Applying The Fuzzy Analytical Hierarchy Process In

This book presents the proceedings of the 13th International Conference on Application of Fuzzy Systems and Soft Computing (ICAFS 2018), held in Warsaw, Poland on August 27–28, 2018. It includes contributions from diverse areas of soft computing such as uncertain computation, Z-information processing, neuro-fuzzy approaches, evolutionary computing and others. The topics of the papers include theory of uncertainty computation; theory and application of soft computing; decision theory with imperfect information; neuro-fuzzy technology; image processing with soft computing; intelligent control; machine learning; fuzzy logic in data analytics and data mining; evolutionary computing; chaotic systems; soft computing in business, economics and finance; fuzzy logic and soft computing in the earth sciences; fuzzy logic and soft computing in engineering; soft computing in medicine, biomedical engineering and the pharmaceutical sciences; and probabilistic and statistical reasoning in the social and educational sciences. The book covers new ideas from theoretical and practical perspectives in economics, business, industry, education, medicine, the earth sciences and other fields. In addition to promoting the development and application of soft computing methods in various real-life fields, it offers a useful guide for academics, practitioners, and graduates in fuzzy logic and soft computing fields.

One of the best-known methods of multi-criteria decision-making is the Analytic Hierarchy Process (AHP). This method provides a convenient and versatile framework for modeling multi-criteria decision problems, evaluating alternatives, and deriving final priorities. Rather than imposing a "correct" decision, AHP allows the user to create a ranking of alternatives, then choose the one which is the best (or among the best). At the core of AHP is a pairwise comparisons (PC) method. This is an old technique known in various forms since at least the Middle Ages. AHP uses and develops the PC method. The aim of Understanding the Analytic Hierarchy Process is to provide the reader with a critical guide to AHP. In this book, the AHP method is considered primarily as a mathematical technique supporting the decision-making process. Key Features Collects the ideas underpinning the AHP method and discusses them together with many improvements and extensions present in the literature. As a result, the reader will receive a much more complete picture of the method. Aimed at theorists and advanced practitioners from a wide range of scientific fields, including the social, management, and technical sciences. Highlights the intuitive assumptions underlying the mathematical methods that make up AHP and the pairwise comparisons method. Provides software code for readers who wish to practice AHP analysis using the Wolfram Language.

The evaluation of transport projects has become increasingly complex. Different aspects have to be taken into account and the consequences of the problems are usually far reaching and the different policy alternatives are numerous and difficult to predict. Several pressure or action groups have also emerged causing an even more complex decision making process. The use of multi criteria analysis for the evaluation of transport projects has increased due to this increasing complexity of the problem situation. At the same time, the importance of stakeholders within this evaluation process should have been recognized. Researches on transport projects are generally carried out to provide information to policymakers that have to operate within restrictive parameters (political, economical, social, etc ...). Researchers should therefore take greater account of the different priorities of stakeholders such as policymakers, private enterprises and households. These stakeholders should be incorporated explicitly in the evaluation process. The Analytic Hierarchy Process is one of the Fuzzy Multiple Criteria Decision Making methods. It can be applied in a very broad range of applications of decision problems. Logistics, urban planning, public politics, marketing, finance, education, economics are a part of this wide application area. In transport subjects it can be used for the evaluation of transport policy measures or decision making problems. Due to its wide range application area, it has been an exciting research subject for many different field researchers. The aim of this paper is to introduce AHP method and to offer how to benefit it for the preference of urban planners in transport problems. This paper is composed of two main parts. First part consists of the literature survey regarding with the AHP and its application areas. The advantage of methods had been mentioned. Second part focuses on a sample application of AHP technique. The study uses AHP technique to determine the selection criteria in the transhipment port selection decision-making process.

This paper proposes a multi-criteria decision making method called the neutrosophic data analytical hierarchy process (NDAHP) for the single-valued neutrosophic set (SVNS). This method is an extension of the neutrosophic analytic hierarchy process (NAHP) but was designed to handle actual datasets which consists of crisp values. Our proposed NDAHP method uses an objective weighting mechanism whereas all other existing versions of the AHP, fuzzy AHP and other fuzzy based AHP method in literature such as the NAHP and picture fuzzy AHP uses a subjective weighting mechanism to arrive at the decision. This makes our proposed NDAHP method a very objective one as the weightage of the criteria which forms the input of the evaluation matrix are determined in an objective manner using actual data collected for the problem, and hence will not change according to the opinions of the different decision makers which are subjective. The proposed NDAHP method is applied to a multi-criteria decision making problem related to the ranking of the financial performance of five public listed petrochemical companies trading in the main board of the Kuala Lumpur Stock Exchange (KLSE). Actual dataset of 15 financial indices for the five petrochemical companies for 2017 obtained from Yahoo! Finance were used in this study. Following this, a brief comparative study is conducted to evaluate the performance of our NDAHP algorithm against the results of other existing SVNS based decision making methods in literature. The results are compared against actual results obtained from KLSE. To further verify the rankings obtained through each method, the Spearman and Pearson ranking tests are carried out on each of the decision making methods that are studied. It is proved that our proposed NDAHP method produces the most accurate results, and this was further verified from the results of the Spearman and Pearson ranking tests.

