Excel can be enhanced by incorporating advanced techniques and additional constraints to reflect real-world investment considerations and improve portfolio robustness.

### Incorporating Constraints and Real-World Factors

Advanced portfolio optimization often requires additional constraints such as:

- Maximum and minimum allocation limits per asset or asset class.
- Transaction cost considerations to minimize trading expenses.
- Cardinality constraints restricting the number of assets in the portfolio.
- Incorporation of tax considerations and other regulatory requirements.

### Using Macros and VBA for Automation

For recurring portfolio optimization tasks, Excel's Visual Basic for Applications (VBA) can automate data processing, optimization runs, and report generation. Macros can streamline complex workflows, saving time and reducing errors in portfolio analysis.

### Scenario Analysis and Stress Testing

Scenario analysis involves testing portfolio performance under different market conditions or assumptions. Using Excel's data tables and scenario manager, investors can evaluate how changes in returns, volatility, or correlations impact the optimized portfolio, enhancing risk management and decision-making.

## Risk Management and Performance Metrics in Excel

Effective portfolio optimization with Excel includes ongoing risk management and performance evaluation. Excel's analytical tools support the calculation of important risk

metrics and performance indicators that help monitor portfolio health.

## Key Risk Metrics

Important risk measures calculated in Excel include:

- **Value at Risk (VaR):** Estimates potential portfolio loss at a given confidence level over a specific time horizon.
- **Beta:** Measures the portfolio's sensitivity to market movements.
- **Sharpe Ratio:** Indicates risk-adjusted return by comparing excess return to standard deviation.
- **Sortino Ratio:** Similar to Sharpe but focuses on downside volatility.

## Tracking and Visualizing Portfolio Performance

Excel facilitates the monitoring of portfolio performance through:

- Dynamic charts illustrating portfolio return vs. risk over time.
- Conditional formatting to highlight asset performance deviations.
- Pivot tables summarizing returns by asset class, sector, or other criteria.

These tools provide investors with insights to adjust portfolio strategies proactively and maintain alignment with investment objectives.

## Frequently Asked Questions

### What is portfolio optimization in Excel?

Portfolio optimization in Excel involves using Excel tools and functions to allocate assets in a way that maximizes return for a given level of risk or minimizes risk for a given level of return, often using techniques like mean-variance optimization.

### Which Excel functions are commonly used for portfolio optimization?

Common Excel functions used include SUMPRODUCT for weighted calculations, AVERAGE and STDEV for calculating returns and volatility, and the Solver add-in for optimizing asset weights to achieve desired risk-return profiles.

## **How can I use Excel Solver for portfolio optimization?**

Excel Solver can be used to find the optimal asset weights by setting an objective function (e.g., maximize return or minimize risk), defining constraints (e.g., weights sum to 1, no short selling), and adjusting variable cells representing asset weights.

## **What data do I need to perform portfolio optimization in Excel?**

You need historical price or return data for the assets in your portfolio, which can be used to calculate expected returns, variances, and covariances necessary for optimization.

## **Can I perform mean-variance portfolio optimization using Excel?**

Yes, mean-variance optimization can be performed in Excel by calculating expected returns, variances, and covariances of assets, then using Solver to optimize weights to maximize return for a given risk or minimize risk for a given return.

## **How do I calculate portfolio variance in Excel?**

Portfolio variance can be calculated using the formula:  $\text{portfolio variance} = w' \Sigma w$ , where  $w$  is the vector of asset weights and  $\Sigma$  is the covariance matrix. In Excel, this can be done using matrix multiplication functions like MMULT and TRANSPOSE.

## **Are there Excel add-ins that can help with portfolio optimization?**

Yes, add-ins such as the Excel Solver, XLSTAT, and third-party tools like Risk Solver or Portfolio Optimization add-ins can simplify and enhance portfolio optimization tasks.

## **How do I handle constraints like no short selling in Excel portfolio optimization?**

In Excel Solver, you can set constraints on the decision variables (asset weights) such as setting the lower bound to 0 to prevent negative weights, effectively disallowing short selling.

## **Can Excel handle large portfolios for optimization?**

Excel can handle moderate-sized portfolios efficiently, but for very large portfolios with many assets, performance may degrade, and specialized software or programming languages like Python or R might be more suitable.

## **How can I visualize the efficient frontier in Excel?**

You can visualize the efficient frontier by solving for portfolio returns and risks at different

levels of target return or risk using Solver, then plotting these points as a scatter chart to show the trade-off between risk and return.

