

Journal Of Computational Analysis And Applications

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This journal offers in-depth research and critical insights into the latest advancements in computational analysis and its diverse applications. Explore peer-reviewed articles covering novel methodologies, algorithms, and practical implementations across various scientific and engineering disciplines. We provide a vital platform for researchers and practitioners focused on applied computing and data analysis techniques, fostering innovation and knowledge exchange in this rapidly evolving field.

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Semi-Infinite Fractional Programming

This book presents a smooth and unified transitional framework from generalised fractional programming, with a finite number of variables and a finite number of constraints, to semi-infinite fractional programming, where a number of variables are finite but with infinite constraints. It focuses on empowering graduate students, faculty and other research enthusiasts to pursue more accelerated research advances with significant interdisciplinary applications without borders. In terms of developing general frameworks for theoretical foundations and real-world applications, it discusses a number of new classes of generalised second-order invex functions and second-order univex functions, new sets of second-order necessary optimality conditions, second-order sufficient optimality conditions, and second-order duality models for establishing numerous duality theorems for discrete minmax (or maxmin) semi-infinite fractional programming problems. In the current interdisciplinary super-computer-oriented research environment, semi-infinite fractional programming is among the most rapidly expanding research areas in terms of its multi-facet applications empowerment for real-world problems, which may stem from many control problems in robotics, outer approximation in geometry, and portfolio problems in economics, that can be transformed into semi-infinite problems as well as handled by transforming them into semi-infinite fractional programming problems. As a matter of fact, in mathematical optimisation programs, a fractional programming (or program) is a generalisation to linear fractional programming. These problems lay the theoretical foundation that enables us to fully investigate the second-order optimality and duality aspects of our principal fractional programming problem as well as its semi-infinite counterpart.

Computation and Applied Mathematics

Issues in Computation / 2011 Edition is a ScholarlyEditions™ eBook that delivers timely, authoritative, and comprehensive information about Computation. The editors have built Issues in Computation: 2011 Edition on the vast information databases of ScholarlyNews.™ You can expect the information

about Computation in this eBook to be deeper than what you can access anywhere else, as well as consistently reliable, authoritative, informed, and relevant. The content of *Issues in Computation* / 2011 Edition has been produced by the world's leading scientists, engineers, analysts, research institutions, and companies. All of the content is from peer-reviewed sources, and all of it is written, assembled, and edited by the editors at ScholarlyEditions™ and available exclusively from us. You now have a source you can cite with authority, confidence, and credibility. More information is available at <http://www.ScholarlyEditions.com/>.

Issues in Computation: 2011 Edition

The first part of this volume gathers the lecture notes of the courses of the “XVII Escuela Hispano-Francesa”, held in Gijón, Spain, in June 2016. Each chapter is devoted to an advanced topic and presents state-of-the-art research in a didactic and self-contained way. Young researchers will find a complete guide to beginning advanced work in fields such as High Performance Computing, Numerical Linear Algebra, Optimal Control of Partial Differential Equations and Quantum Mechanics Simulation, while experts in these areas will find a comprehensive reference guide, including some previously unpublished results, and teachers may find these chapters useful as textbooks in graduate courses. The second part features the extended abstracts of selected research work presented by the students during the School. It highlights new results and applications in Computational Algebra, Fluid Mechanics, Chemical Kinetics and Biomedicine, among others, offering interested researchers a convenient reference guide to these latest advances.

Computational Mathematics, Numerical Analysis and Applications

In the world of mathematics, the study of fuzzy relations and its theories are well-documented and a staple in the area of calculative methods. What many researchers and scientists overlook is how fuzzy theory can be applied to industries outside of arithmetic. The framework of fuzzy logic is much broader than professionals realize. There is a lack of research on the full potential this theoretical model can reach. The *Handbook of Research on Emerging Applications of Fuzzy Algebraic Structures* provides emerging research exploring the theoretical and practical aspects of fuzzy set theory and its real-life applications within the fields of engineering and science. Featuring coverage on a broad range of topics such as complex systems, topological spaces, and linear transformations, this book is ideally designed for academicians, professionals, and students seeking current research on innovations in fuzzy logic in algebra and other matrices.

