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Computational Intelligence Paradigms for Optimization Problems Using **MATLAB®/SIMULINK®**



CRC Press
Taylor & Francis Group

Book Computational Intelligence Paradigms

Optimization Simulink

S. Sumathi, Surekha Paneerselvam

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Computational Intelligence Paradigms for Optimization Problems Using MATLAB®/SIMULINK® S. Sumathi,L. Ashok Kumar,Surekha. P,2018-09-03 Considered one of the most innovative research directions computational intelligence CI embraces techniques that use global search optimization machine learning approximate reasoning and connectionist systems to develop efficient robust and easy to use solutions amidst multiple decision variables complex constraints and tumultuous environments CI techniques involve a combination of learning adaptation and evolution used for intelligent applications Computational Intelligence Paradigms for Optimization Problems Using MATLAB Simulink explores the performance of CI in terms of knowledge representation adaptability optimality and processing speed for different real world optimization problems Focusing on the practical implementation of CI techniques this book Discusses the role of CI paradigms in engineering applications such as unit commitment and economic load dispatch harmonic reduction load frequency control and automatic voltage regulation job shop scheduling multidepot vehicle routing and digital image watermarking Explains the impact of CI on power systems control systems industrial automation and image processing through the above mentioned applications Shows how to apply CI algorithms to constraint based optimization problems using MATLAB m files and Simulink models Includes experimental analyses and results of test systems Computational Intelligence Paradigms for Optimization Problems Using MATLAB Simulink provides a valuable reference for industry professionals and advanced undergraduate postgraduate and research students

Computational Intelligence Paradigms for Optimization Problems Using MATLAB®/SIMULINK® S. Sumathi,L. Ashok Kumar,Surekha. P,2018-09-03 Considered one of the most innovative research directions computational intelligence CI embraces techniques that use global search optimization machine learning approximate reasoning and connectionist systems to develop efficient robust and easy to use solutions amidst multiple decision variables complex constraints and tumultuous environments CI techniques involve a combination of learning adaptation and evolution used for intelligent applications Computational Intelligence Paradigms for Optimization Problems Using MATLAB Simulink explores the performance of CI in terms of knowledge representation adaptability optimality and processing speed for different real world optimization problems Focusing on the practical implementation of CI techniques this book Discusses the role of CI paradigms in engineering applications such as unit commitment and economic load dispatch harmonic reduction load frequency control and automatic voltage regulation job shop scheduling multidepot vehicle routing and digital image watermarking Explains the impact of CI on power systems control systems industrial automation and image processing through the above mentioned applications Shows how to apply CI algorithms to constraint based optimization problems using MATLAB m files and Simulink models Includes experimental analyses and results of test systems Computational Intelligence Paradigms for Optimization Problems Using MATLAB Simulink provides a valuable reference for industry professionals and advanced undergraduate postgraduate and research students

Proceedings of International Conference on Artificial Intelligence, Smart Grid and Smart City Applications L. Ashok Kumar,L. S. Jayashree,R. Manimegalai,2020-03-12 Due to the complexity and heterogeneity of the smart grid and the high volume of information to be processed artificial intelligence techniques and computational intelligence appear to be some of the enabling technologies for its future development and success The theme of the book is Making pathway for the grid of future with the emphasis on trends in Smart Grid renewable interconnection issues planning operation control and reliability of grid real time monitoring and protection market distributed generation and power distribution issues power electronics applications computer IT and signal processing applications power apparatus power engineering education and industry institute collaboration The primary objective of the book is to review the current state of the art of the most relevant artificial intelligence techniques applied to the different issues that arise in the smart grid development

Computational Intelligence Paradigms S. Sumathi,Surekha Panneerselvam,2010-01-05 Offering a wide range of programming examples implemented in MATLAB Computational Intelligence Paradigms Theory and Applications Using MATLAB presents theoretical concepts and a general framework for computational intelligence CI approaches including artificial neural networks fuzzy systems evolutionary computation genetic algorithms and pr

