

## Applications Of Neural Networks In Electromagnetics Artech House Antennas And Propagation Library

This volume aims to offer an overview of the great potential of neural network approaches for research applications in the transportation sector. It does not only focus on engineering types of approaches, but also on social science applications in transport systems.

The revitalization of neural network research in the past few years has already had a great impact on research and development in pattern recognition and artificial intelligence. Although neural network functions are not limited to pattern recognition, there is no doubt that a renewed progress in pattern recognition and its applications now critically depends on neural networks. This volume specially brings together outstanding original research papers in the area and aims to help the continued progress in pattern recognition and its applications.

A Theory of Learning and Generalization provides a formal mathematical theory for addressing intuitive questions of the type: How does a machine learn a new concept on the basis of examples? How can a neural network, after sufficient training, correctly predict the output of a previously unseen input? How much training is required to achieve a specified level of accuracy in the prediction? How can one "identify" the dynamical behaviour of a nonlinear control system by observing its input-output behaviour over a finite interval of time? This is the first book to treat the problem of machine learning in conjunction with the theory of empirical processes, the latter being a well-established branch of probability theory. The treatment of both topics side by side leads to new insights, as well as new results in both topics. An extensive references section and open problems will help readers to develop their own work in the field.

This book brings together a representative set of Earth System Science (ESS) applications of the neural network (NN) technique. It examines a progression of atmospheric and oceanic problems, which, from the mathematical point of view, can be formulated as complex, multidimensional, and nonlinear mappings. It is shown that these problems can be solved utilizing a particular type of NN – the multilayer perceptron (MLP). This type of NN applications covers the majority of NN applications developed in ESSs such as meteorology, oceanography, atmospheric and oceanic satellite remote sensing, numerical weather prediction, and climate studies. The major properties of the mappings and MLP NNs are formulated and discussed. Also, the book presents basic background for each introduced application and provides an extensive set of references. "This is an excellent book to learn how to apply artificial neural network methods to earth system sciences. The author, Dr. Vladimir Krasnopolsky, is a universally recognized master in this field. With his vast knowledge and experience, he carefully guides the reader through a broad variety of problems found in the earth system sciences where neural network methods can be applied fruitfully. (...) The broad range of topics covered in this book ensures that researchers/graduate students from many fields (...) will find it an invaluable guide to neural network methods." (Prof. William W. Hsieh, University of British Columbia, Vancouver, Canada) "Vladimir Krasnopolsky has been the "founding father" of applying computation intelligence methods to environmental science; (...) Dr. Krasnopolsky has created a masterful exposition of a young, yet maturing field that promises to advance a deeper understanding of best modeling practices in environmental science." (Dr. Sue Ellen Haupt, National Center for Atmospheric Research, Boulder, USA) "Vladimir Krasnopolsky has written an important and wonderful book on applications of neural networks to replace complex and expensive computational algorithms within Earth System Science models. He is uniquely qualified to write this book, since he has been a true pioneer with regard to many of these applications. (...) Many other examples of creative emulations will inspire not just readers interested in the Earth Sciences, but any other modeling practitioner (...) to address both theoretical and practical complex problems that may (or will!) arise in a complex system." (Prof. Eugenia Kalnay, University of Maryland, USA)

This book was primarily written for an audience that has heard about neural networks or has had some experience with the algorithms, but would like to gain a deeper understanding of the fundamental material. For those that already have a solid grasp of how to create a neural network application, this work can provide a wide range of examples of nuances in network design, data set design, testing strategy, and error analysis. Computational, rather than artificial, modifiers are used for neural networks in this book to make a distinction between networks that are implemented in hardware and those that are implemented in software. The term artificial neural network covers any implementation that is inorganic and is the most general term. Computational neural networks are only implemented in software but represent the vast majority of applications. While this book cannot provide a blue print for every conceivable geophysics application, it does outline a basic approach that has been used successfully.

