Neural Network Training Using Genetic Algorithms Series In Machine Perception And Artificial Intelligence


The set LNCS 2723 and LNCS 2724 constitutes the refereed proceedings of the Genetic and Evolutionary Computation Conference, GECCO 2003, held in Chicago, IL, USA in July 2003. The 193 revised full papers and 93 poster papers presented were carefully reviewed and selected from a total of 417 submissions. The papers are organized in topical sections on a-life adaptive behavior, agents, and ant colony optimization; artificial immune systems; coevolution; DNA, molecular, and quantum computing; evolvable hardware; evolutionary robotics; evolution strategies and evolutionary programming; evolutionary shedding routing; genetic algorithms; genetic programming; learning classifier systems; real-world applications; and search based softare engineering.

Abstract: “In this paper, we present a neurogenetic learning algorithm which is an integrated method of designing and training neural networks using genetic [sic] algorithms. The proposed scheme provides an integrated means to design and train neural networks, and use the gradient-descend approach for fine-tuning of the network weights and biases. The salient characteristics of the neurogenetic learning is that designing of the network structure and the weight tuning is performed simultaneously. This is a clear distinction from other combination [sic] of GA and neural network proposed in the past. Experimental results demonstrate that the method provides a magnitude of speed up in convergence than current methods, and exhibits far better scaling property.”


For many engineering problems we require optimization processes with dynamic adaptation as we aim to establish the dimension of the search space where the optimum solution resides and develop robust techniques to avoid the local optima usually associated with multimodal problems. This book explores multidimensional particle swarm optimization, a technique developed by the authors that addresses these requirements in a well-defined algorithmic approach. After an introduction to the key optimization techniques, the authors introduce their unified framework and demonstrate its advantages in challenging application domains, focusing on the state of the art of multidimensional extensions such as global convergence in particle swarm optimization, dynamic data clustering, evolutionary neural networks, biomedical applications and personalized ECG classification, content-based image classification and retrieval, and evolutionary feature synthesis. The content is characterized by strong practical considerations, and the book is supported with fully documented source code for all applications presented, as well as many sample swarm datasets. The book will be of benefit to researchers and practitioners working in the areas of machine intelligence, signal processing, pattern recognition, and data mining, or using principles from these areas in their application domains. It may also be used as a reference text for graduate courses on swarm optimization, data clustering and classification, content-based multimedia search, and biomedical signal processing applications.

This book constitutes the refereed proceedings of the Second Hellenic Conference on Artificial Intelligence, SETN 2002, held in Thessaloniki, Greece, in April 2002. The 42 revised full papers presented together with two invited contributions were carefully reviewed and selected for inclusion in the book. The papers are organized in topical sections on knowledge representation and reasoning, logic programming and constraint satisfaction, planning and scheduling, natural language processing, human-computer interaction, machine learning, intelligent Internet and multiagent systems, and intelligent applications.

Abstract: “This paper reports several experimental results on the speed of convergence of neural network training and designing using genetic algorithms. Recent excitement regarding genetic search lead [sic] some researchers to apply it to training and designing neural networks. There are reports on both successful and faulty results, and, unfortunately, no systematic evaluation has been made. This paper reports results of systematic experiments designed to judge utility of genetic algorithms for neural network training and designing. As for the training task, we carried out a set of experiments to answer a question that [sic] whether use of genetic algorithm provides any gain in neural network training over existing methods.

Artificial neural networks can mimic the biological information-processing mechanism in - a very limited sense. Fuzzy logic provides a basis for representing uncertain and imprecise knowledge and forms a basis for human reasoning. Neural networks display genuine promise in solving problems, but a definitive theoretical basis does not yet exist for their design. Fusion of Neural Networks, Fuzzy Systems and Genetic Algorithms integrates neural net, fuzzy system, and evolutionary computing in system design that enables its readers to handle complexity - offsetting the demerits of one paradigm by the merits of another. This book presents specific projects where fuzzy techniques have been applied. The chapters start with the design of a new fuzzy-neural controller. Remaining chapters discuss the application of expert systems, neural networks, fuzzy control, and evolutionary computing techniques in modern engineering systems. These specific applications include: direct frequency converters electro-hydraulic systems motor controlAerospace control speech recognition vehicle routing fault diagnosis Asynchronous Transfer Mode (ATM) communications networks telephones for hard-of-hearing people control of gas turbine aero-engines telecommunications systems design Fusion of Neural Networks, Fuzzy Systems and Genetic Algorithms covers the spectrum of applications - comprehensively demonstrating the advantages of fusion techniques in industrial applications.