Handbook of Research on Emerging Applications of Fuzzy Algebraic Structures

Featuring the clearly presented and expertly-refereed contributions of leading researchers in the field of approximation theory, this volume is a collection of the best contributions at the Third International Conference on Applied Mathematics and Approximation Theory, an international conference held at TOBB University of Economics and Technology in Ankara, Turkey, on May 28-31, 2015. The goal of the conference, and this volume, is to bring together key work from researchers in all areas of approximation theory, covering topics such as ODEs, PDEs, difference equations, applied analysis, computational analysis, signal theory, positive operators, statistical approximation, fuzzy approximation, fractional analysis, semigroups, inequalities, special functions and summability. These topics are presented both within their traditional context of approximation theory, while also focusing on their connections to applied mathematics. As a result, this collection will be an invaluable resource for researchers in applied mathematics, engineering and statistics.

Computational Analysis

In this book the author presents the Opial, Poincaré, Sobolev, Hilbert, and Ostrowski fractional differentiation inequalities. Results for the above are derived using three different types of fractional derivatives, namely by Canavati, Riemann-Liouville and Caputo. The univariate and multivariate cases are both examined. Each chapter is self-contained. The theory is presented systematically along with the applications. The application to information theory is also examined. This monograph is suitable for researchers and graduate students in pure mathematics. Applied mathematicians, engineers, and other applied scientists will also find this book useful.

Fractional Differentiation Inequalities

Knowledge can be modeled and computed using computational mathematical methods, then lead to real world conclusions. The strongly related to that Computational Analysis is a very large area with lots of applications. This monograph includes a great variety of topics of Computational Analysis. We present: probabilistic wavelet approximations, constrained abstract approximation theory, shape preserving weighted approximation, non positive approximations to definite integrals, discrete best approximation, approximation theory of general Picard singular operators including global smoothness preservation property, fractional singular operators. We also deal with non-isotropic general Picard singular multivariate operators and q-Gauss-Weierstrass singular q-integral operators. We talk about quantitative approximations by shift-invariant univariate and multivariate integral operators, nonlinear neural networks approximation, convergence with rates of positive linear operators, quantitative approximation by bounded linear operators, univariate and multivariate quantitative approximation by stochastic positive linear operators on univariate and multivariate stochastic processes. We further present right fractional calculus and give quantitative fractional Korovkin theory of positive linear operators. We also give analytical inequalities, fractional Opial inequalities, fractional identities and inequalities regarding fractional integrals. We further deal with semi group operator approximation, simultaneous Feller probabilistic approximation. We also present Fuzzy singular operator approximations. We give transfers from real to fuzzy approximation and talk about fuzzy wavelet and fuzzy neural networks approximations, fuzzy fractional calculus and fuzzy Ostrowski inequality. We talk about discrete fractional calculus, nabla discrete fractional calculus and inequalities. We study the q-inequalities, and q-fractional inequalities. We further study time scales: delta and nabla approaches, duality principle and inequalities. We introduce delta and nabla time scales fractional calculus and inequalities. We finally study convergence with rates of approximate solutions to exact solution of multivariate Dirichlet problem and multivariate heat equation, and discuss the uniqueness of solution of general evolution partial differential equation $\Delta u = f$ in multivariate time. The exposed results are expected to find applications to: applied and computational mathematics, stochastics, engineering, artificial intelligence, vision, complexity and machine learning. This monograph is suitable for graduate students and researchers.

Intelligent Mathematics: Computational Analysis

This book is a collection of invited and reviewed chapters on state-of-the-art developments in interdisciplinary mathematics. The book discusses recent developments in the fields of theoretical and applied mathematics, covering areas of interest to mathematicians, scientists, engineers, industrialists, researchers, faculty, and students. Readers will be exposed to topics chosen from a wide range of areas including differential equations, integral reforms, operational calculus, numerical analysis, fluid mechanics, and computer science. The aim of the book is to provide brief and reliably expressed research topics that will enable those new or not aware of mathematical sciences in this part of the world. While the book has not been precisely planned to address any branch of mathematics, it presents contributions of the relevant topics to do so. The topics chosen for the book are those that we have found of significant interest to many researchers in the world. These also are topics that are applicable in many fields of computational and applied mathematics. This book constitutes the first attempt in Jordanian literature to scientifically consider the extensive need of research development at the national and international levels with which mathematics deals. The book grew not only from the international collaboration between the authors but rather from the long need for a research-based book from different parts of the world for researchers and professionals working in computational and applied mathematics. This is the modified version of the back-cover content on the print book

Computational Mathematics and Applications

This book is a printed edition of the Special Issue "X-Ray Free-Electron Laser" that was published in Applied Sciences