Neural networks represent a powerful data processing technique that has reached maturity and broad application. When clearly understood and appropriately used, they are a mandatory component in the toolbox of any engineer who wants make the best use of the available data, in order to build models, make predictions, mine data, recognize shapes or signals, etc. Ranging from theoretical foundations to real-life applications, this book is intended to provide engineers and researchers with clear methodologies for taking advantage of neural networks in industrial, financial or banking applications, many instances of which are presented in the book. For the benefit of readers wishing to gain deeper knowledge of the topics, the book features appendices that provide theoretical details for greater insight, and algorithmic details for efficient programming and implementation. The chapters have been written by experts and edited to present a coherent and comprehensive, yet not redundant, practically oriented introduction.

Due to the growing use of web applications and communication devices, the use of data has increased throughout various industries. It is necessary to develop new techniques for managing data in order to ensure adequate usage. Deep learning, a subset of artificial intelligence and machine learning, has been recognized in various real-world

applications such as computer vision, image processing, and pattern recognition. The deep learning approach has opened new opportunities that can make such real-life applications and tasks easier and more efficient. *Deep Learning and Neural Networks: Concepts, Methodologies, Tools, and Applications* is a vital reference source that trends in data analytics and potential technologies that will facilitate insight in various domains of science, industry, business, and consumer applications. It also explores the latest concepts, algorithms, and techniques of deep learning and data mining and analysis. Highlighting a range of topics such as natural language processing, predictive analytics, and deep neural networks, this multi-volume book is ideally designed for computer engineers, software developers, IT professionals, academicians, researchers, and upper-level students seeking current research on the latest trends in the field of deep learning.

Introducing a wide variety of network types, including Kohonen nets, n-tuple nets and radial basis function networks as well as the more useful multilayer perception back-propagation networks, this book aims to give a detailed appreciation of the use of neural nets in these applications.

This book is one of the most up-to-date and cutting-edge texts available on the rapidly growing application area of neural networks. *Neural Networks and Pattern Recognition* focuses on the use of neural networks in pattern recognition, a very important application area for neural networks technology. The contributors are widely known and highly respected researchers and practitioners in the field. Features neural network architectures on the cutting edge of neural network research Brings together highly innovative ideas on dynamical neural networks Includes articles written by authors prominent in the neural networks research community Provides an authoritative, technically correct presentation of each specific technical area

The utility of artificial neural network models lies in the fact that they can be used to infer functions from observations—making them especially useful in applications where the complexity of data or tasks makes the design of such functions by hand impractical. *Exploring Neural Networks with C#* presents the important properties of neural networks—while keeping the complex mathematics to a minimum. Explaining how to build and use neural networks, it presents complicated information about neural networks structure, functioning, and learning in a manner that is easy to understand. Taking a "learn by doing" approach, the book is filled with illustrations to guide you through the mystery of neural networks. Examples of experiments are provided in the text to encourage individual research. Online access to C# programs is also provided to help you discover the properties of neural networks. Following the procedures and using the programs included with the book will allow you to learn how to work with neural networks and evaluate your progress. You can download the programs as both executable applications and C# source code from <http://home.agh.edu.pl/~tad//index.php?page=programy&lang=en>

This book covers neural networks with special emphasis on advanced learning methodologies and applications. It includes practical issues of weight initializations, stalling of learning, and escape from a local minima, which have not been covered by many existing books in this area. Additionally, the book highlights the important feature selection problem, which baffles many neural networks practitioners because of the difficulties handling large datasets. It also contains several interesting IT, engineering and bioinformatics applications.

The two volume set LNCS 3696 and LNCS 3697 constitutes the refereed proceedings of the 15th International Conference on Artificial Neural Networks, ICANN 2005, held in Warsaw, Poland in September 2005. The over 600 papers submitted to ICANN 2005 were thoroughly reviewed and carefully selected for presentation. The first volume includes 106 contributions related to Biological Inspirations; topics addressed are modeling the brain and cognitive functions, development of cognitive powers in embodied systems spiking neural networks, associative memory models, models of biological functions, projects in the area of neuroIT, evolutionary and other biological inspirations, self-organizing maps and their applications, computer vision, face recognition and detection, sound and speech recognition, bioinformatics, biomedical applications, and information-theoretic concepts in biomedical data analysis. The second volume contains 162 contributions related to Formal Models and their Applications and deals with new neural network models, supervised learning algorithms, ensemble-based learning, unsupervised learning, recurrent neural networks, reinforcement learning, bayesian approaches to learning, learning theory, artificial neural networks for system modeling, decision making, optimization and control, knowledge extraction from neural networks, temporal data analysis, prediction and forecasting, support vector machines and kernel-based methods, soft computing methods for data representation, analysis and processing, data fusion for industrial, medical and environmental applications, non-linear predictive models for speech processing, intelligent multimedia and semantics, applications to natural language processing, various applications, computational intelligence in games, and issues in hardware implementation.