Deploy deep learning applications into production across multiple platforms. You will work on computer vision applications that use the convolutional neural network (CNN) deep learning model and Python. This book starts by explaining the traditional machine-learning pipeline, where you will analyze an image dataset. Along the way you will cover artificial neural networks (ANNs), building one from scratch in Python, before optimizing it using genetic algorithms. For automating the process, the book highlights the limitations of traditional hand-crafted features for computer vision and why the CNN deep-learning model is the state-of-art solution. CNNs are discussed from scratch to demonstrate how they are different and more efficient than the fully connected ANN (FCNN). You will implement a CNN in Python to give you a full understanding of the model. After consolidating the basics, you will use TensorFlow to build a practical image-recognition model that you will deploy to a web server using Flask, making it accessible over the Internet. Using Kivy and NumPy, you will create cross-platform data science applications with low overheads. This book will help you apply deep learning and computer vision concepts from scratch, step-by-step from conception to production. What You Will Learn How ANNs and CNNs work Create computer vision applications and CNNs from scratch using Python Follow a deep learning project from conception to production using TensorFlow Use NumPy with Kivy to build cross-platform data science applications Who This Book Is ForData scientists, machine learning and deep learning
engineers, software developers.

This book and software package complements the traditional data analysis tools already widely available. It presents an introduction to the analysis of data using neural network functions such as multilayer feedforward networks using error back propagation, genetic algorithm-neural network hybrids, generalised regression neural networks, learning quantizer networks, and self-organising feature maps. In an easy-to-use, Windows-based environment it offers a wide range of data analytic tools which are not usually found together: genetic algorithms, probabilistic networks, as well as a number of related techniques that support these. Readers are assumed to have a basic understanding of computers and elementary mathematics, allowing them to quickly conduct sophisticated hands-on analyses of data sets.

Machine Learning Proceedings 1994

This book presents a systematic approach to parallel implementation of feedforward neural networks on an array of transputers. The emphasis is on backpropagation learning and training set parallelism. Using systematic analysis, a theoretical model has been developed for the parallel implementation. The model is used to find the optimal mapping to minimize the training time for large backpropagation neural networks. The model has been validated experimentally on several well known benchmark problems. Use of genetic algorithms for optimizing the performance of the parallel implementations is described. Guidelines for efficient parallel implementations are highlighted.

Intelligent Hybrid Systems: Fuzzy Logic, Neural Networks, and Genetic Algorithms is an organized edited collection of contributed chapters covering basic principles, methodologies, and applications of fuzzy systems, neural networks and genetic algorithms. All chapters are original contributions by leading researchers written exclusively for this volume. This book reviews important concepts and models, and focuses on specific methodologies common to fuzzy systems, neural networks and evolutionary computation. The emphasis is on development of cooperative models of hybrid systems. Included are applications related to intelligent data analysis, process analysis, intelligent adaptive information systems, systems identification, nonlinear systems, power and water system design, and many others.

Intelligent Hybrid Systems: Fuzzy Logic, Neural Networks, and Genetic Algorithms provides researchers and engineers with up-to-date coverage of new results, methodologies and applications for building intelligent systems capable of solving large-scale problems.

