# Neural Algorithm For Solving Differential Equations

LNCS volumes 2073 and 2074 contain the proceedings of the International Conference on Computational Science, ICCS 2001, held in San Francisco, California, May 27-31, 2001. The two volumes consist of more than 230 contributed and invited papers that reflect the aims of the conference to bring together researchers and scientists from mathematics and computer science as basic computing disciplines, researchers from various application areas who are pioneering advanced application of computational methods to sciences such as physics, chemistry, life sciences, and engineering, arts and humanitarian fields, along with software developers and vendors, to discuss problems and solutions in the area, to identify new issues, and to shape future directions for research, as well as to help industrial users apply various advanced computational techniques.

This book consists of select proceedings of the National Conference on Wave Mechanics and Vibrations (WMVC 2018). It covers recent developments and cutting-edge methods in wave mechanics and vibrations applied to a wide range of engineering problems. The book presents analytical and computational studies in structural mechanics, seismology and earthquake engineering, mechanical engineering, aeronautics, robotics and nuclear engineering among others. This book can be useful for students, researchers, and professionals interested in the wide-ranging applications of wave mechanics and vibrations.

Optical Bistability: Controlling Light with Light focuses on optical bistability in nonlinear optical systems. Emphasis is on passive (non-laser) systems that exhibit reversible bistability with input intensity as the hysteresis variable, along with the

physics and the potential applications of such systems for nonlinear optical signal processing. This book consists of seven chapters and begins with a historical overview of optical bistability in lasers and passive systems. The next chapter describes steady-state theories of optical bistability, including the Bonifacio-Lugiato model, as well as the boundary conditions of an optical cavity and the coupled Maxwell-Bloch equations. Both intrinsic and hybrid experiments are then described, along with light-by-light control, pulse reshaping, and external switching. The transient phenomena that arise either from instabilities in the bistable systems themselves or from fluctuations in the number of nonlinear atoms or in the number of intracavity photons are also considered. The final chapter examines the characteristics and fundamental limitations of an ideal device, the prospect of improving devices by identifying giant nonlinearities, and the utilization of the full power of optics by parallel processing. This monograph is intended for new entrants and active workers in the field of optical bistability. This volume comprises the select proceedings of the annual convention of the Computer Society of India. Divided into 10 topical volumes, the proceedings present papers on state-of-the-art research, surveys, and succinct reviews. The volumes cover diverse topics ranging from communications networks to big data analytics, and from system architecture to cyber security. This volume focuses on Nature Inspired Computing. The contents of this book will be useful to researchers and students alike.
This book presents state-of-the-art technical contributions based around one of the most successful evolutionary optimization algorithms published to date: Harmony Search. Contributions span from novel technical derivations of this algorithm to applications in the broad fields of civil engineering, energy, transportation & mobility and health,

among many others and focus not only on its cross-domain applicability, but also on its core evolutionary operators, including elements inspired from other meta-heuristics. The global scientific community is witnessing an upsurge in groundbreaking, new advances in all areas of computational intelligence, with a particular flurry of research focusing on evolutionary computation and bio-inspired optimization. Observed processes in nature and sociology have provided the basis for innovative algorithmic developments aimed at leveraging the inherent capability to adapt characterized by various animals, including ants, fireflies, wolves and humans. However, it is the behavioral patterns observed in music composition that motivated the advent of the Harmony Search algorithm, a meta-heuristic optimization algorithm that over the last decade has been shown to dominate other solvers in a plethora of application scenarios. The book consists of a selection of the best contributions presented at ICHSA, a major biannual event where leading global experts on meta-heuristic optimization present their latest findings and discuss the past, present, and future of the exciting field of Harmony Search optimization. It provides a valuable reference resource for researchers working in the field of optimization meta-heuristics, and a solid technical base for frontline investigations around this algorithm.