This volume provides a state-of-the-art survey of artificial neural network applications in biomedical diagnosis, laboratory data analysis and related practical areas. It looks at biomedical applications which involve customising neural network technology to resolve specific difficulties with data processing, and deals with applications relating to particular aspects of clinical practice and laboratory or medically-related analysis. Each chapter is self-contained with regard to the technology used, covering important technical points and implementation issues like the design of user interfaces and hardware/software platforms. *Artificial Neural Networks in Biomedicine* will be of interest to computer scientists and neural network practitioners who want to extend their knowledge of issues relevant to biomedical applications, developers of clinical computer systems, and medical researchers looking for new methods and computational tools.

Recently, the telecommunications industry has been exposed to many changes in technology. AT&T is currently experiencing its second divestiture. The internet has grown explosively with enormous numbers of people subscribing to providers such as America On Line. Microsoft, Netscape, and other computer-oriented companies are competing furiously for customers in the on-line world. Customers are having service problems because the network and providers cannot keep up with the ever-growing demand for service. Selling on the internet is ubiquitous with every company and with many individuals having a home page. Anecdotal evidence, however, suggests that almost nobody is making a profit from the growth of the internet. The papers in this collection reflect these changes. They were presented at a meeting of the International Workshop on the Application of Neural Networks to Communications (IWANN\*97). Discussing a wide variety of intelligent system applications, the major theme of the articles is networking, especially the use of ATM technology and the modeling of the resulting traffic. Recurring themes in this conference are routing and resource allocation in all types of communications networks. The collection also contains papers on fault detection, diagnosis, correction, coding and equalization, customer profiling, and pattern recognition.

Neural network technology encompasses a class of methods which attempt to mimic the basic structures used in the brain for information processing. The technology is aimed at problems such as pattern recognition which are difficult for traditional computational methods. Neural networks have potential applications in many industrial areas such as advanced robotics, operations research, and process engineering. This book is concerned with the application of neural network technology to real industrial problems. It summarizes a three-year collaborative international project called ANNIE (Applications of Neural Networks for Industry in Europe) which was jointly funded by industry and the European Commission within the ESPRIT programme. As a record of a working project, the book gives an insight into the real problems faced in taking a new technology from the workbench into a live industrial application, and shows just how it can be achieved. It stresses the comparison between neural networks and conventional approaches. Even the non-specialist reader will benefit from understanding the limitations as well as the advantages of the new technology.

Neural networks have received a great deal of attention among scientists and engineers. In chemical engineering, neural computing has moved from pioneering projects toward mainstream industrial applications. This book introduces the fundamental principles of neural computing, and is the first to focus on its practical applications in bioprocessing and chemical engineering. Examples, problems, and 10 detailed case studies demonstrate how to develop, train, and apply neural networks. A disk containing input data files for all illustrative examples, case studies, and practice problems provides the opportunity for hands-on experience. An important goal of the book is to help the student or practitioner learn and implement neural networks quickly and inexpensively using commercially available, PC-based software tools. Detailed network specifications and training procedures are included for all neural network examples discussed in the book.

Applications of Neural Networks gives a detailed description of 13 practical applications of neural networks, selected because the tasks performed by the neural networks are real and significant. The contributions are from leading researchers in neural networks and, as a whole, provide a balanced coverage across a range of application areas and algorithms. The book is divided into three sections. Section A is an introduction to neural networks for nonspecialists. Section B looks at examples of applications using 'Supervised Training'. Section C presents a number of examples of 'Unsupervised Training'. For neural network enthusiasts and interested, open-minded sceptics. The book leads the latter through the fundamentals into a convincing and varied series of neural success stories -- described carefully and honestly without over-claiming. Applications of Neural Networks is essential reading for all researchers and designers who are tasked with using neural networks in real life applications.