Why Fuzzy Analytic Hierarchy Process Approach for Transport Problems?

Proceedings of the XVIII International symposium Symorg 2022 (BOOK OF ABSTRACTS)

Journal of Applied Operational Research

Soft Computing Applications and Techniques in Healthcare

Introduction to the Analytic Hierarchy Process

Proceedings of the 5th International Symposium, MISC 2018, December 16-18, 2018, Laghouat, Algeria

Application of Decision Science in Business and Management is a book where each chapter has been contributed by a different author(s). The chapters introduce and demonstrate a decision-making theory to practice case studies. It demonstrates key results for each sector with diverse real-world case studies. Theory is accompanied by relevant analysis techniques, with a progressive approach building from simple theory to complex and dynamic decisions with multiple data points, including big data, lot of data, etc. Computational techniques, dynamic analysis, probabilistic methods, and mathematical optimization techniques are expertly blended to support analysis of multi-criteria decision-making problems with defined constraints and requirements. The book provides an interface between the main disciplines of engineering/technology and the organizational, administrative, and planning abilities of decision making. It is complementary to other sub-disciplines such as economics, finance, marketing, decision and risk analysis, etc.

This book is the first in the literature to present the state of the art and some interesting and relevant applications of the Fuzzy Analytic Hierarchy Process (FAHP). The AHP is a conceptually and mathematically simple, easily implementable, yet extremely powerful tool for group decision making and is used around the world in a wide variety of decision situations, in fields such as government, business, industry, healthcare, and education. The aim of this book is to study various fuzzy methods for dealing with the imprecise and ambiguous data in AHP. Features: First book available on FAHP. Showcases state-of-the-art developments. Contains several novel real-life applications. Provides useful insights to both academics and practitioners in making group decisions under uncertainty This book provides the necessary background to work with existing fuzzy AHP models. Once the material in this book has been mastered, the reader will be able to apply fuzzy AHP models to his or her problems for making decisions with imprecise data.

The Analytic Hierarchy Process (AHP) has been one of the foremost mathematical methods for decision making with multiple criteria and has been widely studied in the operations research literature as well as applied to solve countless real-world problems. This book is meant to introduce and strengthen the readers' knowledge of the AHP, no matter how familiar they may be with the topic. This book provides a concise, yet self-contained, introduction to the AHP that uses a novel and more pedagogical approach. It begins with an introduction to the principles of the AHP, covering the critical points of the method, as well as some of its applications. Next, the book explores further aspects of the method, including the derivation of the priority vector, the estimation of inconsistency, and the use of AHP for group decisions. Each of these is introduced by relaxing initial assumptions. Furthermore, this booklet covers extensions of AHP, which are typically neglected in elementary expositions of the methods. Such extensions concern different numerical representations of preferences and the interval and fuzzy representations of preferences to account for uncertainty. During the whole exposition, an eye is kept on the most recent developments of the method.

This book presents the proceedings of the fifth International Symposium on Modelling and Implementation of Complex Systems (MISC 2018). The event was held in Laghouat, Algeria, on December 16–18, 2018. The 25 papers gathered here have been selected from 109 submissions using a strict peer-review process, and address a range of topics concerning the theory and applications of networking and distributed computing, including: cloud computing and the IoT, metaheuristics and optimization, computational intelligence, software engineering and formal methods.

A Capital Investment Case Study

Proceedings of the Second International Conference of Fuzzy Information and Engineering (ICFIE)

Application of Analytic Hierarchy Process and Fuzzy Logic to Energy Resources Allocation

Proceedings of Data Analytics and Management

Fuzzy Multi-Criteria Decision Making

Smart and Sustainable Cities and Buildings

This book shows how common operation management methods and algorithms can be extended to deal with vague or imprecise information in decision-making problems. It describes how to combine decision trees, clustering, multi-attribute decision-making algorithms and Monte Carlo Simulation with the mathematical description of imprecise or vague information, and how to visualize such information. Moreover, it discusses a broad spectrum of real-life management problems including forecasting the apparent consumption of steel products, planning and scheduling of production processes, project portfolio selection and economic-risk estimation. It is a concise, yet comprehensive, reference source for researchers in decision-making and decision-makers in business organizations alike.