This book describes new theories and applications of artificial neural networks, with a special focus on answering questions in neuroscience, biology and biophysics and cognitive research. It covers a wide range of methods and technologies, including deep neural networks, large scale neural models, brain computer interface, signal processing methods, as well as models of perception, studies on emotion recognition, self-organization and many more. The book includes both selected and invited papers presented at the XXI International Conference on Neuroinformatics, held on

October 7-11, 2019, in Dolgoprudny, a town in Moscow region, Russia.

This book introduces a variety of neural network methods for solving differential equations arising in science and engineering. The emphasis is placed on a deep understanding of the neural network techniques, which has been presented in a mostly heuristic and intuitive manner. This approach will enable the reader to understand the working, efficiency and shortcomings of each neural network technique for solving differential equations. The objective of this book is to provide the reader with a sound understanding of the foundations of neural networks and a comprehensive introduction to neural network methods for solving differential equations together with recent developments in the techniques and their applications. The book comprises four major sections. Section I consists of a brief overview of differential equations and the relevant physical problems arising in science and engineering. Section II illustrates the history of neural networks starting from their beginnings in the 1940s through to the renewed interest of the 1980s. A general introduction to neural networks and learning technologies is presented in Section III. This section also includes the description of the multilayer perceptron and its learning methods. In Section IV, the different neural network methods for solving differential equations are introduced, including discussion of the most recent developments in the field. Advanced students and researchers in mathematics, computer science and various disciplines in science and engineering will find this book a valuable reference source. This book gathers the proceedings of the 2018 International Conference on Digital Science (DSIC'18), held in Budva, Montenegro, on October 19 – 21, 2018. DSIC'18 was an international forum for researchers and practitioners to present and discuss the latest innovations, trends, results,

experiences and concerns in Digital Science. The main goal
of the Conference was to efficiently disseminate original
findings in the natural and social sciences, art & the
humanities. The contributions address the following topics:
Digital Agriculture & Food Technology Digital Art &
Humanities Digital Economics Digital Education Digital
Engineering Digital Environmental Sciences Digital Finance,
Business & Banking Digital Health Care, Hospitals &
Rehabilitation Digital Media Digital Medicine, Pharma &
Public Health Digital Public Administration Digital Technology
& Applied Sciences Digital Virtual Reality

This book focuses on computational intelligence
techniques and their applications — fast-growing and
promising research topics that have drawn a great
deal of attention from researchers over the years. It
brings together many different aspects of the current
research on intelligence technologies such as neural
networks, support vector machines, fuzzy logic and
evolutionary computation, and covers a wide range
of applications from pattern recognition and system
modeling, to intelligent control problems and
biomedical applications. Fundamental concepts and
essential analysis of various computational
techniques are presented to offer a systematic and
effective tool for better treatment of different
applications, and simulation and experimental results
are included to illustrate the design procedure and
the effectiveness of the approaches. Sample
Chapter(s) Chapter 1: Maximal Margin Algorithms for
Pose Estimation (658 KB) Contents:Evolutionary

Computation and Its Applications:Maximal Margin
Algorithms for Pose Estimation (Ying Guo and
Jiaming Li)Polynomial Modeling in a Dynamic
Environment Based on a Particle Swarm
Optimization (Kit Yan Chan and Tharam S
Dillon)Restoration of Half-toned Color-quantized
Images Using Particle Swarm Optimization with Multi-
wavelet Mutation (Frank H F Leung, Benny C W
Yeung and Y H Chan)Fuzzy Logics and Their
Applications:Hypoglycemia Detection for Insulin-
dependent Diabetes Mellitus: Evolved Fuzzy
Inference System Approach (S H Ling, P P San and
H T Nguyen)Neural Networks and Their
Applications:Study of Limit Cycle Behavior of
Weights of Perceptron (C Y F Ho and B W K
Ling)Artificial Neural Network Modeling with
Application to Nonlinear Dynamics (Yi Zhao)Solving
Eigen-problems of Matrices by Neural Networks
(Yiguang Liu, Zhisheng You, Bingbing Liu and Jiliu
Zhou)Automated Screw Insertion Monitoring Using
Neural Networks: A Computational Intelligence
Approach to Assembly in Manufacturing (Bruno
Lara, Lakmal D Seneviratne and Kaspar
Althoefer)Support Vector Machines and Their
Applications:On the Applications of Heart Disease
Risk Classification and Hand-written Character
Recognition Using Support Vector Machines (S R
Alty, H K Lam and J Prada)Nonlinear Modeling
Using Support Vector Machine for Heart Rate