This book is composed of the Proceedings of the International Conference on Advanced Computing, Networking, and Informatics (ICACNI 2013), held at Central Institute of Technology, Raipur, Chhattisgarh, India during June 14–16, 2013. The book records current research articles in the domain of computing, networking, and informatics. The book presents original research articles, case-studies, as well as review articles in the said field of study on their implementation and practical application. Researchers, academicians, practitioners, and industry policy makers around the globe have contributed towards formation of this book with their valuable research submissions.

M.A. BRAMER University of Portsmouth, UK This volume comprises the refereed technical papers presented at ES2001, the Twenty-first SGES International Conference on Knowledge Based Systems and Applied Artificial Intelligence, held in Cambridge in December 2000, together with an invited keynote paper by Professor Derek Sleeman. The conference was organised by SGES, the British Computer Society Specialist Group on Knowledge Based Systems and Applied Artificial Intelligence. The papers in this volume present new and innovative developments in the field, divided into sections on Machine Learning, Constraint Satisfaction, Agents, Knowledge Representation, Knowledge Engineering, and Intelligent Systems. The refereed papers begin with a paper entitled 'Detecting Mismatches Among Experts' Ontologies Acquired Through Knowledge Elicitation', which describes a systematic approach to the analysis of discrepancies within and among experts' ontologies. This paper was judged to be the best refereed technical paper submitted to the conference. The remaining papers are devoted to topics in important areas such as agents, knowledge engineering, knowledge representation, planning and constraint satisfaction, with machine learning again the largest topic covered in terms of the number of papers accepted for publication. This is the eighteenth volume in the Research and Development series. The Application Stream papers are published as a companion volume under the title Applications and Innovations in Intelligent Systems IX.

"Deep Learning networks are a new type of neural network that discovers important object features. These networks determine features without supervision, and are adept at learning high level abstractions about their data sets. These networks are useful for a variety of tasks, but are difficult to train. This difficulty is compounded when multiple networks are trained in a layered fashion, which results in increased solution complexity as well as increased training time. This paper examines the use of Genetic Algorithms as a training mechanism for Deep Learning networks, with emphasis on training networks with a large number of layers, each of which is trained independently to reduce the computational burden and increase the overall flexibility of the algorithm. This paper covers the implementation of a multilayer deep learning network using a genetic algorithm, including tuning the genetic algorithm, as well as results of experiments involving data compression and object classification. This paper aims to show that a genetic algorithm can be used to train a non trivial deep learning network in place of existing methodologies for network training, and that the features extracted can be used for a variety of real world computational problems."--Abstract.

Initially conceived as a methodology for the representation and manipulation of imprecise and vague information, fuzzy computation has found wide use in problems that fall well beyond its originally intended scope of application. Many scientists and engineers now use the paradigms of fuzzy computation to tackle problems that are either intractable. Fifty years ago, A. Turing predicted that by 2000 we would have a machine that could pass the Turing test. Although this may not yet be true, AI has advanced significantly in these 50 years, and at the dawn of the XXI century is still an active and challenging field. This year is also significant for AI in Mexico, with the merging of the two major AI conferences into the biennial Mexican International Conference on Artificial Intelligence (MICAI) series. MICAI is the union of the Mexican National AI Conference (RNIA) and the International AI Symposium (ISAI), organized annually by the Mexican Society for AI (SMIA, since 1984) and the Monterrey Institute of Technology (ITESM, since 1988), respectively. The 1st Mexican International Conference on Artificial Intelligence, MICAI 2000, took place April 11-14, 2000, in the city of Acapulco, Mexico. This conference seeks to promote research in AI, and cooperation among Mexican researchers and their peers worldwide. We welcome you all. Over 163 papers from 17
Artificial neural networks and genetic algorithms both are areas of research which have their origins in mathematical models constructed in order to gain understanding of important natural processes. By focussing on the process models rather than the processes themselves, significant new computational techniques have evolved which have found application in a large number of diverse fields. This diversity is reflected in the topics which are subjects of the contributions to this volume. There are contributions reporting successful applications of the technology to the solution of industrial/commercial problems. This may well reflect the maturity of the technology, notably in the sense that ‘real’ users of modelling/prediction techniques are prepared to accept neural networks as a valid paradigm. Theoretical issues also receive attention, notably in connection with the radial basis function neural network. Contributions in the field of genetic algorithms reflect the wide range of current applications, including, for example, portfolio selection, filter design, frequency assignment, tuning of nonlinear PID controllers. These techniques are also used extensively for combinatorial optimisation problems.