With 140 contributions by authors from 19 different countries, XVIII International Symposium of Organizational Sciences – SymOrg 2022 successfully sets the high level for future conferences. The topic of SymOrg 2020, "Sustainable Business Management and Digital Transformation: Challenges and Opportunities in the Post-COVID Era", attracted researchers from different institutions, both in Serbia and abroad. This year, more than 300 scholars and practitioners authored and co-authored scientific and research articles that had been accepted for publication in the Book of Abstracts. All the contributions to the Book of Abstracts are classified into the following 13 key topics: Blockchain Technology in Business and Information Systems Business Analytics Creativity, Innovation and Sustainable Management Digital Operations and Logistics Management Digital Transformation of Financial Industry Digital Transformation of Public Administration E-Business Ecosystems Evidence-Based Public Policy Making in the Post-COVID Environment LEAN Business Systems – Structures, Processes and Models Managing Digital Transformation Projects under Discontinuity Managing Human Resources in the Post-COVID Era Rethinking Marketing and Communication in the Post-COVID Era Quality Management and Standardization in Digital Transformation Era. The participation of numerous domestic and international authors and the diversity of topics justify our efforts to organize the Symposium. As SymOrg is traditionally at the intersection of academy and business, we believe that this year's meeting will bring about many in-depth discussions, contribute to prospective partnerships, and build stronger business and academic networks. We also believe that meeting will contribute to the exchange of knowledge, research results and experience among industry experts, research institutions and faculties, which all share a common interest in contemporary organizational sciences. We are very grateful to our distinguished keynote and plenary speakers: Ana Draskovic, Aleksander Aristovnik, Manuel Mazzara, Basant Agarwa and Priyanka Harjule. Also, special thanks to moderators for organizing the panels and workshops in the fields of higher education, business, supply chain, doctoral research studies and student engagement and sustainability. The Faculty of Organizational Sciences would like to express its gratitude to the Ministry of Education, Science and Technological Development and all the partners and individuals who have supported and contributed to the organization of the Symposium. We are particularly grateful to the contributors and reviewers who made this issue possible. But above all, we are especially thankful to the authors and presenters for making SymOrg 2022 a success! Belgrade, June 6, 2022 Marko Mihić, Ph.D. Sandra Jednak, Ph.D. Gordana Savić, Ph.D.

- Investigation of new developments and technical limits on applied computational intelligence - Demonstration of added value of applied computational intelligence - Presentation of direct and potential real world applications of applied computational intelligence

These proceedings gather contributions presented at the 3rd International Conference on Applied Operational Research (ICAOR 2011) in Istanbul, Turkey, August 24-26, 2011, published in the series Lecture Notes in Management Science (LNMS). The conference covers all aspects of Operational Research and Management Science (OR/MS) with a particular emphasis on applications.

Multi-Criteria Decision Making in Maritime Studies and Logistics

Theory and Applications

Sustainable Business Management and Digital Transformation: Challenges and Opportunities in the Post-Covid Era

Handbook of Research on Modeling, Analysis, and Application of Nature-Inspired Metaheuristic Algorithms

Understanding the Analytic Hierarchy Process

11th International Conference on Theory and Application of Soft Computing, Computing with Words and Perceptions and Artificial Intelligence - ICSCCW-2021

This book presents the proceedings of the 11th Conference on Theory and Applications of Soft Computing, Computing with Words and Perceptions and Artificial Intelligence, ICSCCW-2021, held in Antalya, Turkey, on August 23-24, 2021. The general scope of the book covers uncertain computation, decision making under imperfect information, neuro-fuzzy approaches, natural language processing, and other areas. The topics of the papers include theory and application of soft computing, computing with words, image processing with soft computing, intelligent control, machine learning, fuzzy logic in data mining, soft computing in business, economics, engineering, material sciences, biomedical engineering, and health care. This book is a useful guide for academics, practitioners, and graduates in fields of soft computing and computing with words. It allows for increasing of interest in development and applying of these paradigms in various real-life fields.

This book constitutes the proceedings of the First International Conference on Mining Intelligence and Knowledge Exploration, MIKE 2013, held in Tamil Nadu, India on December 2013. The 82 papers presented were carefully reviewed and selected from 334 submissions. The papers cover the topics such as feature selection, classification, clustering, image processing, network security, speech processing, machine learning, information retrieval, recommender systems, natural language processing, language, cognition and computation and other certain problems in dynamical systems.