X-Ray Free-Electron Laser

In general, every problem of science and engineering is governed by mathematical models. There is often a need to model, solve and interpret the problems one encounters in the world of practical problems. Models of practical application problems usually need to be handled by efficient computational models. New Paradigms in Computational Modeling and Its Applications deals with recent developments in mathematical methods, including theoretical models as well as applied science and engineering. The book focuses on subjects that can benefit from mathematical methods with concepts

of simulation, waves, dynamics, uncertainty, machine intelligence, and applied mathematics. The authors bring together leading-edge research on mathematics combining various fields of science and engineering. This perspective acknowledges the inherent characteristic of current research on mathematics operating in parallel over different subject fields. *New Paradigms in Computational Modeling and Its Applications* meets the present and future needs for the interaction between various science and technology/engineering areas on the one hand and different branches of mathematics on the other. As such, the book contains 13 chapters covering various aspects of computational modeling from theoretical to application problems. The first six chapters address various problems of structural and fluid dynamics. The next four chapters include solving problems where the governing parameters are uncertain regarding fuzzy, interval, and affine. The final three chapters will be devoted to the use of machine intelligence in artificial neural networks. Presents a self-contained and up to date review of modelling real life scientific and engineering application problems Introduces new concepts of various computing techniques to handle different engineering and science problems Demonstrates the efficiency and power of the various algorithms and models in a simple and easy to follow style, including numerous examples to illustrate concepts and algorithms

New Paradigms in Computational Modeling and Its Applications

This volume presents a broad discussion of computational methods and theories on various classical and modern research problems from pure and applied mathematics. Readers conducting research in mathematics, engineering, physics, and economics will benefit from the diversity of topics covered. Contributions from an international community treat the following subjects: calculus of variations, optimization theory, operations research, game theory, differential equations, functional analysis, operator theory, approximation theory, numerical analysis, asymptotic analysis, and engineering. Specific topics include algorithms for difference of monotone operators, variational inequalities in semi-inner product spaces, function variation principles and normed minimizers, equilibria of parametrized N-player nonlinear games, multi-symplectic numerical schemes for differential equations, time-delay multi-agent systems, computational methods in non-linear design of experiments, unsupervised stochastic learning, asymptotic statistical results, global-local transformation, scattering relations of elastic waves, generalized Ostrowski and trapezoid type rules, numerical approximation, Szász Durrmeyer operators and approximation, integral inequalities, behaviour of the solutions of functional equations, functional inequalities in complex Banach spaces, functional contractions in metric spaces.

Computational Mathematics and Variational Analysis

This book is a valuable source for graduate students and researchers and provides a comprehensive introduction to recent theories and applications of mathematical modeling and numerical simulation. It includes selected peer-reviewed papers presented at the 4th International Conference on Mathematical Modelling, Applied Analysis and Computation (ICMMAAC 2021), held at JECRC University, Jaipur, India, during August 5–7, 2021. The book is focused on mathematical modeling of various problems arising in science and engineering and new efficient numerical approaches for solving linear nonlinear problems and rigorous mathematical theories, which can be used to analyze different kinds of mathematical models. Applications of mathematical methods in physics, chemistry, biology, mechanical engineering, civil engineering, computer science, social science, and finance are presented.

Advances in Mathematical Modelling, Applied Analysis and Computation

This book presents the foundations of key problems in computational molecular biology and bioinformatics. It focuses on computational and statistical principles applied to genomes, and introduces the mathematics and statistics that are crucial for understanding these applications. The book features a free download of the R software statistics package and the text provides great crossover material that is interesting and accessible to students in biology, mathematics, statistics and computer science. More than 100 illustrations and diagrams reinforce concepts and present key results from the primary literature. Exercises are given at the end of chapters.

Computational Genome Analysis

Temporal and spatiotemporal data form an inherent fabric of the society as we are faced with streams of data coming from numerous sensors, data feeds, recordings associated with numerous areas of application embracing physical and human-generated phenomena (environmental data, financial markets, Internet activities, etc.). A quest for a thorough analysis, interpretation, modeling and prediction

of time series comes with an ongoing challenge for developing models that are both accurate and user-friendly (interpretable). The volume is aimed to exploit the conceptual and algorithmic framework of Computational Intelligence (CI) to form a cohesive and comprehensive environment for building models of time series. The contributions covered in the volume are fully reflective of the wealth of the CI technologies by bringing together ideas, algorithms, and numeric studies, which convincingly demonstrate their relevance, maturity and visible usefulness. It reflects upon the truly remarkable diversity of methodological and algorithmic approaches and case studies. This volume is aimed at a broad audience of researchers and practitioners engaged in various branches of operations research, management, social sciences, engineering, and economics. Owing to the nature of the material being covered and a way it has been arranged, it establishes a comprehensive and timely picture of the ongoing pursuits in the area and fosters further developments.