Response to Exercise (Weidong Chen, Steven W
Su, Yi Zhang, Ying Guo, Nghir Nguyen, Branko G
Celler and Hung T Nguyen)Machine Learning-based
Nonlinear Model Predictive Control for Heart Rate
Response to Exercise (Yi Zhang, Steven W Su,
Branko G Celler and Hung T Nguyen)Intelligent Fault
Detection and Isolation of HVAC System Based on
Online Support Vector Machine (Davood Dehestani,
Ying Guo, Sai Ho Ling, Steven W Su and Hung T
Nguyen) Readership: Graduates and researchers in
computer science, especially those specialising in
artificial intelligence, neural networks, fuzzy logic and
pattern recognition. Keywords:Evolutionary
Computation;Fuzzy Logic;Neural Networks;Support
Vector MachineKey Features:Covers wide-ranging
applications from pattern recognition, control
systems to biomedical applications. Various
computational techniques are proposed and
presented in detail for the treatment of various
problemsMost of the applications in this book are
real and high impact, such as hypoglycaemia,
detection for diabetes patients, cardio respiratory
response estimation, pattern recognition and pose
estimationAddresses important related problems and
difficulties using the collective experiences and
knowledge from the contributors, who are each
prominent in their own area of research
The ten-volume set LNCS 12949 – 12958 constitutes
the proceedings of the 21st International Conference

on Computational Science and Its Applications, ICCSA 2021, which was held in Cagliari, Italy, during September 13 – 16, 2021. The event was organized in a hybrid mode due to the Covid-19 pandemic.The 466 full and 18 short papers presented in these proceedings were carefully reviewed and selected from 1588 submissions. The books cover such topics as multicore architectures, blockchain, mobile and wireless security, sensor networks, open source software, collaborative and social computing systems and tools, cryptography, applied mathematics human computer interaction, software design engineering, and others. Part IV of the set includes the papers on Urban and Regional Planning and the proceedings of the following workshops: ?International Workshop on Blockchain and Distributed Ledgers: Technologies and Applications (BDLTA 2021); International Workshop on Computational and Applied Mathematics (CAM 2021); International Workshop on Computational and Applied Statistics (CAS 2021); International Workshop on Computerized Evaluation of Economic Activities: Urban Spaces (CEEA 2021).The chapters "Automated Housing Price Valuation and Spatial Data", "Spatial Automated Valuation Model (sAVM) - from the notion of space to the design of an evaluation tool", and "A MCDA/GIS-based approach for evaluating accessibility to health facilities" are published open access under a CC BY license

This book constitutes the refereed post-conference proceedings of 10 workshops held at the 35th International ISC High Performance 2020 Conference, in Frankfurt, Germany, in June 2020: First Workshop on Compiler-assisted Correctness Checking and Performance Optimization for HPC (C3PO); First International Workshop on the Application of Machine Learning Techniques to Computational Fluid Dynamics Simulations and Analysis (CFDML); HPC I/O in the Data Center Workshop (HPC-IODC); First Workshop \Machine Learning on HPC Systems" (MLHPCS); First International Workshop on Monitoring and Data Analytics (MODA); 15th Workshop on Virtualization in High-Performance Cloud Computing (VHPC). The 25 full papers included in this volume were carefully reviewed and selected. They cover all aspects of research, development, and application of large-scale, high performance experimental and commercial systems. Topics include high-performance computing (HPC), computer architecture and hardware, programming models, system software, performance analysis and modeling, compiler analysis and optimization techniques, software sustainability, scientific applications, deep learning.
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.
"Differential equations play a vital role in the fields of