Optimal Power Flow Using FACTS Devices L. Ashok Kumar,K. Mohana Sundaram,2020-12-03 Optimal Power Flow Using FACTS Devices Soft Computing Techniques develops intelligent algorithms to analyze optimal power flow OPF and to enhance the power transfer capability of the transmission line with reduced congestion By providing elaborate studies on FACTS devices and by using soft computing metaheuristics algorithms such as Firefly Cuckoo Flower Pollination and others this book enables readers to know about algorithms in real time power system applications and damping of subsynchronous resonance SSR oscillations Key features of this book include Offers comprehensive review of FACTS devices and the importance of soft computing techniques for solving OPF Describes the various problems associated with power system operation and control Addresses issues of SSR in power systems and proposes soft techniques for SSR analysis in power systems Demonstrates of the importance of SSR and congestion management using intelligent FACTS devices as part of OPF Covers power systems reliability quality cost effectiveness effects on customer goodwill and pollution limits including the deregulation of markets and different intelligent controllers Optimal Power Flow Using FACTS Devices Soft Computing Techniques is aimed at researchers and professionals in the field of power systems

Software Tools for the Simulation of Electrical Systems L. Ashok Kumar,V. Indragandhi,Uma Y. Maheswari,2020-08-08 Simulation of Software Tools for Electrical Systems Theory and Practice offers engineers and students what they need to update their understanding of software tools for electric systems along with guidance on a variety of tools on which to model electrical systems from device level to system level The book uses MATLAB PSIM Pspice and PSCAD to discuss how to build simulation models of electrical systems that assist in the practice or implementation of simulation software tools in switches circuits controllers instruments and automation system design In addition the book

covers power electronic switches and FACTS controller device simulation model building with the use of Labview and PLC for industrial automation process control monitoring and measurement in electrical systems and hybrid optimization software HOMER is presented for researchers in renewable energy systems Includes interactive content for numerical computation visualization and programming for learning the software tools related to electrical sciences Identifies complex and difficult topics illustrated by useable examples Analyzes the simulation of electrical systems hydraulic and pneumatic systems using different software including MATLAB LABVIEW MULTISIM AUTOSIM and PSCAD

Power Converters for Electric

Vehicles L. Ashok Kumar,S. Albert Alexander,2020-12-10 Power Converters for Electric Vehicles gives an overview topology design and simulation of different types of converters used in electric vehicles EV It covers a wide range of topics ranging from the fundamentals of EV Hybrid EV and its stepwise approach simulation of the proposed converters for real time applications and corresponding experimental results performance improvement paradigms and overall analysis Drawing upon the need for novel converter topologies this book provides the complete solution for the power converters for EV applications along with simulation exercises and experimental results It explains the need for power electronics in the improvement of performance in EV This book Presents exclusive information on the power electronics of EV including traction drives Provides step by step procedure for converter design Discusses various topologies having different isolated and non isolated converters Describes control circuit design including renewable energy systems and electrical drives Includes practical case studies incorporated with simulation and experimental results Power Converters for Electric Vehicles will provide researchers and graduate students in Power Electronics Electric Drives Vehicle Engineering a useful resource for stimulating their efforts in this important field of the search for renewable technologies

Automation in Textile

Machinery L. Ashok Kumar,M Senthil kumar,2018-03-20 Automation is the use of various control systems for operating equipment such as machinery and processes In line this book deals with comprehensive analysis of the trends and technologies in automation and control systems used in textile engineering The control systems descript in all chapters is to dissect the important components of an integrated control system in spinning weaving knitting chemical processing and garment industries and then to determine if and how the components are converging to provide manageable and reliable systems throughout the chain from fiber to the ultimate customer Key Features Describes the design features of machinery for operating various textile machineries in product manufacturing Covers the fundamentals of the instrumentation and control engineering used in textile machineries Illustrates sensors and basic elements for textile automation Highlights the need of robotics in textile engineering Reviews the overall idea and scope of research in designing textile machineries