Time Series Analysis, Modeling and Applications

This volume presents recent advances in the field of matrix analysis based on contributions at the MAT-TRIAD 2015 conference. Topics covered include interval linear algebra and computational complexity, Birkhoff polynomial basis, tensors, graphs, linear pencils, K-theory and statistic inference, showing the ubiquity of matrices in different mathematical areas. With a particular focus on matrix and operator theory, statistical models and computation, the International Conference on Matrix Analysis and its Applications 2015, held in Coimbra, Portugal, was the sixth in a series of conferences. Applied and Computational Matrix Analysis will appeal to graduate students and researchers in theoretical and applied mathematics, physics and engineering who are seeking an overview of recent problems and methods in matrix analysis.

Applied and Computational Matrix Analysis

This book offers an essential textbook on complex analysis. After introducing the theory of complex analysis, it places special emphasis on the importance of Poincare theorem and Hartog's theorem in the function theory of several complex variables. Further, it lays the groundwork for future study in analysis, linear algebra, numerical analysis, geometry, number theory, physics (including hydrodynamics and thermodynamics), and electrical engineering. To benefit most from the book, students should have some prior knowledge of complex numbers. However, the essential prerequisites are quite minimal, and include basic calculus with some knowledge of partial derivatives, definite integrals, and topics in advanced calculus such as Leibniz's rule for differentiating under the integral sign and to some extent analysis of infinite series. The book offers a valuable asset for undergraduate and graduate students of mathematics and engineering, as well as students with no background in topological properties.

Complex Analysis and Applications

The neutrosophic cubic sets (NCSs) attained attraction of many researchers in the current time, so the need to discuss and study their stability was felt. Thus, in this article, we discuss the three types of stability of NCSs such as truth-stability, indeterminacy-stability, and falsity-stability. We define the left (resp., right) truth-left evaluative set, left (resp., right) indeterminacy-evaluative set, and left (resp., right) falsity-evaluative set. A new notion of stable NCSs, partially stable NCSs, and unstable NCSs is defined.

The Neutro-Stability Analysis of Neutrosophic Cubic Sets with Application in Decision Making Problems

Algorithms—Advances in Research and Application: 2012 Edition is a ScholarlyEditions™ eBook that delivers timely, authoritative, and comprehensive information about Algorithms. The editors have built Algorithms—Advances in Research and Application: 2012 Edition on the vast information databases of ScholarlyNews.™ You can expect the information about Algorithms in this eBook to be deeper than what you can access anywhere else, as well as consistently reliable, authoritative, informed, and relevant. The content of Algorithms—Advances in Research and Application: 2012 Edition has been produced by the world's leading scientists, engineers, analysts, research institutions, and companies. All of the content is from peer-reviewed sources, and all of it is written, assembled, and edited by the editors at ScholarlyEditions™ and available exclusively from us. You now have a source you can cite with authority, confidence, and credibility. More information is available at <http://www.ScholarlyEditions.com/>.

Algorithms—Advances in Research and Application: 2012 Edition

This book is a collection of original research papers as proceedings of the 6th International Congress of the Moroccan Society of Applied Mathematics organized by Sultan Moulay Slimane University, Morocco, during 7th–9th November 2019. It focuses on new problems, applications and computational methods in the field of nonlinear analysis. It includes various topics including fractional differential systems of various types, time-fractional systems, nonlinear Jerk equations, reproducing kernel Hilbert space method, thrombin receptor activation mechanism model, labour force evolution model, nonsmooth vector optimization problems, anisotropic elliptic nonlinear problem, viscous primitive equations of geophysics, quadratic optimal control problem, multi-orthogonal projections and generalized continued fractions. The conference aimed at fostering cooperation among students, researchers and experts from diverse areas of applied mathematics and related sciences through fruitful deliberations on new research findings. This book is expected to be resourceful for researchers, educators and graduate students interested in applied mathematics and interactions of mathematics with other branches of science and engineering.