engineering and science. Problems in engineering and science can be modeled using ordinary or partial differential equations. Analytical solutions of differential equations may not be obtained easily, so numerical methods have been developed to handle them. Machine intelligence methods, such as Artificial Neural Networks (ANN), are being used to solve differential equations, and these methods are presented in Artificial Neural Networks for Engineers and Scientists: Solving Ordinary Differential Equations. This book shows how computation of differential equation becomes faster once the ANN model is properly developed and applied."--Provided by publisher.

An Introduction to Neural Network Methods for Differential EquationsSpringer

In today's modernized market, various disciplines continue to search for universally functional technologies that improve upon traditional processes. Artificial neural networks are a set of statistical modeling tools that are capable of processing nonlinear data with strong accuracy. Due to their complexity, utilizing their potential was previously seen as a challenge. However, with the development of artificial intelligence, this technology has proven to be an effective and efficient problem-solving method. Artificial Neural Network Applications in Business and Engineering is an essential reference source that illustrates recent

advancements of artificial neural networks in various professional fields, accompanied by specific case studies and practical examples. Featuring research on topics such as training algorithms, transportation, and computer security, this book is ideally designed for researchers, students, developers, managers, engineers, academicians, industrialists, policymakers, and educators seeking coverage on modern trends in artificial neural networks and their real-world implementations.

This book constitutes the refereed proceedings of the International Conference on Logic, Information, Control and Computation, ICLICC 2011, held in Gandhigram, India, in February 2011. The 52 revised full papers presented were carefully reviewed and selected from 278 submissions. The papers are organized in topical sections on control theory and its real time applications, computational mathematics and its application to various fields, and information sciences focusing on image processing and neural networks.

Brings mathematics to bear on your real-world, scientific problems Mathematical Methods in Interdisciplinary Sciences provides a practical and usable framework for bringing a mathematical approach to modelling real-life scientific and technological problems. The collection of chapters Dr. Snehashish Chakraverty has provided describe in detail how to bring mathematics, statistics, and computational methods to the fore to solve even the most stubborn problems involving the intersection of multiple fields of study. Graduate

students, postgraduate students, researchers, and professors will all benefit significantly from the author's clear approach to applied mathematics. The book covers a wide range of interdisciplinary topics in which mathematics can be brought to bear on challenging problems requiring creative solutions. Subjects include: Structural static and vibration problems Heat conduction and diffusion problems Fluid dynamics problems The book also covers topics as diverse as soft computing and machine intelligence. It concludes with examinations of various fields of application, like infectious diseases, autonomous car and monotone inclusion problems. Semi-empirical Neural Network Modeling presents a new approach on how to quickly construct an accurate, multilayered neural network solution of differential equations. Current neural network methods have significant disadvantages, including a lengthy learning process and single-layered neural networks built on the finite element method (FEM). The strength of the new method presented in this book is the automatic inclusion of task parameters in the final solution formula, which eliminates the need for repeated problem-solving. This is especially important for constructing individual models with unique features. The book illustrates key concepts through a large number of specific problems, both hypothetical models and practical interest. Offers a new approach to neural networks using a unified simulation model at all stages of design and operation Illustrates this new approach with numerous concrete examples throughout the book Presents the methodology in separate and clearly-defined stages

Nowadays mathematical modeling and numerical simulations play an important role in life and natural science. Numerous researchers are working in developing different methods and techniques to help understand the behavior of very complex systems, from the brain activity with real importance in

medicine to the turbulent flows with important applications in physics and engineering. This book presents an overview of some models, methods, and numerical computations that are useful for the applied research scientists and mathematicians, fluid tech engineers, and postgraduate students.