This is the only book to apply neural nets, genetic algorithms, and fuzzy set theory to the fast growing field of machine learning. Placing particular emphasis on neural networks, it explores how to integrate them with other technologies to improve their performance. Examples are included for each system discussed. This book describes the application of evolutionary computation in the automatic generation of a neural network architecture. The architecture has a significant influence on the performance of the neural network. It is the usual practice to use trial and error to find a suitable neural network architecture for a given problem. The process of trial and error is not only time-consuming but may not generate an optimal network. The use of evolutionary computation is a step towards automation in neural network architecture generation. An overview of the field of evolutionary computation is presented, together with the biological background from which the field was inspired. The most commonly used approaches to a mathematical foundation of the field of genetic algorithms are given, as well as an overview of the hybridization between evolutionary computation and neural networks. Experiments on the implementation of automatic neural network generation using genetic programming and one using genetic algorithms are described, and the efficacy of genetic algorithms as a learning algorithm for a feedforward neural network is also investigated. Contents:Artificial Neural Networks;Evolutionary Computation;The Biological Background;Mathematical Foundations of Genetic Algorithms;Implementing Gas;Hybridisation of Evolutionary Computation and Neural Networks;Using Genetic Programming to Generate Neural Networks;Using a GA to Optimise the Weights of a Neural Network;Using a GA with Grammar Encoding to Generate Neural Networks;Conclusions and Future Directions.

Readership: Scientists, engineers, and researchers interested in artificial intelligence and systems & knowledge engineering.

keywords: Artificial Neural Networks; Neural Networkworks Architecture; Automatic Neural Networkworks Generation; Learning; Genetic Algorithms; Evolutionary Algorithms; Hybridization

This book provides a unified framework that describes how genetic learning can be used to design pattern recognition and learning systems. It examines how a search technique, the genetic algorithm, can be used for pattern classification mainly through approximating decision boundaries. Coverage also demonstrates the effectiveness of the genetic classifiers vis-à-vis several widely used classifiers, including neural networks.

The First Southern African Geotechnical Conference was organised by the Geotechnical Division of the South African Institution of Civil Engineering (SAICE) under the auspices of the International Society of Soil Mechanics and Geotechnical Engineering (ISSMGE) and took place at Sun City, South Africa on 5 and 6 May 2016. More than 60 papers were rec

In recent years Genetic Algorithms (GA) and Artificial Neural Networks (ANN) have progressively increased in importance amongst the techniques routinely used in chemometrics. This book contains contributions from experts in the field is divided in two sections (GA and ANN). In each part, tutorial chapters are included in which the theoretical bases of each technique are expertly (but simply) described. These are followed by application chapters in which special emphasis will be given to the advantages of the application of GA or ANN to that specific problem, compared to classical techniques, and to the risks connected with its misuse. This book is of use to all those who are using or are interested in GA and ANN. Beginners can focus their attentions on the tutorials, whilst the most advanced readers will be more interested in looking at the applications of...
the techniques. It is also suitable as a reference book for students. Subject matter is steadily increasing in importance Comparison of Genetic Algorithms (GA) and Artificial Neural Networks (ANN) with the classical techniques Suitable for both beginners and advanced researchers

Artificial neural networks and genetic algorithms both are areas of research which have their origins in mathematical models constructed in order to gain understanding of important natural processes. By focussing on the process models rather than the processes themselves, significant new computational techniques have evolved which have found application in a large number of diverse fields. This diversity is reflected in the topics which are the subjects of contributions to this volume. There are contributions reporting theoretical developments in the design of neural networks, and in the management of their learning. In a number of contributions, applications to speech recognition tasks, control of industrial processes as well as to credit scoring, and so on, are reflected. Regarding genetic algorithms, several methodological papers consider how genetic algorithms can be improved using an experimental approach, as well as by hybridizing with other useful techniques such as tabu search. The closely related area of classifier systems also receives a significant amount of coverage, aiming at better ways for their implementation. Further, while there are many contributions which explore ways in which genetic algorithms can be applied to real problems, nearly all involve some understanding of the context in order to apply the genetic algorithm paradigm more successfully. That this can indeed be done is evidenced by the range of applications covered in this volume.