Applying computational intelligence for product design is a fast-growing and promising research area in computer sciences and industrial engineering. However, there is currently a lack of books, which discuss this research area. This book discusses a wide range of computational intelligence techniques for implementation on product design. It covers common issues on product design from identification of customer requirements in product design, determination of importance of customer requirements, determination of optimal design attributes, relating design attributes and customer satisfaction, integration of marketing aspects into product design, affective product design, to quality control of new products. Approaches for refinement of computational intelligence are discussed, in order to address different issues on product design. Cases studies of product design in terms of development of real-world new products are included, in order to illustrate the design procedures, as well as the effectiveness of the computational intelligence based approaches to product design. This book covers the state-of-art of computational intelligence methods for product design, which provides a clear picture to post-graduate students in industrial engineering and computer science. It is particularly suitable for researchers and professionals working on computational intelligence for product design. It provides concepts, techniques and methodologies, for product designers in applying computational intelligence to deal with product design.

The digital age is ripe with emerging advances and applications in technological innovations. Mimicking the structure of complex systems in nature can provide new ideas on how to organize mechanical and personal systems. The Handbook of Research on Modeling, Analysis, and Application of Nature-Inspired Metaheuristic Algorithms is an essential scholarly resource on current algorithms that have been inspired by the natural world. Featuring coverage on diverse topics such as cellular automata, simulated annealing, genetic programming, and differential evolution, this reference publication is ideal for scientists, biological engineers, academics, students, and researchers that are interested in discovering what models from nature influence the current technology-centric world.

From Early History to the 21st Century

Volume 4, Number 2, 2012

Applied Operational Research

Geospatial Technology Based Approach

Applications and Cases

Theory and Practice

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.

This book brings together the papers presented at the Smart and Sustainable Built Environments Conference, 2018 (SASBE).This latest research falls into two tracks: smart and sustainable design and planning cities; and the technicalities of smart and sustainable buildings. The growth of smart cities is evident, but not always linked to sustainability. This book gives an overview of the latest academic developments in increasing the smartness and sustainability of our cities and buildings. Aspects such as inclusivity, smart cities, place and space, the resilient city, urbanity and urban ecology are prominently featured in the design and planning part of the book; while energy, educational buildings, comfort, building design, construction and performance form the sub-themes of the technical part of the book. This book will appeal to urban designers, architects, urban planners, smart city designers and sustainable building experts.

The analytic hierarchy process (AHP) is recognised as one of the most commonly applied methods in the multiple attribute decision-making (MADM) literature. In the AHP, encompassing uncertainty feature necessitates using suitable uncertainty theories, since dealing efficiently with uncertainty in subjective judgements is of great importance in real-world decision-making problems. The neutrosophic set (NS) theory and grey systems are two reliable uncertainty theories which can bring considerable benefits to uncertain decision-making. Thea im of this study is to improve uncertain decision-making by incorporating advantages of the NS and grey systems theories with the AHP in investigating sustainability through agility readiness evaluation in large manufacturing plants.

The Second International Conference on Fuzzy Information and Engineering (ICFIE2007) is a major symposium for scientists, engineers and practitioners in China as well as the world to present their latest results, ideas, developments and applications in all areas of fuzzy information and knowledge engineering. It aims to strengthen relations between industry research laboratories and universities, and to create a primary symposium for world scientists.
ICDAM 2021
Decision Making for Strategic Decisions
On urban water pricing with practical application of fuzzy logic model and analytic hierarchy process in Shanghai
Multiple Criteria Decision Making
Theory and Applications with Recent Developments
13th International Conference on Theory and Application of Fuzzy Systems and Soft Computing — ICAFS-2018

This book introduces readers to the novel concept of spherical fuzzy sets, showing how these sets can be applied in practice to solve various decision-making problems. It also demonstrates that these sets provide a larger preference volume in 3D space for decision-makers. Written by authoritative researchers, the various chapters cover a large amount of theoretical and practical information, allowing readers to gain an extensive understanding of both the fundamentals and applications of spherical fuzzy sets in intelligent decision-making and mathematical programming.

We are pleased to welcome readers to this issue of the Journal of Applied Operational Research (JAOR), Volume 4, Number 2. The journal reports on developments in all aspects of operational research, including the latest advances and applications. It is a primarily goal of the journal to focus on and publish practical case studies which illustrate real-life applications.

Fuzzy Analytic Hierarchy ProcessCRC Press

The purpose of this book is to provide an introduction to the theory and applications in the field of decision making, especially focused on Analytic Hierarchy Process, a structured technique for organizing and analyzing complex decisions, based on mathematics and psychology. It was developed by Prof. Thomas L. Saaty in the 1970s and has been extensively studied and refined since then. The idea of the book is to expand the reader's consciousness to deal with problems regarding the decision making. This book presents some application examples of Analytic Hierarchy. It contains original research and application chapters from different perspectives, and covers different areas such as supply chain, environmental engineering, safety, and social issues. This book is intended to be a useful resource for anyone who deals with decision making problems.