This book contains the proceedings of the 22nd EANN "Engineering Applications of Neural Networks" 2021 that comprise of research papers on both theoretical foundations and cutting-edge applications of artificial intelligence. Based on the discussed research areas, emphasis is given in advances of machine learning (ML) focusing on the following algorithms-approaches: Augmented ML, autoencoders, adversarial neural networks, blockchain-adaptive methods, convolutional neural networks, deep learning, ensemble methods, learning-federated learning, neural networks, recurrent – long short-term memory. The application domains are related to: Anomaly detection, bio-medical AI, cyber-security, data fusion, e-learning, emotion recognition, environment, hyperspectral imaging, fraud detection, image analysis, inverse kinematics, machine vision, natural language, recommendation systems, robotics, sentiment analysis, simulation, stock market prediction. Sponsored by the Committee on Expert Systems and Artificial Intelligence of the Technical Council on Computer Practices of ASCE. This report illustrates advanced methods and new developments in the application of artificial neural networks to solve problems in civil engineering. Topics include: Evaluating new construction technologies; Using multi-layered artificial neural network architecture to overcome problems with conventional traffic signal control systems; Increasing the computational efficiency of an optimization model; Predicting carbonation depth in concrete structures; Detecting defects in concrete piles; Analyzing pavement systems; Using neural network hybrids to select the most appropriate bidders for a construction project; and Predicting the Energy Performance Index of residential buildings. Many of the ideas and techniques discussed in this book cross across disciplinary boundaries and, therefore, should be of interest to all civil engineers.

Originating from models of biological neural systems, artificial neural networks (ANN) are the cornerstones of artificial intelligence research. Catalyzed by the upsurge in computational power and availability, and made widely accessible with the co-evolution of software, algorithms, and methodologies, artificial neural networks have had a profound impact in the elucidation of complex biological, chemical, and environmental processes. Artificial Neural Networks in Biological and Environmental Analysis provides an in-depth and timely perspective on the fundamental, technological, and applied aspects of computational neural networks. Presenting the basic principles of neural networks together with applications in the field, the book stimulates communication and partnership among scientists in fields as diverse as biology, chemistry, mathematics, medicine, and environmental science. This interdisciplinary discourse is essential not only for the success of independent and collaborative research and teaching programs, but also for the continued interest in the use of neural network tools in scientific inquiry. The book covers: A brief history of computational neural network models in relation to brain function Neural network operations, including neuron connectivity and layer arrangement Basic building blocks of model design, selection, and application from a statistical perspective Neurofuzzy systems, neuro-genetic systems, and neuro-fuzzy-genetic systems Function of neural networks in the study of complex natural processes Scientists deal with very complicated systems, much of the inner workings of which are frequently unknown to researchers. Using only simple, linear mathematical methods, information that is needed to truly understand natural systems may be lost. The development of new algorithms to model such processes is needed, and ANNs can play a major role. Balancing basic principles and diverse applications, this text introduces newcomers to the field and reviews recent developments of interest to active neural network practitioners. The book emphasizes neural network structures for achieving practical and effective systems, and provides many examples. Practitioners, researchers, and students in industrial, manufacturing, electrical, mechanical, and production engineering will find this volume a unique and comprehensive reference source for diverse application methodologies. Control and Dynamic Systems covers the important topics of highly effective Orthogonal Activation Function Based Neural Network System Architecture, multi-layer recurrent neural networks for synthesizing and implementing real-time linear control, adaptive control of unknown nonlinear dynamical systems, Optimal Tracking Neural Controller techniques, a consideration of unified approximation theory and applications, techniques for the determination of multi-variable nonlinear model structures for dynamic systems with a detailed treatment of relevant system model input determination, High Order Neural Networks and Recurrent High Order Neural Networks, High Order Moment Neural Array Systems, Online Learning Neural Network controllers, and Radial Bias Function techniques. Coverage includes: Orthogonal Activation Function Based Neural Network System Architecture (OAFNN) Multilayer recurrent neural networks for synthesizing and implementing real-time linear control Adaptive control of unknown nonlinear dynamical systems Optimal Tracking Neural Controller techniques Consideration of unified approximation theory and applications Techniques for determining multivariable nonlinear model structures for dynamic systems, with a detailed treatment of relevant system model input determination