Power Electronic Converters for Solar Photovoltaic Systems L. Ashok Kumar,S.Albert Alexander,Madhuvanthani Rajendran,2020-11-01 Power Electronic Converters for Solar Photovoltaic Systems provides design and implementation procedures for power electronic converters and advanced controllers to improve standalone and grid environment solar

photovoltaics performance Sections cover performance and improvement of solar photovoltaics under various conditions with the aid of intelligent controllers allowing readers to better understand the nuances of power electronic converters for renewable energy systems With algorithm development and real time implementation procedures this reference is useful for those interested in power electronics for performance improvement in distributed energy resources design of advanced controllers and measurement of critical parameters surrounding renewable energy systems By providing a complete solution for performance improvement in solar PV with novel control techniques this book will appeal to researchers and engineers working in power electronic converters renewable energy and power quality Includes simulation studies and photovoltaic performance analysis Uses case studies as a reference for design and research Covers different varieties of power converters from fundamentals to implementation

MATLAB Handbook with Applications to Mathematics, Science,

Engineering, and Finance Jose Miguel David Baez-Lopez,David Alfredo Baez Villegas,2019-01-21 The purpose of this handbook is to allow users to learn and master the mathematics software package MATLAB as well as to serve as a quick reference to some of the most used instructions in the package A unique feature of this handbook is that it can be used by the novice and by experienced users alike For experienced users it has four chapters with examples and applications in engineering finance physics and optimization Exercises are included along with solutions available for the interested reader on the book s web page These exercises are a complement for the interested reader who wishes to get a deeper understanding of MATLAB Features Covers both MATLAB and introduction to Simulink Covers the use of GUIs in MATLAB and Simulink Offers downloadable examples and programs from the handbook s website Provides an introduction to object oriented programming using MATLAB Includes applications from many areas Includes the realization of executable files for MATLAB programs and Simulink models

Neuro-fuzzy and Soft Computing Jyh-Shing Roger Jang,Chuen-Tsai Sun,Eiji Mizutani,1997

Neuro Fuzzy and Soft Computing provides the first comprehensive treatment of the constituent methodologies underlying neuro fuzzy and soft computing an evolving branch of computational intelligence The constituent methodologies include fuzzy set theory neural networks data clustering techniques and several stochastic optimization methods that do not require gradient information In particular the authors put equal emphasis on theoretical aspects of covered methodologies as well as empirical observations and verifications of various applications in practice The book is well suited for use as a text for courses on computational intelligence and as a single reference source for this emerging field To help readers understand the material the presentation includes more than 50 examples more than 150 exercises over 300 illustrations and more than 150 Matlab scripts In addition Matlab is utilized to visualize the processes of fuzzy reasoning neural network learning neuro fuzzy integration and training and gradient free optimization such as genetic algorithms simulated annealing random search and downhill Simplex method The presentation also makes use of SIMULINK for neuro fuzzy control system simulations All Matlab scripts used in the book are available on the free companion software disk that may be ordered by using the enclosed

reply card The book also contains an Internet Resource Page to point the reader to on line neuro fuzzy and soft computing home pages publications public domain software research institutes news groups etc All the HTTP and FTP addresses are available as a bookmark file on the companion software disk [The British National Bibliography](#) Arthur James Wells,1996

Computational Intelligence Nazmul Siddique,Hojjat Adeli,2013-05-06 Computational Intelligence Synergies of Fuzzy Logic Neural Networks and Evolutionary Computing presents an introduction to some of the cutting edge technological paradigms under the umbrella of computational intelligence Computational intelligence schemes are investigated with the development of a suitable framework for fuzzy logic neural networks and evolutionary computing neuro fuzzy systems evolutionary fuzzy systems and evolutionary neural systems Applications to linear and non linear systems are discussed with examples Key features Covers all the aspects of fuzzy neural and evolutionary approaches with worked out examples MATLAB exercises and applications in each chapter Presents the synergies of technologies of computational intelligence such as evolutionary fuzzy neural fuzzy and evolutionary neural systems Considers real world problems in the domain of systems modelling control and optimization Contains a foreword written by Lotfi Zadeh Computational Intelligence Synergies of Fuzzy Logic Neural Networks and Evolutionary Computing is an ideal text for final year undergraduate postgraduate and research students in electrical control computer industrial and manufacturing engineering