Modelling and Implementation of Complex Systems

14th International Conference on Information Processing and Management of Uncertainty in Knowledge-Based Systems, IPMU 2012, Catania, Italy, July 9 - 13, 2012. Proceedings, Part IV

Developing the Application of the Fuzzy Analytic Hierarchy Process to Group Decision-making

Applicational Techniques and Case Studies

Computational Intelligence Techniques for New Product Design

These four volumes (CCIS 297, 298, 299, 300) constitute the proceedings of the 14th International Conference on Information Processing and Management of Uncertainty in Knowledge-Based Systems, IPMU 2012, held in Catania, Italy, in July 2012. The 258 revised full papers presented together with six invited talks were carefully reviewed and selected from numerous submissions. The papers are organized in topical sections on fuzzy machine learning and on-line modeling; computing with words and decision making; soft computing in computer vision; rough sets and complex data analysis: theory and applications; intelligent databases and information system; information fusion systems; philosophical and methodological aspects of soft computing; basic issues in rough sets; 40th anniversary of the measures of fuziness; SPS11 uncertainty in profiling systems and applications; handling uncertainty with copulas; formal methods to deal with uncertainty of many-valued events; linguistic summarization and description of data; fuzzy implications: theory and applications; sensing and data mining for teaching and learning; theory and applications of intuitionistic fuzzy sets; approximate aspects of data mining and database analytics; fuzzy numbers and their applications; information processing and management of uncertainty in knowledge-based systems; aggregation functions; imprecise probabilities; probabilistic graphical models with imprecision: theory and applications; belief function theory: basics and/or applications; fuzzy uncertainty in economics and business; new trends in De Finetti's approach; fuzzy measures and integrals; multi criteria decision making; uncertainty in privacy and security; uncertainty in the spirit of Pietro Benvenuti; coopetition; game theory; probabilistic approach.

Land Reclamation and Restoration Strategies for Sustainable Development: Geospatial Technology Based Approach, Volume Ten covers spatial mapping, modeling and risk assessment in land hazards issues and sustainable management. Each section in the book explores state-of-art techniques using commercial, open source and statistical software for mapping and modeling, along with case studies that illustrate modern image processing techniques and computational algorithms. A special focus is given on recent trends in data mining techniques. This book will be of particular interest to students, researchers and professionals in the fields of earth science, applied geography, and those in the environmental sciences. Demonstrates a geoinformatics approach to data mining techniques, data analysis, modeling, risk assessment, visualization, and management strategies in different aspects of land use, hazards and reclamation Covers land contamination problems, including effects on agriculture, forestry, and coastal and wetland areas Suggests specific techniques of remediation Explores state-of-art techniques based on commercial, open source, and statistical software for mapping and modeling using modern image processing techniques and computational algorithm

This book includes original unpublished contributions presented at the International Conference on Data Analytics and Management (ICDAM 2021), held at Jan Wyzykowski University, Poland, during June 2021. The book covers the topics in data analytics, data management, big data, computational intelligence, and communication networks. The book presents innovative work by leading academics, researchers, and experts from industry which is useful for young researchers and students.

This proceedings consists of selected papers presented at the 3rd International Conference on Application of Materials Science and Environmental Materials (AMSEM2015), which was successfully held on Phuket Island, Thailand, between October 01-03, 2015.Building on the success of AMSEM2013 and AMSEM2014, AMSEM2015 continues to provide a forum for academic scientists, leading engineers, industry researchers and doctoral students to exchange and share their experience and research results, so as to promote the advancement in Materials Engineering, Environments Materials and Material Science.AMSEM2015 attracted more than 80 submissions. Among them, only 33 papers were accepted into the conference after a stringent peer review process. It is hoped that this book will provide readers with a broad overview of the latest advances on the above areas, and also serve as a good reference for academic research and industrial professionals.

Proceeding of NCCS 2019
Dynamics in GIscience
A Novel Neutrosophic Data Analytic Hierarchy Process for Multi-Criteria Decision Making Method: A Case Study in Kuala Lumpur Stock Exchange
Application Of Materials Science And Environmental Materials - Proceedings Of The 3rd International Conference (Amsem2015)
The Analytic Hierarchy Process in Natural Resource and Environmental Decision Making
Fuzzy Information and Engineering

Multiple Criteria Decision Making (MCDM) is all about making choices in the presence of multiple conflicting criteria. MCDM has become one of the most important and fastest growing subfields of Operations Research/Management Science. As modern MCDM started to emerge about 50 years ago, it is now a good time to take stock of developments. This book aims to present an informal, nontechnical history of MCDM, supplemented with many pictures. It covers the major developments in MCDM, from early history until now. It also covers fascinating discoveries by Nobel Laureates and other prominent scholars.The book begins with the early history of MCDM, which covers the roots of MCDM through the 1960s. It proceeds to give a decade-by-decade account of major developments in the field starting from the 1970s until now. Written in a simple and accessible manner, this book will be of interest to students, academics, and professionals in the field of decision sciences.