This comprehensive tutorial on artificial neural networks covers all the important neural network architectures as well as the most recent theory--e.g., pattern recognition, statistical theory, and other mathematical prerequisites. A broad range of applications is provided for each of the architectures.

"Applications of Neural Networks in High Assurance Systems" is the first book directly addressing a key part of neural network technology: methods used to pass the tough verification and validation (V&V) standards required in many safety-critical applications. The book presents what kinds of evaluation methods have been developed across many sectors, and how to pass the tests. A new adaptive structure of V&V is developed in this book, different from the simple six sigma methods usually used for large-scale systems and different from the theorem-based approach used for simplified component subsystems.

MATLAB has the tool Neural Network Toolbox that provides algorithms, functions, and apps to create, train, visualize, and simulate neural networks. You can perform classification, regression, clustering, dimensionality reduction, time-series forecasting, and dynamic system modeling and control. The toolbox includes convolutional neural network and autoencoder deep learning algorithms for image classification and feature learning tasks. To speed up training of large data sets, you can distribute computations and data across multicore processors, GPUs, and computer clusters using Parallel Computing Toolbox. The more important features are the following: \*Deep learning, including convolutional neural networks and autoencoders \*Parallel computing and GPU support for accelerating training (with Parallel Computing Toolbox) \*Supervised learning algorithms, including multilayer, radial basis, learning vector quantization (LVQ), time-delay, nonlinear

autoregressive (NARX), and recurrent neural network (RNN) \*Unsupervised learning algorithms, including self-organizing maps and competitive layers \*Apps for data-fitting, pattern recognition, and clustering \*Preprocessing, postprocessing, and network visualization for improving training efficiency and assessing network performance \*Simulink(r) blocks for building and evaluating neural networks and for control systems applications

This book is a follow-up to the IChemE symposium on "Neural Networks and Other Learning Technologies", held at Imperial College, UK, in May 1999. The interest shown by the participants, especially those from the industry, has been instrumental in producing the book. The papers have been written by contributors of the symposium and experts in this field from around the world. They present all the important aspects of neural network utilisation as well as show the versatility of neural networks in various aspects of process engineering problems — modelling, estimation, control, optimisation and industrial applications. Contents:Modelling and IdentificationHybrid SchemesEstimations and ControlNew Learning TechnologiesExperimental and Industrial Applications Readership: Academic and industrial researchers, chemical engineers and control engineers. Keywords:Modelling;Hybrid Schemes;Technologies;Industrial Applications

The past fifteen years has witnessed an explosive growth in the fundamental research and applications of artificial neural networks (ANNs) and fuzzy logic (FL). The main impetus behind this growth has been the ability of such methods to offer solutions not amenable to conventional techniques, particularly in application domains involving pattern recognition, prediction and control. Although the origins of ANNs and FL may be traced back to the 1940s and 1960s, respectively, the most rapid progress has only been achieved in the last fifteen years. This has been due to significant theoretical advances in our understanding of ANNs and FL, complemented by major technological developments in high-speed computing. In geophysics, ANNs and FL have enjoyed significant success and are now employed routinely in the following areas (amongst others): 1. Exploration Seismology. (a) Seismic data processing (trace editing; first break picking; deconvolution and multiple suppression; wavelet estimation; velocity analysis; noise identification/reduction; statics analysis; dataset matching/prediction, attenuation), (b) AVO analysis, (c) Chimneys, (d) Compression I dimensionality reduction, (e) Shear-wave analysis, (f) Interpretation (event tracking; lithology prediction and well-log analysis; prospect appraisal; hydrocarbon prediction; inversion; reservoir characterisation; quality assessment; tomography). 2. Earthquake Seismology and Subterranean Nuclear Explosions. 3. Mineral Exploration. 4. Electromagnetic I Potential Field Exploration. (a) Electromagnetic methods, (b) Potential field methods, (c) Ground penetrating radar, (d) Remote sensing, (e) inversion.