Soft Computing for Hybrid Intelligent Systems Oscar Castillo,Patricia Melin,Witold Pedrycz,2008-09-10 We describe in this book new methods and applications of hybrid intelligent systems using soft computing techniques Soft Computing SC consists of several intelligent computing paradigms including fuzzy logic neural networks and evolutionary al rithms which can be used to produce powerful hybrid intelligent systems The book is organized in five main parts which contain a group of papers around a similar subject The first part consists of papers with the main theme of intelligent control which are basically papers that use hybrid systems to solve particular problems of control The second part contains papers with the main theme of pattern recognition which are basically papers using soft computing techniques for achieving pattern recognition in different applications The third part contains papers with the themes of intelligent agents and social systems which are papers that apply the ideas of agents and social behavior to solve real world problems The fourth part contains papers that deal with the hardware implementation of intelligent systems for solving particular problems The fifth part contains papers that deal with modeling simulation and optimization for real world applications

Soft Computing for Intelligent Control and Mobile Robotics Oscar Castillo,Witold Pedrycz,2010-10-05 This book describes in a detailed fashion the application of hybrid intelligent systems using soft computing techniques for intelligent control and mobile robotics Soft Computing SC consists of several intelligent computing paradigms including fuzzy logic neural networks and bio inspired optimization algorithms which can be used to produce powerful hybrid intelligent systems The prudent combination of SC techniques can produce powerful hybrid intelligent systems that are capable of solving real world problems This is illustrated in this book with a wide range of

applications with particular emphasis in intelligent control and mobile robotics The book is organized in five main parts which contain a group of papers around a similar subject The first part consists of papers with the main theme of theory and algorithms which are basically papers that propose new models and concepts which can be the basis for achieving intelligent control and mobile robotics The second part contains papers with the main theme of intelligent control which are basically papers using bio inspired techniques like evolutionary algorithms and neural networks for achieving intelligent control of non linear plants The third part contains papers with the theme of optimization of fuzzy controllers which basically consider the application of bio inspired optimization methods to automate the de sign process of optimal type 1 and type 2 fuzzy controllers The fourth part contains papers that deal with the application of SC techniques in times series prediction and intelligent agents The fifth part contains papers with the theme of computer vision and robotics which are papers considering soft computing methods for applications related to vision and robotics

Evolutionary Design of Intelligent Systems in Modeling, Simulation and Control Oscar Castillo, Witold Pedrycz, 2009-10-09 We describe in this book new methods for evolutionary design of intelligent systems using soft computing and their applications in modeling simulation and control. Soft Computing SC consists of several intelligent computing paradigms including fuzzy logic, neural networks and evolutionary algorithms which can be used to produce powerful hybrid intelligent systems. The book is organized in four main parts which contain a group of papers around a similar subject. The first part consists of papers with the main theme of evolutionary design of fuzzy systems in intelligent control which consists of papers that propose new methods for designing and optimizing intelligent controllers for different applications. The second part contains papers with the main theme of evolutionary design of intelligent systems for pattern recognition applications which are basically papers using evolutionary algorithms for optimizing modular neural networks with fuzzy systems for response tegration for achieving pattern recognition in different applications. The third part contains papers with the themes of models for learning and social simulation which are papers that apply intelligent systems to the problems of designing learning jects and social agents. The fourth part contains papers that deal with intelligent systems in robotics applications and hardware implementations. In the part of Intelligent Control there are 5 papers that describe different c tributions on evolutionary optimization of fuzzy systems in intelligent control. The first paper by Ricardo Martinez Marroquin et al Applied Computational Intelligence and Soft Computing in Engineering Khalid, Saifullah, 2017-09-13 Although computational intelligence and soft computing are both well known fields using computational intelligence and soft computing in conjunction is an emerging concept. This combination can effectively be used in practical areas of various fields of research. Applied Computational Intelligence and Soft Computing in Engineering is an essential reference work featuring the latest scholarly research on the concepts, paradigms and algorithms of computational intelligence and its constituent methodologies such as evolutionary computation, neural networks and fuzzy logic. Including coverage on a broad range of topics and perspectives such as cloud computing.

sampling in optimization and swarm intelligence this publication is ideally designed for engineers academicians technology developers researchers and students seeking current research on the benefits of applying computational intelligence techniques to engineering and technology

Computational Intelligence in Sustainable Reliability Engineering S. C.