This book provides insights into contemporary issues and challenges in soft computing applications and techniques in healthcare. It will be a useful guide to identify, categorise and assess the role of different soft computing techniques for disease, diagnosis and prediction due to technological advancements. The book explores applications in soft computing and covers empirical properties of artificial neural network (ANN), evolutionary computing, fuzzy logic and statistical techniques. It presents basic and advanced concepts to help beginners and industry professionals get up to speed on the latest developments in soft computing and healthcare systems. It incorporates the latest methodologies and challenges facing soft computing, examines descriptive, predictive and social network techniques and discusses analytics tools and their role in providing effective solutions for science and technology. The primary users for the book include researchers, academicians, postgraduate students, specialists and practitioners. Dr. Ashish Mishra is a professor in the Department of Computer Science and Engineering, Gyan Ganga Institute of Technology and Sciences, Jabalpur, Madhya Pradesh, India. He has contributed in organising the INSPIRE Science Internship Camp. He is a member of the Institute of Electrical and Electronics Engineers and is a life member of the Computer Society of India. His research interests include the Internet of Things, data mining, cloud computing, image processing and knowledge-based systems. He holds nine patents in Intellectual Property, India. He has authored four books in the areas of data mining, image processing and LaTex. Dr. G. Suseendran is an assistant professor, Department of Information Technology, School of Computing Sciences, Vels Institute of Science, Technology & Advanced Studies (VISTAS), Chennai, Tamil Nadu, India. His research interests include ad-hoc networks, the Internet of Things, data mining, cloud computing, image processing, knowledge-based systems, and Web information exploration. He has published more than 75 research papers in various international journals such as Science Citation Index, Springer Book Chapter, Scopus, IEEE Access and UGC-referred journals. Prof. Trung-Nghia Phung is an associate professor and Head of Academic Affairs, Thai Nguyen University of Information and Communication Technology (ICTU). He has published more than 60 research papers. His main research interest lies in the field of speech, audio, and biomedical signal processing. He serves as a technical committee program member, track chair, session chair, and reviewer of many international conferences and journals. He was a co-Chair of the International Conference on Advances in Information and Communication Technology 2016 (ICTA 2016) and a Session Chair of the 4th International Conference on Information System Design and Intelligent Applications (INDIA 2017).

This book describes a wide range real-case applications of Multi-Criteria Decision Making (MCDM) in maritime related subjects including shipping, port, maritime logistics, cruise ports, waterfront developments, and shipping finance, etc. In such areas, researchers, students and industrialists, in general, felt struggling to find a step-by-step guide on how to apply MCDM to formulate effective solutions to solving real problems in practice. This book focuses on the in-depth analysis and applications of the most well-known MDCM methodologies in the aforementioned areas. It brings together an eclectic collection of twelve chapters which seek to respond to these challenges. The book begins with an introduction and is followed by an overview of major MCDM techniques. The next chapter examines the theory of analytic hierarchy process (AHP) in detail and investigates a fuzzy AHP (FAHP) approach and its capability and rationale in dealing with decision problems of ambiguous information. Chapter 4 proposes a generic methodology to identify the key factors influencing green shipping and to establish an evaluation system for the assessment of shipping greenness. In Chapter 5, the authors describe a new function of fuzzy Evidential Reasoning (ER) to improve the vessel selection process in which multiple criteria with insufficient and ambiguous information are evaluated and synthesized. Chapter 6 presents a novel methodology by using an Artificial Potential Field (APF) model and the ER approach to estimate the collision probabilities of monitoring targets for coastal radar surveillance. Chapter 7 develops the inland port performance assessment model (IPPAM) using a hybrid of AHP, ER and a utility function. The next chapter showcases a challenging approach to address the risk and uncertainty in LNG transfer operations, by utilizing a Stochastic Utility Additives (UTA) method with the help of the philosophy of aggregation–disaggregation coupled with a robustness control procedure. Chapter 9 uses Entropy and Grey Relation Analysis (GRA) to analyze the relative weights of financial ratios through the case studies of the four major shipping companies in Korea and Taiwan: Evergreen, Yang Ming, Hanjin and Hyundai Merchant Marine. Chapter 10 systemically applies modern heuristics to solving MCDM problems in the fields of operation optimisation in container terminals. Arguing that bunkering port selection is typically a multi-criteria group decision problem, and in many practical situations, decision makers cannot form proper judgments using incomplete and uncertain information in an environment with exact and crisp values, in Chapter 11, the authors propose a hybrid Fuzzy-Delphi-TOPSIS based methodology with a sensitivity analysis. Finally, Chapter 12deals with a new conceptual port performance indicators (PPIs) interdependency model using a hybrid approach of a fuzzy logic based evidential reasoning (FER) and a decision making trial and evaluation laboratory (DEMATEL).

