Sparse And Redundant Representations From Theory To Applications In Signal And Image Processing Author Michael Elad Oct 2010

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Intelligent Systems Technologies and Applications - Stefano Berretti 2015-08-28
This book contains a selection of refereed and revised papers of Intelligent Techniques and Applications track, and the Special Track on Intelligent Image Processing and Artificial Vision track originally presented at the International Symposium on Intelligent Systems Technologies and Applications (ISTA), August 10-13, 2015, Kochi, India.

Proceedings of the 28th Conference of Spacecraft TT&C Technology in China - Rongjun Shen 2017-07-25
This book collects selected papers from the 28th Conference of Spacecraft TT&C Technology in China held on November 8-10, 2016. The book features state-of-the-art studies on spacecraft TT&C in China with the theme of “Openness, Integration and Intelligent Interconnection”. To meet requirements of new space endeavors, development of spacecraft instrumentation systems have to follow an open concept and approach in China. An open spacecraft instrumentation system encompasses integrated development of different types of services, integration of disciplines and specialties, intelligent links, and more scientific and intelligent information interface technology. Researchers and engineers in the field of aerospace engineering and communication engineering can benefit from the book.

Geo-Spatial Knowledge and Intelligence - Hanning Yuan 2017-03-02
The two volume proceedings of CCIS 698 and 699 constitutes revised selected papers from the 4th International Conference on Geo-Informatics in Resource Management and Sustainable Ecosystem, GRMSE 2016, held in Hong Kong, China, in November 2016. The total of 118 papers presented in these proceedings were carefully reviewed and selected from 311 submissions. The contributions were organized in topical sections named: smart city in resource management and sustainable ecosystem; spatial

data acquisition through RS and GIS in resource management and sustainable ecosystem; ecological and environmental data processing and management; advanced geospatial model and analysis for understanding ecological and environmental processes; applications of geo-informatics in resource management and sustainable ecosystem.

Image and Graphics - Yu-Jin Zhang 2015-08-03

This book constitutes the refereed conference proceedings of the 8th International Conference on Image and Graphics, ICIG 2015 held in Tianjin, China, in August 2015. The 164 revised full papers and 6 special issue papers were carefully reviewed and selected from 339 submissions. The papers focus on various advances of theory, techniques and algorithms in the fields of images and graphics.

Advances in Multimedia Information Processing, PCM 2012 - Ming-Ting Sun 2013-12-06

This book constitutes the proceedings of the 13th Pacific Rim Conference on Multimedia, held in Singapore during December 4-6, 2012. The 59 revised full papers presented were carefully reviewed and selected from 106 submissions for the main conference and are accompanied by 23 presentations of 4 special sessions. The papers are organized in topical sections on multimedia content analysis, image and video processing, video coding and multimedia information processing, image/video processing and analysis, video coding and multimedia system, advanced image and video coding, cross media learning with structural priors, as well as efficient multimedia analysis and utilization.

Machine Learning - Sergios Theodoridis 2020-02-19

Machine Learning: A Bayesian and Optimization Perspective, 2nd edition, gives a unified perspective on machine learning by covering both pillars of supervised learning, namely regression and classification. The book starts with the basics, including mean square, least

squares and maximum likelihood methods, ridge regression, Bayesian decision theory classification, logistic regression, and decision trees. It then progresses to more recent techniques, covering sparse modelling methods, learning in reproducing kernel Hilbert spaces and support vector machines, Bayesian inference with a focus on the EM algorithm and its approximate inference variational versions, Monte Carlo methods, probabilistic graphical models focusing on Bayesian networks, hidden Markov models and particle filtering. Dimensionality reduction and latent variables modelling are also considered in depth. This palette of techniques concludes with an extended chapter on neural networks and deep learning architectures. The book also covers the fundamentals of statistical parameter estimation, Wiener and Kalman filtering, convexity and convex optimization, including a chapter on stochastic approximation and the gradient descent family of algorithms, presenting related online learning techniques as well as concepts and algorithmic versions for distributed optimization. Focusing on the physical reasoning behind the mathematics, without sacrificing rigor, all the various methods and techniques are explained in depth, supported by examples and problems, giving an invaluable resource to the student and researcher for understanding and applying machine learning concepts. Most of the chapters include typical case studies and computer exercises, both in MATLAB and Python. The chapters are written to be as self-contained as possible, making the text suitable for different courses: pattern recognition, statistical/adaptive signal processing, statistical/Bayesian learning, as well as courses on sparse modeling, deep learning, and probabilistic graphical models. New to this edition: Complete re-write of the chapter on Neural Networks and Deep Learning to reflect the latest advances since the 1st edition. The chapter, starting from the basic

perceptron and feed-forward neural networks concepts, now presents an in depth treatment of deep networks, including recent optimization algorithms, batch normalization, regularization techniques such as the dropout method, convolutional neural networks, recurrent neural networks, attention mechanisms, adversarial examples and training, capsule networks and generative architectures, such as restricted Boltzman machines (RBMs), variational autoencoders and generative adversarial networks (GANs). Expanded treatment of Bayesian learning to include nonparametric Bayesian methods, with a focus on the Chinese restaurant and the Indian buffet processes. Presents the physical reasoning, mathematical modeling and algorithmic implementation of each method Updates on the latest trends, including sparsity, convex analysis and optimization, online distributed algorithms, learning in RKH spaces, Bayesian inference, graphical and hidden Markov models, particle filtering, deep learning, dictionary learning and latent variables modeling Provides case studies on a variety of topics, including protein folding prediction, optical character recognition, text authorship identification, fMRI data analysis, change point detection, hyperspectral image unmixing, target localization, and more