Neural Network Applications contains the 12 papers presented at the second British Neural Network Society Meeting (NCM '91) held at King's College London on 1st October 1991. The meeting was sponsored by the Centre for Neural Networks, King's College, and the British Neural Network Society, and was also part of the DEANNA ESPRIT programme. The papers reflect the wide spectrum of neural network applications that are currently being attempted in industry and medicine. They cover medical diagnosis, robotics, plant control, machine learning, and visual inspection, as well as more general discussions on net learning and knowledge representation. The breadth and depth of coverage is a sign of the health of the subject, as well as indicating the importance of neural network developments in industry and the manner in which the applications are progressing. Among the actual topics covered are: Learning algorithms - theory and practice; A review of medical diagnostic applications of neural networks; Simulated ultrasound tomographic imaging of defects; Linear quadtrees for neural network based position invariant pattern recognition; The pRTAM as a hardware-realizable neuron; The cognitive modalities ("CM") system of knowledge representation - the DNA of neural networks? This volume provides valuable reading for all those attempting to apply neural networks, as well as those entering the field, including researchers and postgraduate students in computational neuroscience, neurobiology, electrical engineering, computer science, mathematics, and medicine.

This book constitutes the refereed proceedings of the 16th International Conference on Engineering Applications of Neural Networks, EANN 2015, held in Rhodes, Greece, in September 2015. The 36 revised full papers presented together with the abstracts of three invited talks and two tutorials were carefully reviewed and selected from 84 submissions. The papers are organized in topical sections on industrial-engineering applications of ANN; bioinformatics; intelligent medical modeling; life-earth sciences intelligent modeling; learning-algorithms; intelligent telecommunications modeling; fuzzy modeling; robotics and control; smart cameras; pattern recognition-facial mapping; classification; financial intelligent modeling; echo state networks.

This monograph provides researchers with an understanding of the potential of artificial neural networks for solving civil engineering related problems, and guidance on how to develop successful implementations for a broad range of problems. Fundamental issues in the selection, development, and use of neural networks, as well as example applications to each of the various disciplines in civil engineering are presented. An introduction to neural networks is provided, along with a classification of the various forms of neural networking systems available (architectures, modes of operation, and methods of development).

"For professionals, students, and academics interested in applying neural networks to a variety of business applications, this reference book introduces the three most common neural network models and how they work. A wide range of business applications and a series of global case studies are presented to illustrate the neural network models provided. Each model or technique is discussed in detail and used to solve a business problem such as managing direct marketing, calculating foreign exchange rates, and improving cash flow forecasting."

In this book, international experts report the history of the application of ANN to chemical and biological problems, provide a guide to network architectures, training and the extraction of rules from trained networks, and cover many cutting-edge examples of the application of ANN to chemistry and biology. Methods involving the mapping and interpretation of Infra Red spectra and modelling environmental toxicology are included. This book is an excellent guide to this exciting field.

This authoritative reference offers you a comprehensive understanding of the underpinnings and practical applications of artificial neural networks and their use in the retrieval of geophysical parameters. You find expert guidance on the development and evaluation of neural network algorithms that process data from a new generation of hyperspectral sensors. The book provides clear explanations of the mathematical and physical foundations of remote sensing systems, including radiative transfer and propagation theory, sensor technologies, and inversion and estimation approaches. You discover how to use neural networks to approximate remote sensing inverse functions with emphasis on model selection, preprocessing, initialization, training, and performance evaluation.