This book examines Multi-Criteria Decision Modelling (MCDM) methodologies and facilitates diverse ways for strategic decision-making in a variety of practical applications. This book also provides a pragmatic foundation for solving real-life problems in different scenarios of emerging global markets. Multi-Criteria Decision Modelling: Applicational Techniques and Case Studies depicts the use of sensitivity analysis and modelling and includes case studies to understand and illustrate challenging concepts. It also offers step-by-step comprehensive methodologies for the utilization of MCDM to a variety of situations. The book deliberates ways for companies to use these methods to their advantage in order to achieve sustainability. Furthermore, it also presents an overview of the major streams of thought and provides a holistic view of the latest research and development trends in modelling and optimization. FEATURES Offers a stepwise comprehensive methodology for the application of MCDM to a variety of situations Presents an overview of the major streams of thought present in the MCDM technique Provides a holistic view of the latest research and development trends in the emerging markets in terms of modelling and optimization using MCDM for different industrial sectors Illuminates a practical foundation in order to provide a guide to address the problems of emerging markets Enlightens the ways for companies to use these methods to their advantage to be able to achieve sustainability This book is a guide for those performing decision analysis for academic purposes as well as for researchers aspiring to expand their knowledge on MCDM problem solving.

A Hybrid Neutrosophic-Grey Analytic Hierarchy Process Method: Decision-Making Modelling in Uncertain Environments
Land Reclamation and Restoration Strategies for Sustainable Development
Multi-Criteria Decision Modelling
Nanoelectronics, Circuits and Communication Systems
Advances in Computational Intelligence, Part IV
Decision Making with Spherical Fuzzy Sets

This book features selected papers presented at the Fifth International Conference on Nanoelectronics, Circuits and Communication Systems (NCCS 2019). It covers a range of topics, including nanoelectronic devices, microelectronics devices, material science, machine learning, Internet of things, cloud computing, computing systems, wireless communication systems, advances in communication 5G and beyond. Further, it discusses VLSI circuits and systems, MEMS, IC design and testing, electronic system design and manufacturing, speech signal processing, digital signal processing, FPGA-based wireless communication systems and FPGA-based system design, Industry 4.0, e-farming, semiconductor memories, and IC fault detection and correction.

This book is intended for researchers, practitioners and students who are interested in the current trends and want to make their GI applications and research dynamic. Time is the key element of contemporary GIS: mobile and wearable electronics, sensor networks, UAVs and other mobile snoopers, the IoT and many other resources produce a massive amount of data every minute, which is naturally located in space as well as in time. Time series data is transformed into almost (from the human perspective) continuous data streams, which require changes to the concept of spatial data recording, storage and manipulation. This book collects the latest innovative research presented at the GIS Ostrava 2017 conference held in 2017 in Ostrava, Czech Republic, under the auspices of EuroSDR and EuroGEO. The accepted papers cover various aspects of dynamics in GIscience, including spatiotemporal data analysis and modelling; spatial mobility data and trajectories; real-time geodata and real-time applications; dynamics in land use, land cover and urban development; visualisation of dynamics; open spatiotemporal data; crowdsourcing for spatiotemporal data and big spatiotemporal data.