Malik,Deepak Sinwar,Ashish Kumar,S. R. Gadde,Prasenjit Chatterjee,Bui Thanh Hung,2023-03-28 COMPUTATIONAL INTELLIGENCE IN SUBSTAINABLE RELIABILITY ENGINEERING The book is a comprehensive guide on how to apply computational intelligence techniques for the optimization of sustainable materials and reliability engineering This book focuses on developing and evolving advanced computational intelligence algorithms for the analysis of data involved in reliability engineering material design and manufacturing to ensure sustainability Computational Intelligence in Sustainable Reliability Engineering unveils applications of different models of evolutionary algorithms in the field of optimization and solves the problems to help the manufacturing industries Some special features of this book include a comprehensive guide for utilizing computational models for reliability engineering state of the art swarm intelligence methods for solving manufacturing processes and developing sustainable materials high quality and innovative research contributions and a guide for applying computational optimization on reliability and maintainability theory The book also includes dedicated case studies of real life applications related to industrial optimizations Audience Researchers industry professionals and post graduate students in reliability engineering manufacturing materials and design

Recent Advances on Hybrid

Approaches for Designing Intelligent Systems Oscar Castillo,Patricia Melin,Witold Pedrycz,Janusz Kacprzyk,2016-09-03

This book describes recent advances on hybrid intelligent systems using soft computing techniques for diverse areas of application such as intelligent control and robotics pattern recognition time series prediction and optimization complex problems Soft Computing SC consists of several intelligent computing paradigms including fuzzy logic neural networks and bio inspired optimization algorithms which can be used to produce powerful hybrid intelligent systems The book is organized in five main parts which contain a group of papers around a similar subject The first part consists of papers with the main theme of type 2 fuzzy logic which basically consists of papers that propose new models and applications for type 2 fuzzy systems The second part contains papers with the main theme of bio inspired optimization algorithms which are basically papers using nature inspired techniques to achieve optimization of complex optimization problems in diverse areas of application The third part contains papers that deal with new models and applications of neural networks in real world problems The fourth part contains papers with the theme of intelligent optimization methods which basically consider the proposal of new methods of optimization to solve complex real world optimization problems The fifth part contains papers with the theme of evolutionary methods and intelligent computing which are papers considering soft computing methods for applications related to diverse areas such as natural language processing recommending systems and optimization

Type-2 Fuzzy Logic in Intelligent Control Applications Oscar Castillo,2011-11-08 We describe in this book hybrid

intelligent systems based mainly on type 2 fuzzy logic for intelligent control Hybrid intelligent systems combine several intelligent computing paradigms including fuzzy logic and bio inspired optimization algorithms which can be used to produce powerful automatic control systems The book is organized in three main parts which contain a group of chapters around a similar subject The first part consists of chapters with the main theme of theory and design algorithms which are basically chapters that propose new models and concepts which can be the basis for achieving intelligent control with interval type 2 fuzzy logic The second part of the book is comprised of chapters with the main theme of evolutionary optimization of type 2 fuzzy systems in intelligent control with the aim of designing optimal type 2 fuzzy controllers for complex control problems in diverse areas of application including mobile robotics aircraft dynamics systems and hardware implementations The third part of the book is formed with chapters dealing with the theme of bio inspired optimization of type 2 fuzzy systems in intelligent control which includes the application of particle swarm intelligence and ant colony optimization algorithms for obtaining optimal type 2 fuzzy controllers

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