The aim of this B is to design fast thesisd forward neural networks to present a method to solve initial value problem for ordinary differential equations. That is to develop an algorithm which can speedup the solution times, reduce solver failures, and increase possibility of obtaining the globally optimal solution. The applicability of this approach ranges from single ordinary differential equations, to systems of ordinary differential equations with initial condition . Also, a variant types of compute the search direction k of conjugate gradient training algorithm are introduced and we describing several different training algorithms, many modified and new algorithms have been proposed for training Feed Forward Neural Network(FFNN), many of them having a very fast convergence rate for reasonable size networks. In all of these algorithms we use the gradient of the performance function( energy function) to determine how to adjust the weights such that the performance function is minimized, where the back propagation algorithm has been used to increase the speed of training. Finally, we illustrate the method by solving a variety of model problems."

This book describes new theories and applications of artificial neural networks, with a special focus on addressing problems in neuroscience, biology and biophysics and cognitive research. It covers a wide range of methods and technologies, including deep neural networks, large-scale neural models, brain–computer interface, signal processing methods, as well as models of perception, studies on emotion recognition, self-organization and many more. The book includes both selected and invited papers presented at the

XX International Conference on Neuroinformatics, held in Moscow, Russia on October 8–12, 2018.

This book is the second of a two-volume set that constitutes the refereed proceedings of the 17th International Conference on Artificial Neural Networks, ICANN 2007. It features contributions related to computational neuroscience, neurocognitive studies, applications in biomedicine and bioinformatics, pattern recognition, self-organization, text mining and internet applications, signal and times series processing, vision and image processing, robotics, control, and more.

An original, systematic-solution approach to uncertain nonlinear systems control and modeling using fuzzy equations and fuzzy differential equations There are various numerical and analytical approaches to the modeling and control of uncertain nonlinear systems. Fuzzy logic theory is an increasingly popular method used to solve inconvenience problems in nonlinear modeling. Modeling and Control of Uncertain Nonlinear Systems with Fuzzy Equations and Z-Number presents a structured approach to the control and modeling of uncertain nonlinear systems in industry using fuzzy equations and fuzzy differential equations. The first major work to explore methods based on neural networks and Bernstein neural networks, this innovative volume provides a framework for control and modeling of uncertain nonlinear systems with applications to industry. Readers learn how to use fuzzy techniques to solve scientific and engineering problems and understand intelligent control design and applications. The text assembles the results of four years of research on control of uncertain nonlinear systems with dual fuzzy equations, fuzzy modeling for uncertain nonlinear systems with fuzzy equations, the numerical solution of fuzzy equations with Z-numbers, and the numerical solution of fuzzy differential equations with Z-numbers. Using clear and

accessible language to explain concepts and principles
applicable to real-world scenarios, this book: Presents the
modeling and control of uncertain nonlinear systems with
fuzzy equations and fuzzy differential equations Includes an
overview of uncertain nonlinear systems for non-specialists
Teaches readers to use simulation, modeling and verification
skills valuable for scientific research and engineering systems
development Reinforces comprehension with illustrations,
tables, examples, and simulations Modeling and Control of
Uncertain Nonlinear Systems with Fuzzy Equations and Z-
Number is suitable as a textbook for advanced students,
academic and industrial researchers, and practitioners in
fields of systems engineering, learning control systems,
neural networks, computational intelligence, and fuzzy logic
control.
Written by experts in the field, this book, "Boundary Layer
Flows - Theory, Applications, and Numerical Methods"
provides readers with the opportunity to explore its theoretical
and experimental studies and their importance to the
nonlinear theory of boundary layer flows, the theory of heat
and mass transfer, and the dynamics of fluid. With the
theory's importance for a wide variety of applications, applied
mathematicians, scientists, and engineers - especially those
in fluid dynamics - along with engineers of aeronautics, will
undoubtedly welcome this authoritative, up-to-date book.
The Proceedings of SocProS 2014 serves as an
academic bonanza for scientists and researchers
working in the field of Soft Computing. This book
contains theoretical as well as practical aspects using
fuzzy logic, neural networks, evolutionary algorithms,
swarm intelligence algorithms, etc., with many
applications under the umbrella of 'Soft Computing'.
The book is beneficial for young as well as experienced

researchers dealing across complex and intricate real
world problems for which finding a solution by traditional
methods is a difficult task. The different application areas
covered in the Proceedings are: Image Processing,
Cryptanalysis, Industrial Optimization, Supply Chain
Management, Newly Proposed Nature Inspired
Algorithms, Signal Processing, Problems related to
Medical and Healthcare, Networking Optimization
Problems, etc.