In recent years, there has been a growing interest in applying neural networks to dynamic systems identification (modelling), prediction and control. Neural networks are computing systems characterised by the ability to learn from examples rather than having to be programmed in a conventional sense. Their use enables the behaviour of complex systems to be modelled and predicted and accurate control to be achieved through training, without a priori information about the systems' structures or parameters. This book describes examples of applications of neural networks In modelling, prediction and control. The topics covered include identification of general linear and non-linear processes, forecasting of river levels, stock market prices and currency exchange rates, and control of a time-delayed plant and a two-joint robot. These applications employ the major types of neural networks and learning algorithms. The neural network types considered in detail are the multilayer perceptron (MLP), the Elman and Jordan networks and the Group-Method-of-Data-Handling (GMDH) network. In addition, cerebellar-model-articulation-controller (CMAC) networks and

neuromorphic fuzzy logic systems are also presented. The main learning algorithm adopted in the applications is the standard backpropagation (BP) algorithm. Widrow-Hoff learning, dynamic BP and evolutionary learning are also described.

The two volumes set, CCIS 383 and 384, constitutes the refereed proceedings of the 14th International Conference on Engineering Applications of Neural Networks, EANN 2013, held on Halkidiki, Greece, in September 2013. The 91 revised full papers presented were carefully reviewed and selected from numerous submissions. The papers describe the applications of artificial neural networks and other soft computing approaches to various fields such as pattern recognition-predictors, soft computing applications, medical applications of AI, fuzzy inference, evolutionary algorithms, classification, learning and data mining, control techniques-aspects of AI evolution, image and video analysis, classification, pattern recognition, social media and community based governance, medical applications of AI-bioinformatics and learning.

Apply computer vision and machine learning concepts in developing business and industrial applications ?using a practical, step-by-step approach. The book comprises four main sections starting with setting up your programming environment and configuring your computer with all the prerequisites to run the code examples. Section 1 covers the basics of image and video processing with code examples of how to manipulate and extract useful information from the images. You will mainly use OpenCV with Python to work with examples in this section. Section 2 describes machine learning and neural network concepts as applied to computer vision. You will learn different algorithms of the neural network, such as convolutional neural network (CNN), region-based convolutional neural network (R-CNN), and YOLO. In this section, you will also learn how to train, tune, and manage neural networks for computer vision. Section 3 provides step-by-step examples of developing business and industrial applications, such as facial recognition in video surveillance and surface defect detection in manufacturing. The final section is about training neural networks involving a large number of images on cloud infrastructure, such as Amazon AWS, Google Cloud Platform, and Microsoft Azure. It walks you through the process of training distributed neural networks for computer vision on GPU-based cloud infrastructure. By the time you finish reading Building Computer Vision Applications Using Artificial Neural Networks and working through the code examples, you will have developed some real-world use cases of computer vision with deep learning. What You Will Learn · Employ image processing, manipulation, and feature extraction techniques · Work with various deep learning algorithms for computer vision · Train, manage, and tune hyperparameters of CNNs and object detection models, such as R-CNN, SSD, and YOLO · Build neural network models using Keras and TensorFlow · Discover best practices when implementing computer vision applications in business and industry · Train distributed models on GPU-based cloud infrastructure Who This Book Is For Data scientists, analysts, and machine learning and software engineering professionals with Python programming knowledge.

This book is a collection of real-world applications of neural networks, which were presented at the ICANN '95 conference of the European Neural Network Society. The contributions have been carefully selected by the Program Committee under three criteria: soundness of the technical approach, relevance for the application sector, and quality of the results obtained. The book covers all major areas of industrial and service activities: process engineering, control and monitoring, technical diagnosis and nondestructive testing, power systems, robotics, transportation, telecommunications, remote sensing, banking, finance and insurance, forecasting, document processing, and medicine. It thus represents one of the most comprehensive existing surveys of the applicability and use of neural networks in industry and services.

Contents:Process Engineering, Control and MonitoringTechnical Diagnosis and Nondestructive TestingPower SystemsRoboticsTransportationTelecommunicationsRemote SensingBanking, Finance and InsuranceDocument ProcessingMedicine Readership: Undergraduates, engineers, researchers and scientists in neural networks, electrical & electronic engineering, ocean engineering, systems & knowledge engineering, pattern/ handwriting recognition, robotics, economics/finance and medicine. keywords:

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