Nonlinear Analysis: Problems, Applications and Computational Methods

The exponential progress and accessibility of computing has vastly increased data flows and revolutionized the practice of science, engineering, and communication. Computing plays a critical role in advancing research across almost every scientific discipline. *Computation for Humanity: Information Technology to Advance Society* is a guide for the creation of services, products, and tools that facilitate, support, and enhance progress of humanity toward more sustainable life. This book: Provides a deep understanding of the practical applications of computation to solve human-machine problems Delivers insight into theoretical approaches in an accessible manner Provides a comprehensive overview of computational science and engineering applications in selected disciplines Crosses the boundaries between different domains and shows how they interrelate and complement one another Focuses on grand challenges and issues that matter for the future of humanity Shows different perspectives of computational thinking, understanding, and reasoning Provides a basis for scientific discoveries and enables adopting scientific theories and engineering practices from other disciplines Takes a step back to provide a human-related abstraction level that is not ultimately seen in pure technological elaborations/collections The editors provide a collection of numerous computation-related projects that form a foundation from which to cross-pollinate between different disciplines and further extensive collaboration. They present a clear and profound understanding of computing in today's world, and provide fundamental solutions to some of the most pertinent humanity-related problems.

Computation for Humanity

This monograph is the first in Fuzzy Approximation Theory. It contains mostly the author's research work on fuzziness of the last ten years and relies a lot on [10]–[32] and it is a natural outgrowth of them. It belongs to the broader area of Fuzzy Mathematics. Chapters are self-contained and several advanced courses can be taught out of this book. We provide lots of applications but always within the framework of Fuzzy Mathematics. In each chapter is given background and motivations. A complete list of references is provided at the end. The topics covered are very diverse. In Chapter 1 we give an extensive basic background on Fuzziness and Fuzzy Real Analysis, as well a complete description of the book. In the following Chapters 2,3 we cover in deep Fuzzy Differentiation and Integration Theory, e.g. we present Fuzzy Taylor Formulae. It follows Chapter 4 on Fuzzy Ostrowski Inequalities. Then in Chapters 5, 6 we present results on classical algebraic and trigonometric polynomial Fuzzy Approximation.

Fuzzy Mathematics: Approximation Theory

Applications of Fractional Calculus to Modeling in Dynamics and Chaos aims to present novel developments, trends, and applications of fractional-order derivatives with power law and Mittag-Leffler kernel in the areas of chemistry, mechanics, chaos, epidemiology, fluid mechanics, modeling, and engineering. Non-singular and non-local fractional-order derivatives have been applied in different chapters to describe complex problems. The book offers theory and practical applications for the solutions of real-life problems and will be of interest to graduate-level students, educators, researchers, and scientists interested in mathematical modeling and its diverse applications. Features Discusses real-world problems, theory, and applications Covers new developments and advances in the various areas of nonlinear dynamics, signal processing, and chaos Suitable to teach master's and/or PhD-level

graduate students, and can be used by researchers, from any field of the social, health, and physical sciences

Applications of Fractional Calculus to Modeling in Dynamics and Chaos

Polynomials are well known for their ability to improve their properties and for their applicability in the interdisciplinary fields of engineering and science. Many problems arising in engineering and physics are mathematically constructed by differential equations. Most of these problems can only be solved using special polynomials. Special polynomials and orthonormal polynomials provide a new way to analyze solutions of various equations often encountered in engineering and physical problems. In particular, special polynomials play a fundamental and important role in mathematics and applied mathematics. Until now, research on polynomials has been done in mathematics and applied mathematics only. This book is based on recent results in all areas related to polynomials. Divided into sections on theory and application, this book provides an overview of the current research in the field of polynomials. Topics include cyclotomic and Littlewood polynomials; Descartes' rule of signs; obtaining explicit formulas and identities for polynomials defined by generating functions; polynomials with symmetric zeros; numerical investigation on the structure of the zeros of the q -tangent polynomials; investigation and synthesis of robust polynomials in uncertainty on the basis of the root locus theory; pricing basket options by polynomial approximations; and orthogonal expansion in time domain method for solving Maxwell's equations using paralleling-in-order scheme.

Polynomials

Along with finite differences and finite elements, spectral methods are one of the three main methodologies for solving partial differential equations on computers. This book provides a detailed presentation of basic spectral algorithms, as well as a systematical presentation of basic convergence theory and error analysis for spectral methods. Readers of this book will be exposed to a unified framework for designing and analyzing spectral algorithms for a variety of problems, including in particular high-order differential equations and problems in unbounded domains. The book contains a large number of figures which are designed to illustrate various concepts stressed in the book. A set of basic matlab codes has been made available online to help the readers to develop their own spectral codes for their specific applications.