## Additional Resources

### 1. *Portfolio Optimization with Excel: A Practical Guide to Asset Allocation*

This book provides a comprehensive introduction to portfolio optimization techniques using Microsoft Excel. It covers fundamental concepts such as mean-variance optimization, risk-return trade-offs, and constraints handling. Readers will learn step-by-step methods to build efficient portfolios and apply real-world data to optimize asset allocation effectively.

### 2. *Mastering Portfolio Optimization in Excel: From Theory to Practice*

Designed for both beginners and experienced investors, this book bridges the gap between theoretical portfolio optimization and practical implementation in Excel. It explores advanced optimization models including the Black-Litterman model and robust optimization. The text includes downloadable Excel templates and VBA macros to automate complex calculations.

### 3. *Excel Modeling for Asset Management and Portfolio Optimization*

Focusing on asset management professionals, this title offers practical Excel models for portfolio construction and risk management. It highlights scenario analysis, stress testing, and portfolio rebalancing techniques. The book emphasizes transparent modeling approaches that help users understand underlying assumptions and results.

### 4. *Quantitative Portfolio Optimization Using Excel and VBA*

This book dives deep into quantitative methods for portfolio optimization, integrating Excel with VBA programming. It covers optimization algorithms such as quadratic programming and genetic algorithms tailored for asset allocation problems. Readers will gain skills to develop customized optimization tools for complex financial portfolios.

### 5. *Practical Portfolio Optimization with Excel Solver*

Focused on leveraging Excel's Solver add-in, this guide teaches how to set up and solve portfolio optimization problems with various constraints. It includes practical examples on maximizing returns, minimizing risk, and incorporating transaction costs. The straightforward approach makes it ideal for those new to optimization software.

### 6. *Advanced Portfolio Optimization Techniques in Excel*

Targeting advanced users, this book explores sophisticated portfolio optimization methods including multi-period optimization and factor-based models. It explains how to implement these models within Excel using built-in functions and add-ins. The book also discusses performance evaluation and optimization diagnostics.

### 7. *Excel for Investment Portfolio Management and Optimization*

This book combines investment management principles with hands-on Excel tutorials to optimize portfolios effectively. Topics include asset correlation analysis, diversification strategies, and performance metrics. It offers practical tips for building dynamic spreadsheets that adapt to changing market conditions.

### 8. *Portfolio Construction and Optimization with Excel: A Step-by-Step Approach*

Offering a clear and structured pathway, this book guides readers through the entire

portfolio construction process using Excel. It covers data input, return estimation, risk measurement, and optimization under various constraints. The step-by-step instructions and examples make complex concepts accessible.

#### *9. Risk-Based Portfolio Optimization Using Excel*

This title focuses on incorporating different risk measures such as Value-at-Risk (VaR) and Conditional Value-at-Risk (CVaR) into portfolio optimization models. It demonstrates how to implement these risk metrics in Excel and use Solver to find optimal portfolios. The book is suitable for risk managers and quantitative analysts aiming to enhance portfolio resilience.

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Hayden Van Der Post, 2025-04-03 Reactive Publishing Advanced Portfolio Optimization with Excel & Python Master Quantitative Investing with Real-World Applications Unlock the full power of modern portfolio theory, machine learning, and quantitative finance using two of the most accessible tools in your arsenal: Excel and Python. This advanced guide is designed for serious investors, analysts, and finance professionals who want to go beyond basic models and learn how to engineer high-performance portfolios. Inside, you'll find a deep dive into risk-adjusted strategies, multi-factor models, regime switching, Monte Carlo simulations, Black-Litterman adjustments, and more-anchored by code and practical Excel frameworks you can apply immediately. Whether you're managing capital or building algorithms, this book offers you the tools to: Construct robust portfolios with modern optimization techniques Combine fundamental and technical factors in allocation decisions Apply risk-parity, volatility targeting, and regime-based tilts Leverage Python for backtesting and Excel for scenario analysis Bridge academic theory with real-world portfolio management With a dual emphasis on financial insight and hands-on execution, this book is ideal for those who want more than just theory-it's for builders, quants, and future fund managers.

**portfolio optimization with excel: Financial Risk Modelling and Portfolio Optimization with R** Bernhard Pfaff, 2012-11-05 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. 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. Enables the reader to replicate the results in the book using R code. Is accompanied by a supporting website featuring examples and case studies in R. 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.