The three-volume set LNAI 3213, LNAI 3214, and LNAI 3215 constitutes the refereed proceedings of the 8th International Conference on Knowledge-Based Intelligent Information and Engineering Systems, KES 2004, held in Wellington, New Zealand in September 2004. The over 450 papers presented were carefully reviewed and selected from numerous submissions. The papers present a wealth of original research results from the field of intelligent information processing in the broadest sense; among the areas covered are artificial intelligence, computational intelligence, cognitive technologies, soft computing, data mining, knowledge processing, various new paradigms in biologically inspired computing, and applications in various domains such as bioinformatics, finance, signal processing etc.

This book provides comprehensive introduction to a consortium of technologies underlying soft computing, an evolving branch of computational intelligence. The constituent technologies discussed comprise neural networks, fuzzy logic, genetic algorithms, and a number of hybrid systems which include classes such as neuro-fuzzy, fuzzy-genetic, and neuro-genetic systems. The hybridization of the technologies is demonstrated on architectures such as Fuzzy-Back-propagation Networks (NN-FL), Simplified Fuzzy ARTMAP (NN-FL), and Fuzzy Associative Memories. The book also gives an exhaustive discussion of FL-GA hybridization. Every architecture has been discussed in detail through illustrative examples and applications. The algorithms have been presented in pseudo-code with a step-by-step illustration of the same in problems. The applications, demonstrative of the potential of the architectures, have been chosen from diverse disciplines of science and engineering. This book with a wealth of information that is clearly presented and illustrated by many examples and applications is designed for use as a text for courses in soft computing at both the senior undergraduate and first-year post-graduate engineering levels. It should also be of interest to researchers and technologists desirous of applying soft computing technologies to their respective fields of work.

This book contains state-of-the-art contributions in the field of evolutionary and deterministic methods for design, optimization and control in engineering and sciences. Specialists have written each of the 34 chapters as extended versions of selected papers presented at the International Conference on Evolutionary and Deterministic Methods for Design, Optimization and Control with Applications to Industrial and Societal Problems (EUROGEN 2013). The conference was one of the Thematic Conferences of the European Community on Computational Methods in Applied Sciences (ECCOMAS). Topics treated in the various chapters are classified in the following sections: theoretical and numerical methods and tools for optimization (theoretical methods and tools; numerical methods and tools) and engineering design and societal applications (turbo machinery; structures, materials and civil engineering; aeronautics and astronautics; societal applications; electrical and electronics applications), focused particularly on intelligent systems for multidisciplinary design optimization (mdo) problems based on multi-hybridized software, adjoint-based and one-shot methods, uncertainty quantification and optimization, multidisciplinary design optimization, applications of game theory to industrial optimization problems, applications in structural and civil engineering optimum design and surrogate models based optimization methods in aerodynamic design.

This book provides successful implementations of metaheuristic methods for neural network training. It is the first book to achieve this objective. Moreover, the basic principles and fundamental ideas given in the book will allow the readers to create successful training methods on their own. Overall, the book's aim is to provide a broad coverage of the concepts, methods, and tools of the important area of ANNs within the realm of continuous optimization.

This book provides a collection of forty articles containing new material on both theoretical aspects of Evolutionary Computing (EC), and demonstrating the usefulness/success of it for various kinds of large-scale real world problems. Around 23 articles deal with various theoretical aspects of EC and 17 articles demonstrate the success of EC methodologies. These articles are written by leading experts of the field from different countries all over the world.

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