Spectral Methods

Provides clear guidance on leveraging computational techniques to answer social science questions In disciplines such as political science, sociology, psychology, and media studies, the use of computational analysis is rapidly increasing. Statistical modeling, machine learning, and other computational techniques are revolutionizing the way electoral results are predicted, social sentiment is measured, consumer interest is evaluated, and much more. Computational Analysis of Communication teaches social science students and practitioners how computational methods can be used in a broad range of applications, providing discipline-relevant examples, clear explanations, and practical guidance. Assuming little or no background in data science or computer linguistics, this accessible textbook teaches readers how to use state-of-the art computational methods to perform data-driven analyses of social science issues. A cross-disciplinary team of authors—with expertise in both the social sciences and computer science—explains how to gather and clean data, manage textual, audio-visual, and network data, conduct statistical and quantitative analysis, and interpret, summarize, and visualize the results. Offered in a unique hybrid format that integrates print, ebook, and open-access online viewing, this innovative resource: Covers the essential skills for social sciences courses on big data, data visualization, text analysis, predictive analytics, and others Integrates theory, methods, and tools to provide unified approach to the subject Includes sample code in Python and links to actual research questions and cases from social science and communication studies Discusses ethical and normative issues relevant to privacy, data ownership, and reproducible social science Developed in partnership with the International Communication Association and by the editors of Computational Communication Research Computational Analysis of Communication is an invaluable textbook and reference for students taking computational methods courses in social sciences, and for professional social scientists looking to incorporate computational methods into their work.

Computational Analysis of Communication

This book focuses on the recent development of fractional differential equations, integro-differential equations, and inclusions and inequalities involving the Hadamard derivative and integral. Through a comprehensive study based in part on their recent research, the authors address the issues related to initial and boundary value problems involving Hadamard type differential equations and inclusions as well as their functional counterparts. The book covers fundamental concepts of multivalued analysis and introduces a new class of mixed initial value problems involving the Hadamard derivative and Riemann-Liouville fractional integrals. In later chapters, the authors discuss nonlinear Langevin equations as well as coupled systems of Langevin equations with fractional integral conditions. Focused and thorough, this book is a useful resource for readers and researchers interested in the area of fractional calculus.

Hadamard-Type Fractional Differential Equations, Inclusions and Inequalities

This book provides a comprehensive introduction to the mathematical theory of nonlinear problems described by elliptic partial differential equations. These equations can be seen as nonlinear versions of the classical Laplace equation, and they appear as mathematical models in different branches of physics, chemistry, biology, genetics, and engineering and are also relevant in differential geometry and relativistic physics. Much of the modern theory of such equations is based on the calculus of variations and functional analysis. Concentrating on single-valued or multivalued elliptic equations with nonlinearities of various types, the aim of this volume is to obtain sharp existence or nonexistence results, as well as decay rates for general classes of solutions. Many technically relevant questions are presented and analyzed in detail. A systematic picture of the most relevant phenomena is obtained for the equations under study, including bifurcation, stability, asymptotic analysis, and optimal regularity of solutions. The method of presentation should appeal to readers with different backgrounds in functional analysis and nonlinear partial differential equations. All chapters include detailed heuristic arguments providing thorough motivation of the study developed later on in the text, in relationship with concrete processes arising in applied sciences. A systematic description of the most relevant singular phenomena described in this volume includes existence (or nonexistence) of solutions, unicity or multiplicity properties, bifurcation and asymptotic analysis, and optimal regularity. The book includes an extensive bibliography and a rich index, thus allowing for quick orientation among the vast collection of literature on the mathematical theory of nonlinear phenomena described by elliptic partial differential equations.

Qualitative Analysis of Nonlinear Elliptic Partial Differential Equations

The special issue on “Computational Analysis of Heat Transfer in Fluids and Solids” of the journal “Defect and Diffusion Forum” addresses various novel nonlinear models and computational techniques important for tackling the heat transfer phenomenon in fluids and solids. Numerical results are discussed quantitatively to illustrate the salient features of practical engineering and industrial applications. Topics covered by excellent research papers in this issue include: extended surfaces fins, reactive flow problem, Newtonian and non-Newtonian flow, nanofluids dynamics, boundary layer flow, natural convection, hydrodynamic stability, biomechanics, plasma physics, physics of dusty plasma, forced convection, mixed convection, magnetohydrodynamics, thermal radiation, porous media flow and irreversibility analysis. We anticipate that our special issue will stimulate and help a wide audience of researchers, engineers and educators from various fields of human activity.