The author is glad to present to the readers, the book titled “Fuzzy Decision Making Tools to Sieve out the Poor in Nalanda District, Bihar”. The book is all about ‘how to identify and how to aggregate the poor’ in any given socio-economic context or condition, using the concept of Fuzzy Logic and Fuzzy Sets. This book will serve research students in applied mathematics and it will also be helpful to those who are involved in making socio-economic decision to distribute the resources available at their disposal. Why and How this book came into Being Decision making over the issue of ‘how to measure poverty’ has always been the subject of contentious debate for an economist, for a government, for a statistician, for a mathematician, or for any socio-economic plan. Several Decision Methods have been adopted to decide who would be considered poor or who would not. For examples: (i) Absolute and Relative Poverty Line Method, (ii) Uni- dimension poverty Method (iii) Income-Expenditure Method (iv) Head Count Ratio (HCR), (v) Income Gap Ratio (IGR) (vi) Poverty Gap Ratio (PGR), (vii) Advance Measure Method: - Foster-Greer-Thorbecke Measure, Sen - Shorrocks - Thon measure (SST), and Sen Index (viii) Multi-dimensional Poverty Approach :- (i) Counting Multi-dimensional Poverty (ii) Multi-dimensional Poverty Index (MPI) , and (iii) Capability Approach. These above mentioned methods were used at the global level. Identification of poor and non-poor in India is done based on Uni-dimensional model that is to say Income-consumption and expenditure model using following experts committee reports: (i) Dandekar and Rath (ii) Y.K. Alagh (iii) Lakdawala (iii) Suresh Tendulkar Committee (iv) C. Rangarajan Committee:- Modified Mixed Reference Period (MMRP), Poverty Line Basket (PLB), and Socio-Economic and Caste Census (SECC) 2011: BPL Identification in 2015. Nevertheless, every state in India is free to set its own standard of method to scale out the poor. The state of Bihar adopted the method of A Score Based Ranking Methodology to identify the poor. In Mathematical Modelling context all the above mentioned methods of making decisions fall under Crisp Decision Approach based on Aristotelian logic and Crisp Sets. In response to this method of decision making approach, fuzzy decision making approach was suggested as a better alternative to the process of poverty measurement method. Andrea Cerioli and Sergio Zani were the first one to apply fuzzy logic to poverty assessment in the year 1990. Later, Chiappero Martinetti and Qizilbash added the intrinsic vagueness of being poor by using so - called membership function for the identification of the poor. As the research continued further some more methods were addressed such as Totally Fuzzy (TF), Totally Fuzzy and Relative (TFR), Integrated Fuzzy Approach (Multidimensional and Longitudinal) to apply to identify and aggregate the poor. Key Concepts and Techniques This book further develops and introduces a new approach suggesting Multi-Criteria Fuzzy Decision-making Tools and Fuzzy Set Theory to capture the extent of poverty of households accommodating both the quantitative and qualitative factors such as Roti (Food), Kapda (Clothing), Makaan (Housing), Kaam (Job), and Samman (Social Status) and their fourteen respective sub-criteria. The fuzzification process is carried out by using Pentagonal Fuzzy Numbers (PFNs) and by introducing Stratified Fuzzy Analytical Hierarchy Process (SFAHP). Fuzzy poverty categorization is carried out by

introducing Fuzzy Sieve Technique (FST). The judgment and scaling of the criteria and sub-criteria are done by adopting participative decision making method (interview method based on questionnaires). Stratified Fuzzy Analytical Hierarchy Process (SFAHP) categorizes the group of the poor into five subgroups such as (i) very poor, (ii) almost very poor (iii) poor, (iv) rather poor and (v) non-poor. Our fuzzy tools and methods are applied to the case study in Nalanda District, Bihar, India. The book also highlights the comparative studies between three models such as Analytical Hierarchy Process (AHP), Fuzzy Analytical Hierarchy Process (FAHP) and Stratified Fuzzy Analytical Hierarchy Process (SFAHP). The final results justify that Stratified Fuzzy Analytical Hierarchy Process (SFAHP) gives better results in identifying the Poverty Status. Special Features Computer Algorithmic approach via MATLAB: (Programme for 5 X 5 Matrix) is given to calculate the fuzzy centre value by using Matlab m-file which will minimize the time in carrying out the fuzzification and normalization process to measure poverty status. At the end the author shall ever be grateful to the inquisitive researchers and socio-economic planners for their valuable suggestions for further improvement of this book. DR. RAJ KUMAR St. Xavier’s College of Management and Technology, Patna Digha Ashiyan Road -11. Affliated to AKU, Patna, Bihar, India

Decision making in land management involves preferential selection among competing alternatives. Often, such choices are difficult owing to the complexity of the decision context. Because the analytic hierarchy process (AHP, developed by Thomas Saaty in the 1970s) has been successfully applied to many complex planning, resource allocation, and priority setting problems in business, energy, health, marketing, natural resources, and transportation, more applications of the AHP in natural resources and environmental sciences are appearing regularly. This realization has prompted the authors to collect some of the important works in this area and present them as a single volume for managers and scholars. Because land management contains a somewhat unique set of features not found in other AHP application areas, such as site-specific decisions, group participation and collaboration, and incomplete scientific knowledge, this text fills a void in the literature on management science and decision analysis for forest resources.

Application of Decision Science in Business and Management

First International Conference, MIKE 2013, Tamil Nadu, India, December 18-20, 2013, Proceedings

Mining Intelligence and Knowledge Exploration

Proceedings of the 6th International FLINS Conference, Blankenberge, Belgium, September 1-3, 2004

Applied Computational Intelligence

Applications and Theory of Analytic Hierarchy Process