The aim of this book is to handle different application
problems of science and engineering using expert
Artificial Neural Network (ANN). As such, the book starts
with basics of ANN along with different mathematical
preliminaries with respect to algebraic equations. Then it
addresses ANN based methods for solving different
algebraic equations viz. polynomial equations,
diophantine equations, transcendental equations, system
of linear and nonlinear equations, eigenvalue problems
etc. which are the basic equations to handle the
application problems mentioned in the content of the
book. Although there exist various methods to handle
these problems, but sometimes those may be problem
dependent and may fail to give a converge solution with
particular discretization. Accordingly, ANN based
methods have been addressed here to solve these
problems. Detail ANN architecture with step by step
procedure and algorithm have been included. Different
example problems are solved with respect to various
application and mathematical problems. Convergence
plots and/or convergence tables of the solutions are
depicted to show the efficacy of these methods. It is

worth mentioning that various application problems viz. Bakery problem, Power electronics applications, Pole placement, Electrical Network Analysis, Structural engineering problem etc. have been solved using the ANN based methods.

This book is the proceedings of the Third Annual Conference on Fuzzy Information and Engineering (ACFIE2008) from Dec. 5-10, 2008 in Haikou, China. The conf- ence proceedingsis published by Springer-Verlag(Advancesin Soft Computing,ISSN: 1615-3871). This year, we have received 155 submissions. Each paper has undergone a rigorous review process. Only high-quality papers are included. The Third Annual Conference on Fuzzy Information and Engineering (ACFIE2008), built on the success of previous conferences,the ACFIE2005 (Guangzhou,China), is a major symposium for scientists, engineers and practitioners in China to present their updated results, ideas, devel- ments and applications in all areas of fuzzy information and engineering. It aims to strengthen relations between industry research laboratoriesand universities, and to c- ate a primary symposium for world scientists in fuzzy ?elds as follows: 1) Fuzzy intelligence, neural networks and optimal; 2) Fuzzy algebra; 3) Fuzzy analysis; 4) Fuzzy systems and logic; 5) Fuzzy topology and measure; 6)Fuzzy probability, control, forecasting and decision-making; 7) Fuzzy clustering and fuzzy algorithms; 8) Application in fuzzy sets; 9) Rough sets and its application; etc. This book contains 80 papers, divided into nine main parts: In Section I, we have 9 papers on "fuzzy intelligence, neural networks and

optimal". In Section II, we have 11 papers on "fuzzy algebra". In Section III, we have 9 papers on "fuzzy analysis". In Section IV, we have 9 papers on "fuzzy systems and logic". In Section V, we have 9 papers on "fuzzy topology and measure".

This book describes different mathematical modeling and soft computing techniques used to solve practical engineering problems. It gives an overview of the current state of soft computing techniques and describes the advantages and disadvantages of soft computing compared to traditional hard computing techniques. Through examples and case studies the editors demonstrate and describe how problems with inherent uncertainty can be addressed and eventually solved through the aid of numerical models and methods. The chapters address several applications and examples in bioengineering science, drug delivery, solving inventory issues, Industry 4.0, augmented reality and weather forecasting. Other examples include solving fuzzy-shortest-path problems by introducing a new distance and ranking functions. Because, in practice, problems arise with uncertain data and most of them cannot be solved exactly and easily, the main objective is to develop models that deliver solutions with the aid of numerical methods. This is the reason behind investigating soft numerical computing in dynamic systems. Having this in mind, the authors and editors have considered error of approximation and have discussed several common types of errors and their propagations. Moreover, they have explained the numerical methods, along with convergence and