Computational Analysis of Heat Transfer in Fluids and Solids

A hands-on approach to statistical inference that addresses the latest developments in this ever-growing field. This clear and accessible book for beginning graduate students offers a practical and detailed approach to the field of statistical inference, providing complete derivations of results, discussions, and MATLAB programs for computation. It emphasizes details of the relevance of the material, intuition, and discussions with a view towards very modern statistical inference. In addition to classic subjects associated with mathematical statistics, topics include an intuitive presentation of the (single and double) bootstrap for confidence interval calculations, shrinkage estimation, tail (maximal moment) estimation, and a variety of methods of point estimation besides maximum likelihood, including use of characteristic functions, and indirect inference. Practical examples of all methods are given. Estimation issues associated with the discrete mixtures of normal distribution, and their solutions, are developed in detail. Much emphasis throughout is on non-Gaussian distributions, including details on working with the stable Paretian distribution and fast calculation of the noncentral Student's t .

An entire chapter is dedicated to optimization, including development of Hessian-based methods, as well as heuristic/genetic algorithms that do not require continuity, with MATLAB codes provided. The book includes both theory and nontechnical discussions, along with a substantial reference to the literature, with an emphasis on alternative, more modern approaches. The recent literature on the misuse of hypothesis testing and p-values for model selection is discussed, and emphasis is given to alternative model selection methods, though hypothesis testing of distributional assumptions is covered in detail, notably for the normal distribution. Presented in three parts—Essential Concepts in Statistics; Further Fundamental Concepts in Statistics; and Additional Topics—Fundamental Statistical Inference: A Computational Approach offers comprehensive chapters on: Introducing Point and Interval Estimation; Goodness of Fit and Hypothesis Testing; Likelihood; Numerical Optimization; Methods of Point Estimation; Q-Q Plots and Distribution Testing; Unbiased Point Estimation and Bias Reduction; Analytic Interval Estimation; Inference in a Heavy-Tailed Context; The Method of Indirect Inference; and, as an appendix, A Review of Fundamental Concepts in Probability Theory, the latter to keep the book self-contained, and giving material on some advanced subjects such as saddlepoint approximations, expected shortfall in finance, calculation with the stable Paretian distribution, and convergence theorems and proofs.

Fundamental Statistical Inference

This book presents a summary of artificial intelligence and machine learning techniques in its first two chapters. The remaining chapters of the book provide everything one must know about the basic artificial intelligence to modern machine intelligence techniques including the hybrid computational intelligence technique, using the concepts of several real-life solved examples, design of projects and research ideas. The solved examples with more than 200 illustrations presented in the book are a great help to instructors, students, non-AI professionals, and researchers. Each example is discussed in detail with encoding, normalization, architecture, detailed design, process flow, and sample input/output. Summary of the fundamental concepts with solved examples is a unique combination and highlight of this book.

Illustrated Computational Intelligence

The first full survey of statistical, topological, data-mining, and ontology-based methods for analyzing protein-protein interaction networks.

Protein Interaction Networks

This is an invaluable five-volume reference on the very broad and highly significant subject of computer aided and integrated manufacturing systems. It is a set of distinctly titled and well-harmonized volumes by leading experts on the international scene. The techniques and technologies used in computer aided and integrated manufacturing systems have produced, and will no doubt continue to produce, major annual improvements in productivity, which is defined as the goods and services produced from each hour of work. This publication deals particularly with more effective utilization of labor and capital, especially information technology systems. Together the five volumes treat comprehensively the major techniques and technologies that are involved.

Computer Aided and Integrated Manufacturing Systems: Computer aided design

This is an invaluable five-volume reference on the very broad and highly significant subject of computer aided and integrated manufacturing systems. It is a set of distinctly titled and well-harmonized volumes by leading experts on the international scene. The techniques and technologies used in computer aided and integrated manufacturing systems have produced, and will no doubt continue to produce, major annual improvements in productivity, which is defined as the goods and services produced from each hour of work. This publication deals particularly with more effective utilization of labor and capital, especially information technology systems. Together the five volumes treat comprehensively the major techniques and technologies that are involved.