### **portfolio optimization with excel: Understanding Financial Risk Management** Angelo



Corelli, 2024-05-27 Financial risk management is a topic of primary importance in financial markets. It is important to learn how to measure and control risk, how to be primed for the opportunity of compensative return, and how to avoid useless exposure.

**portfolio optimization with excel:** Analytical Corporate Finance Angelo Corelli, 2023-09-29 This book draws readers' attention to the financial aspects of daily life at a corporation by combining a robust mathematical setting and the explanation and derivation of the most popular models of the firm. Intended for third-year undergraduate students of business finance, quantitative finance, and financial mathematics, as well as first-year postgraduate students, it is based on the twin pillars of theory and analytics, which merge in a way that makes it easy for students to understand the exact meaning of the concepts and their representation and applicability in real-world contexts. Examples are given throughout the chapters in order to clarify the most intricate aspects; where needed, there are appendices at the end of chapters, offering additional mathematical insights into specific topics. Due to the recent growth in knowledge demand in the private sector, practitioners can also profit from the book as a bridge-builder between university and industry. Lastly, the book provides useful information for managers who want to deepen their understanding of risk management and come to recognize what may have been lacking in their own systems.

**portfolio optimization with excel:** *Operational Research in Business and Economics* Evangelos Grigoroudis, Michael Doumpos, 2016-07-29 This book gathers a selection of refereed papers presented at the 4th International Symposium and 26th National Conference of the Hellenic Operational Research Society. It highlights recent scientific advances in operational research and management science (OR/MS), with a focus on linking OR/MS with other areas of quantitative methods in a multidisciplinary framework. Topics covered include areas such as business process modeling, supply chain management, organization performance and strategy planning, revenue management, financial applications, production planning, metaheuristics, logistics, inventory systems, and energy systems.

**portfolio optimization with excel:** *Decision Support System for Portfolio Optimization*, 1997

**portfolio optimization with excel:** *Handbook on Decision Support Systems 2* Frada Burstein, Clyde W. Holsapple, 2008-01-22 As the most comprehensive reference work dealing with decision support systems (DSS), this book is essential for the library of every DSS practitioner, researcher, and educator. Written by an international array of DSS luminaries, it contains more than 70 chapters that approach decision support systems from a wide variety of perspectives. These range from classic foundations to cutting-edge thought, informative to provocative, theoretical to practical, historical to futuristic, human to technological, and operational to strategic. The chapters are conveniently organized into ten major sections that novices and experts alike will refer to for years to come.

**portfolio optimization with excel:** *Creating an Investment Policy Statement* Norman M. Boone, Linda S. Lubitz, 2004 What is an Investment Policy Statement? The IPS provides the foundation for all future investment decisions to be made by an investor. It serves as a guidepost, identifying goals, creating a system and discipline for a decisions. A client said, Once the trustees adopted the Investment Policy Statement, we found that we were making our decisions in a deliberate fashion, rather than in the heat of battle. Since we'd already thought about how things would get done under a variety of circumstances, we no longer found ourselves getting emotional. Planning ahead makes it easier for all of us when the investment markets get turbulent. If you are an investment advisor, financial planner, stock broker, insurance agent, CPA or attorney advising your clients about their money, this innovative book will be a key tool for working with clients.

**portfolio optimization with excel:** *Operations Research Applications and Algorithms* Mr. Rohit Manglik, 2023-07-23 Provides practical insight into solving linear, nonlinear, and dynamic problems using operations research algorithms and techniques.