consistence properties and characteristics, as the main objectives behind this book involve considering, discussing and proving related theorems within the setting of soft computing. This book examines dynamic models, and how time is fundamental to the structure of the model and data as well as the understanding of how a process unfolds • Discusses mathematical modeling with soft computing and the implementations of uncertain mathematical models • Examines how uncertain dynamic systems models include uncertain state, uncertain state space and uncertain state's transition functions • Assists readers to become familiar with many soft numerical methods to simulate the solution function's behavior This book is intended for system specialists who are interested in dynamic systems that operate at different time scales. The book can be used by engineering students, researchers and professionals in control and finite element fields as well as all engineering, applied mathematics, economics and computer science interested in dynamic and uncertain systems. Ali Ahmadian is a Senior Lecturer at the Institute of IR 4.0, The National University of Malaysia. Soheil Salahshour is an associate professor at Bahcesehir University.

This book aims to promote a sample of current theoretical and application oriented intelligent systems research specifically in the field of neural networks computing. It presents examples of experimental and real-world investigations that demonstrate contemporary achievements and advances in the area of intelligent systems. This book will prove as a valuable source of up-

to-date theoretical and application oriented research in intelligent systems for researchers and postgraduate students.

This book constitutes the refereed proceedings of the Third International Conference on Convergent Cognitive Information Technologies, Convergent 2018, held in Moscow, Russia, in December 2018. The 26 revised full papers and 9 short papers were carefully reviewed and selected from 147 submissions. The papers of this volume are organized in topical sections on theoretical questions of computer science, computational mathematics, computer science and cognitive information technologies; cognitive information technologies in control systems; big data and applications; the Internet of Things (IoT): standards, communication and information technologies, network applications; smart cities: standards, cognitive-information technologies and their applications.- cognitive information technologies in the digital economics.- digital transformation of transport.

This book introduces a variety of neural network methods for solving differential equations arising in science and engineering. The emphasis is placed on a deep understanding of the neural network techniques, which has been presented in a mostly heuristic and intuitive manner. This approach will enable the reader to understand the working, efficiency and shortcomings of each neural network technique for solving differential equations. The objective of this book is to provide the reader with a sound understanding of the foundations of neural networks, and a comprehensive introduction to

neural network methods for solving differential equations together with recent developments in the techniques and their applications. The book comprises four major sections. Section I consists of a brief overview of differential equations and the relevant physical problems arising in science and engineering. Section II illustrates the history of neural networks starting from their beginnings in the 1940s through to the renewed interest of the 1980s. A general introduction to neural networks and learning technologies is presented in Section III. This section also includes the description of the multilayer perceptron and its learning methods. In Section IV, the different neural network methods for solving differential equations are introduced, including discussion of the most recent developments in the field. Advanced students and researchers in mathematics, computer science and various disciplines in science and engineering will find this book a valuable reference source.

The 2010 Asian Conference on Intelligent Information and Database Systems (ACIIDS) was the second event of the series of international scientific conferences for research and applications in the field of intelligent information and database systems. The aim of ACIIDS 2010 was to provide an international forum for scientific research in the technologies and applications of intelligent information, database systems and their applications. ACIIDS 2010 was co-organized by Hue University (Vietnam) and Wroclaw University of Technology (Poland) and took place in Hue city (Vietnam) during March 24–26, 2010. We received