Computer Aided and Integrated Manufacturing Systems

Data analysis as an area of importance has grown exponentially, especially during the past couple of decades. This can be attributed to a rapidly growing computer industry and the wide applicability of computational techniques, in conjunction with new advances of analytic tools. This being the case, the

need for literature that addresses this is self-evident. New publications are appearing, covering the need for information from all fields of science and engineering, thanks to the universal relevance of data analysis and statistics packages. This book is a collective work by a number of leading scientists, analysts, engineers, mathematicians and statisticians who have been working at the forefront of data analysis. The chapters included in this volume represent a cross-section of current concerns and research interests in these scientific areas. The material is divided into two parts: Computational Data Analysis, and Classification Data Analysis, with methods for both - providing the reader with both theoretical and applied information on data analysis methods, models and techniques and appropriate applications.

Data Analysis and Applications 3

This book represents Volume II of the Proceedings of the UN/ESA/NASA Workshop on the International Heliophysical Year 2007 and Basic Space Science, hosted by the National Astronomical Observatory of Japan, Tokyo, 18 - 22 June, 2007. It covers two programme topics explored in this and past workshops of this nature: (i) non-extensive statistical mechanics as applicable to astrophysics, addressing q-distribution, fractional reaction and diffusion, and the reaction coefficient, as well as the Mittag-Leffler function and (ii) the TRIPOD concept, developed for astronomical telescope facilities. The companion publication, Volume I of the proceedings of this workshop, is a special issue in the journal Earth, Moon, and Planets, Volume 104, Numbers 1-4, April 2009.

Proceedings of the Third UN/ESA/NASA Workshop on the International Heliophysical Year 2007 and Basic Space Science

Graphs allows us to study the different patterns of inside the data by making a mental image. The aim of this paper is to develop neutrosophic cubic graph structure which is the extension of neutrosophic cubic graphs. As neutrosophic cubic graphs are defined for one set of edges between vertices while neutrosophic cubic graphs structures are defined for more than one set of edges. Further, we defined some basic operations such as Cartesian product, composition, union, join, cross product, strong product and lexicographic product of two neutrosophic cubic graph structures. Several types of other interesting properties of neutrosophic cubic graph structures are discussed in this paper. Finally, a decision-making algorithm based on the idea of neutrosophic cubic graph structures is constructed. The proposed decision-making algorithm is applied in a decision-making problem to check the validity.

Novel Neutrosophic Cubic Graphs Structures with Application in Decision Making Problems

The Handbooks in Finance are intended to be a definitive source for comprehensive and accessible information in the field of finance. Each individual volume in the series should present an accurate self-contained survey of a sub-field of finance, suitable for use by finance and economics professors and lecturers, professional researchers, graduate students and as a teaching supplement. The goal is to have a broad group of outstanding volumes in various areas of finance. The Handbook of Heavy Tailed Distributions in Finance is the first handbook to be published in this series. This volume presents current research focusing on heavy tailed distributions in finance. The contributions cover methodological issues, i.e., probabilistic, statistical and econometric modelling under non- Gaussian assumptions, as well as the applications of the stable and other non -Gaussian models in finance and risk management.

Handbook of Heavy Tailed Distributions in Finance

Data analysis as an area of importance has grown exponentially, especially during the past couple of decades. This can be attributed to a rapidly growing computer industry and the wide applicability of computational techniques, in conjunction with new advances of analytic tools. This being the case, the need for literature that addresses this is self-evident. New publications are appearing, covering the need for information from all fields of science and engineering, thanks to the universal relevance of data analysis and statistics packages. This book is a collective work by a number of leading scientists, analysts, engineers, mathematicians and statisticians who have been working at the forefront of data analysis. The chapters included in this volume represent a cross-section of current concerns and research interests in these scientific areas. The material is divided into three parts: Financial Data Analysis and Methods, Statistics and Stochastic Data Analysis and Methods, and Demographic Methods and Data Analysis- providing the reader with both theoretical and applied information on data analysis methods, models and techniques and appropriate applications.

The fields of computer vision and image processing are constantly evolving as new research and applications in these areas emerge. Staying abreast of the most up-to-date developments in this field is necessary in order to promote further research and apply these developments in real-world settings. Computer Vision and Image Processing in Intelligent Systems and Multimedia Technologies features timely and informative research on the design and development of computer vision and image processing applications in intelligent agents as well as in multimedia technologies. Covering a diverse set of research in these areas, this publication is ideally designed for use by academicians, technology professionals, students, and researchers interested in uncovering the latest innovations in the field.

Computer Vision and Image Processing in Intelligent Systems and Multimedia Technologies