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**portfolio optimization with excel: Financial Modeling, fourth edition** Simon Benninga, 2014-04-18 A substantially revised edition of a bestselling text combining explanation and implementation using Excel; for classroom use or as a reference for finance practitioners. Financial Modeling is now the standard text for explaining the implementation of financial models in Excel. This long-awaited fourth edition maintains the “cookbook” features and Excel dependence that have made the previous editions so popular. As in previous editions, basic and advanced models in the areas of corporate finance, portfolio management, options, and bonds are explained with detailed Excel spreadsheets. Sections on technical aspects of Excel and on the use of Visual Basic for Applications (VBA) round out the book to make Financial Modeling a complete guide for the financial modeler. The new edition of Financial Modeling includes a number of innovations. A new section explains the principles of Monte Carlo methods and their application to portfolio management and exotic option valuation. A new chapter discusses term structure modeling, with special emphasis on the Nelson-Siegel model. The discussion of corporate valuation using pro forma models has been rounded out with the introduction of a new, simple model for corporate valuation based on accounting data and a minimal number of valuation parameters. New print copies of this book include a card affixed to the inside back cover with a unique access code. Access codes are required to download Excel worksheets and solutions to end-of-chapter exercises. If you have a used copy of this book, you may purchase a digitally-delivered access code separately via the Supplemental Material link on this page. If you purchased an e-book, you may obtain a unique access code by emailing [digitalproducts-cs@mit.edu](mailto:digitalproducts-cs@mit.edu) or calling 617-253-2889 or 800-207-8354 (toll-free in the U.S. and Canada). Praise for earlier editions “Financial Modeling belongs on the desk of every finance professional. Its no-nonsense, hands-on approach makes it an indispensable tool.” —Hal R. Varian, Dean, School of Information Management and Systems, University of California, Berkeley “Financial Modeling is highly recommended to readers who are interested in an introduction to basic, traditional approaches to financial modeling and analysis, as well as to those who want to learn more about applying spreadsheet software to financial analysis. —Edward Weiss, Journal of Computational Intelligence in Finance “Benninga has a clear writing style and uses numerous illustrations, which make this book one of the best texts on using Excel for finance that I've seen.” —Ed McCarthy, Ticker Magazine

**portfolio optimization with excel: Artificial Intelligence in Intelligent Systems** Radek Silhavy, 2021-07-15 This book constitutes the refereed proceedings of the artificial intelligence in intelligent systems section of the 10th Computer Science Online Conference 2021 (CSOC 2021), held online in April 2021. Artificial intelligence in intelligent systems topics are presented in this book. Modern hybrid and bio-inspired algorithms and their application are discussed in selected papers.

**portfolio optimization with excel: Analytics Stories** Wayne L. Winston, 2020-09-16 Inform your own analyses by seeing how one of the best data analysts in the world approaches analytics problems Analytics Stories: How to Make Good Things Happen is a thoughtful, incisive, and entertaining exploration of the application of analytics to real-world problems and situations. Covering fields as diverse as sports, finance, politics, healthcare, and business, Analytics Stories bridges the gap between the oft inscrutable world of data analytics and the concrete problems it solves. Distinguished professor and author Wayne L. Winston answers questions like: Was Liverpool over Barcelona the greatest upset in sports history? Was Derek Jeter a great infielder What's wrong with the NFL QB rating? How did Madoff keep his fund going? Does a mutual fund's past performance predict future performance? What caused the Crash of 2008? Can we predict where crimes are likely to occur? Is the lot of the American worker improving? How can analytics save the US Republic? The birth of evidence-based medicine: How did James Lind know citrus fruits cured scurvy? How can I objectively compare hospitals? How can we predict heart attacks in real time? How does a retail store know if you're pregnant? How can I use A/B testing to improve sales from my

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**portfolio optimization with excel:** [Python for Finance](#) Yves Hilpisch, 2014-12-11 The financial industry has adopted Python at a tremendous rate recently, with some of the largest investment banks and hedge funds using it to build core trading and risk management systems. This hands-on guide helps both developers and quantitative analysts get started with Python, and guides you through the most important aspects of using Python for quantitative finance. Using practical examples through the book, author Yves Hilpisch also shows you how to develop a full-fledged framework for Monte Carlo simulation-based derivatives and risk analytics, based on a large, realistic case study. Much of the book uses interactive IPython Notebooks, with topics that include: Fundamentals: Python data structures, NumPy array handling, time series analysis with pandas, visualization with matplotlib, high performance I/O operations with PyTables, date/time information handling, and selected best practices Financial topics: mathematical techniques with NumPy, SciPy and SymPy such as regression and optimization; stochastics for Monte Carlo simulation, Value-at-Risk, and Credit-Value-at-Risk calculations; statistics for normality tests, mean-variance portfolio optimization, principal component analysis (PCA), and Bayesian regression Special topics: performance Python for financial algorithms, such as vectorization and parallelization, integrating Python with Excel, and building financial applications based on Web technologies