almost 330 papers from 35 countries. Each paper was peer reviewed by at least two members of the International Program Committee and International Reviewer Board. Only 96 best papers were selected for oral presentation and publi- tion in the two volumes of the ACIIDS 2010 proceedings. The papers included in the proceedings cover the following topics: artificial social systems, case studies and reports on deployments, collaborative learning, collaborative systems and applications, data warehousing and data mining, database management technologies, database models and query languages, database security and integrity,- business, e-commerce, e-finance, e-learning systems, information modeling and - quirements engineering, information retrieval systems, intelligent agents and mul- agent systems, intelligent information systems, intelligent internet systems, intelligent optimization techniques, object-relational DBMS, ontologies and information sharing, semi-structured and XML database systems, unified modeling language and unified processes, Web services and Semantic Web, computer networks and communication systems. Differential equations play a vital role in the fields of engineering and science. Problems in engineering and science can be modeled using ordinary or partial differential equations. Analytical solutions of differential equations may not be obtained easily, so numerical methods have been developed to handle them. Machine intelligence methods, such as Artificial Neural Networks (ANN), are being used to solve differential equations, and these methods are presented in Artificial Neural

Networks for Engineers and Scientists: Solving Ordinary Differential Equations. This book shows how computation of differential equation becomes faster once the ANN model is properly developed and applied. The constant evolution of the calculation capacity of the modern computers implies in a permanent effort to adjust the existing numerical codes, or to create new codes following new points of view, aiming to adequately simulate fluid flows and the related transport of physical properties. Additionally, the continuous improving of laboratory devices and equipment, which allow to record and measure fluid flows with a higher degree of details, induces to elaborate specific experiments, in order to shed light in unsolved aspects of the phenomena related to these flows. This volume presents conclusions about different aspects of calculated and observed flows, discussing the tools used in the analyses. It contains eighteen chapters, organized in four sections: 1) Smoothed Spheres, 2) Models and Codes in Fluid Dynamics, 3) Complex Hydraulic Engineering Applications, 4) Hydrodynamics and Heat/Mass Transfer. The chapters present results directed to the optimization of the methods and tools of Hydrodynamics. This book presents the proceedings of the 24th European Conference on Artificial Intelligence (ECAI 2020), held in Santiago de Compostela, Spain, from 29 August to 8 September 2020. The conference was postponed from June, and much of it conducted online due to the COVID-19 restrictions. The conference is one of the principal occasions for researchers and practitioners of AI to meet and discuss the latest trends

and challenges in all fields of AI and to demonstrate innovative applications and uses of advanced AI technology. The book also includes the proceedings of the 10th Conference on Prestigious Applications of Artificial Intelligence (PAIS 2020) held at the same time. A record number of more than 1,700 submissions was received for ECAI 2020, of which 1,443 were reviewed. Of these, 361 full-papers and 36 highlight papers were accepted (an acceptance rate of 25% for full-papers and 45% for highlight papers). The book is divided into three sections: ECAI full papers; ECAI highlight papers; and PAIS papers. The topics of these papers cover all aspects of AI, including Agent-based and Multi-agent Systems; Computational Intelligence; Constraints and Satisfiability; Games and Virtual Environments; Heuristic Search; Human Aspects in AI; Information Retrieval and Filtering; Knowledge Representation and Reasoning; Machine Learning; Multidisciplinary Topics and Applications; Natural Language Processing; Planning and Scheduling; Robotics; Safe, Explainable, and Trustworthy AI; Semantic Technologies; Uncertainty in AI; and Vision. The book will be of interest to all those whose work involves the use of AI technology. This two-volume set LNCS 11554 and 11555 constitutes the refereed proceedings of the 16th International Symposium on Neural Networks, ISNN 2019, held in Moscow, Russia, in July 2019. The 111 papers presented in the two volumes were carefully reviewed and selected from numerous submissions. The papers were organized in topical sections named: Learning System, Graph Model, and Adversarial Learning; Time

Series Analysis, Dynamic Prediction, and Uncertain Estimation; Model Optimization, Bayesian Learning, and Clustering; Game Theory, Stability Analysis, and Control Method; Signal Processing, Industrial Application, and Data Generation; Image Recognition, Scene Understanding, and Video Analysis; Bio-signal, Biomedical Engineering, and Hardware.

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