**portfolio optimization with excel:** [Financial Modeling, fifth edition](#) Simon Benninga, Tal Mofkadi, 2022-02-08

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**portfolio optimization with excel:** [Advances in Quantitative Methods for Economics and Business](#) Salvador Cruz Rambaud, Juan Evangelista Trinidad Segovia, Catalina B. García-García, 2025-09-26 Bringing together a distinguished group of contributors, this volume in honor of José García Pérez provides a comprehensive overview of the latest advances in quantitative methods for business and economics, including distribution theory, econometrics, behavioral finance, financial networks and economic applications, as well as parallels exploring José García Pérez's research interests. Contemporary challenges in this field include evaluating the robustness of structural econometric analyses under collinearity, identifying the connections between long-term memory and financial performance, and treating multicollinearity in the Nelson-Siegel model. To tackle these problems, this book offers a wealth of innovative approaches, methodologies, and theoretical frameworks. For example, it presents new probability distributions, explores the application of

partial least structural equation modeling in economics, discusses the theoretical-practical approach to portfolio management in sustainable finance and Environmental, Social and Governance, and reviews the application and usefulness of state-of-the-art machine learning and artificial intelligence in applied finance. The book serves as a valuable resource for researchers and practitioners in econometrics, finance, and economics, providing a comprehensive yet accessible resource for further exploration and study. In honoring José García Pérez, it not only pays tribute to a distinguished scholar but will also act as a catalyst for continued exploration and advancement in the dynamic and evolving landscape of quantitative methods for economics and business.

**portfolio optimization with excel: Modern Management Based on Big Data III** A.J. Tallón-Ballesteros, 2022-09-29 Data is the basic ingredient of all Big Data applications, and Big Data technologies are constantly deploying new strategies to maximise efficiency and reduce the time taken to process information. This book presents the proceedings of MMBD2022, the third edition of the conference series Modern Management based on Big Data (MMBD). The conference was originally scheduled to take place from 15 to 18 August 2022 in Seoul, South Korea, but was changed to a virtual event on the same dates. Some 200 submissions were received for presentation at the conference, 52 of which were ultimately accepted after exhaustive review by members of the programme committee and peer-reviewers, who took into account the breadth and depth of the research topics and the scope of MMBD. Topics covered include data analytics, modelling, technologies and visualization, architectures for parallel processing systems, data mining tools and techniques, machine learning algorithms, and big data for engineering applications. There are also papers covering modern management, including topics such as strategy, decision making, manufacturing and logistics-based systems, engineering economy, information systems and law-based information treatment, and papers from a special session covering big data in manufacturing, retail, healthcare, accounting, banking, education, global trading, and e-commerce. Big data analysis and emerging applications were popular topics. The book includes many innovative and original ideas, as well as results of general significance, all supported by clear and rigorous reasoning and compelling evidence and methods, and will be of interest to all those working with Big Data.

**portfolio optimization with excel: Evolutionary and Memetic Computing for Project Portfolio Selection and Scheduling** Kyle Robert Harrison, Saber Elsayed, Ivan Leonidovich Garanovich, Terence Weir, Sharon G. Boswell, Ruhul Amin Sarker, 2021-11-13 This book consists of eight chapters, authored by distinguished researchers and practitioners, that highlight the state of the art and recent trends in addressing the project portfolio selection and scheduling problem (PPSSP) across a variety of domains, particularly defense, social programs, supply chains, and finance. Many organizations face the challenge of selecting and scheduling a subset of available projects subject to various resource and operational constraints. In the simplest scenario, the primary objective for an organization is to maximize the value added through funding and implementing a portfolio of projects, subject to the available budget. However, there are other major difficulties that are often associated with this problem such as qualitative project benefits, multiple conflicting objectives, complex project interdependencies, workforce and manufacturing constraints, and deep uncertainty regarding project costs, benefits, and completion times. It is well known that the PPSSP is an NP-hard problem and, thus, there is no known polynomial-time algorithm for this problem. Despite the complexity associated with solving the PPSSP, many traditional approaches to this problem make use of exact solvers. While exact solvers provide definitive optimal solutions, they quickly become prohibitively expensive in terms of computation time when the problem size is increased. In contrast, evolutionary and memetic computing afford the capability for autonomous heuristic approaches and expert knowledge to be combined and thereby provide an efficient means for high-quality approximation solutions to be attained. As such, these approaches can provide near real-time decision support information for portfolio design that can be used to augment and improve existing human-centric strategic decision-making processes. This edited book provides the reader with a broad overview of the PPSSP, its associated challenges, and approaches to addressing the

problem using evolutionary and memetic computing.

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