Dictionary Learning Algorithms and Applications - Bogdan Dumitrescu 2018-04-16

This book covers all the relevant dictionary learning algorithms, presenting them in full detail and showing their distinct characteristics while also revealing the similarities. It gives implementation tricks that are often ignored but that are crucial for a successful program. Besides MOD, K-SVD, and other standard algorithms, it provides the significant dictionary learning problem variations, such as regularization, incoherence enforcing, finding an economical size, or learning adapted to specific problems like classification. Several types of dictionary structures are treated, including shift

invariant; orthogonal blocks or factored dictionaries; and separable dictionaries for multidimensional signals. Nonlinear extensions such as kernel dictionary learning can also be found in the book. The discussion of all these dictionary types and algorithms is enriched with a thorough numerical comparison on several classic problems, thus showing the strengths and weaknesses of each algorithm. A few selected applications, related to classification, denoising and compression, complete the view on the capabilities of the presented dictionary learning algorithms. The book is accompanied by code for all algorithms and for reproducing most tables and figures. Presents all relevant dictionary learning algorithms - for the standard problem and its main variations - in detail and ready for implementation; Covers all dictionary structures that are meaningful in applications; Examines the numerical properties of the algorithms and shows how to choose the appropriate dictionary learning algorithm.

Handbook of Convex Optimization Methods in Imaging Science - Vishal Monga 2017-10-27
This book covers recent advances in image processing and imaging sciences from an optimization viewpoint, especially convex optimization with the goal of designing tractable algorithms. Throughout the handbook, the authors introduce topics on the most key aspects of image acquisition and processing that are based on the formulation and solution of novel optimization problems. The first part includes a review of the mathematical methods and foundations required, and covers topics in image quality optimization and assessment. The second part of the book discusses concepts in image formation and capture from color imaging to radar and multispectral imaging. The third part focuses on sparsity constrained optimization in image processing and vision and includes inverse problems such as image restoration and de-noising, image classification and recognition and learning-based problems pertinent to image

understanding. Throughout, convex optimization techniques are shown to be a critically important mathematical tool for imaging science problems and applied extensively. Convex Optimization Methods in Imaging Science is the first book of its kind and will appeal to undergraduate and graduate students, industrial researchers and engineers and those generally interested in computational aspects of modern, real-world imaging and image processing problems.

Image Analysis and Recognition - Aurélio Campilho 2014-10-09

The two volumes LNCS 8814 and 8815 constitute the thoroughly refereed proceedings of the 11th International Conference on Image Analysis and Recognition, ICIAR 2014, held in Vilamoura, Portugal, in October 2014. The 107 revised full papers presented were carefully reviewed and selected from 177 submissions. The papers are organized in the following topical sections: image representation and models; sparse representation; image restoration and enhancement; feature detection and image segmentation; classification and learning methods; document image analysis; image and video retrieval; remote sensing; applications; action, gestures and audio-visual recognition; biometrics; medical image processing and analysis; medical image segmentation; computer-aided diagnosis; retinal image analysis; 3D imaging; motion analysis and tracking; and robot vision.

Computer Vision – ECCV 2020 - Andrea Vedaldi 2020-10-06

The 30-volume set, comprising the LNCS books 12346 until 12375, constitutes the refereed proceedings of the 16th European Conference on Computer Vision, ECCV 2020, which was planned to be held in Glasgow, UK, during August 23-28, 2020. The conference was held virtually due to the COVID-19 pandemic. The 1360 revised papers presented in these proceedings were carefully reviewed and selected from a total of 5025 submissions. The

papers deal with topics such as computer vision; machine learning; deep neural networks; reinforcement learning; object recognition; image classification; image processing; object detection; semantic segmentation; human pose estimation; 3d reconstruction; stereo vision; computational photography; neural networks; image coding; image reconstruction; object recognition; motion estimation.

Image and Video Compression - Madhuri A. Joshi 2014-11-17

Image and video signals require large transmission bandwidth and storage, leading to high costs. The data must be compressed without a loss or with a small loss of quality. Thus, efficient image and video compression algorithms play a significant role in the storage and transmission of data. Image and Video Compression: Fundamentals, Techniques, and Applications explains the major techniques for image and video compression and demonstrates their practical implementation using MATLAB® programs. Designed for students, researchers, and practicing engineers, the book presents both basic principles and real practical applications. In an accessible way, the book covers basic schemes for image and video compression, including lossless techniques and wavelet- and vector quantization-based image compression and digital video compression. The MATLAB programs enable readers to gain hands-on experience with the techniques. The authors provide quality metrics used to evaluate the performance of the compression algorithms. They also introduce the modern technique of compressed sensing, which retains the most important part of the signal while it is being sensed.

Compressive Sensing for Wireless Networks - Zhu Han 2013-06-06

Compressive sensing is a new signal processing paradigm that aims to encode sparse signals by using far lower sampling rates than those in the traditional Nyquist approach. It helps acquire,

store, fuse and process large data sets efficiently and accurately. This method, which links data acquisition, compression, dimensionality reduction and optimization, has attracted significant attention from researchers and engineers in various areas. This comprehensive reference develops a unified view on how to incorporate efficiently the idea of compressive sensing over assorted wireless network scenarios, interweaving concepts from signal processing, optimization, information theory, communications and networking to address the issues in question from an engineering perspective. It enables students, researchers and communications engineers to develop a working knowledge of compressive sensing, including background on the basics of compressive sensing theory, an understanding of its benefits and limitations, and the skills needed to take advantage of compressive sensing in wireless networks.

Machine Learning and Medical Imaging - Guorong Wu 2016-08-11

Machine Learning and Medical Imaging presents state-of- the-art machine learning methods in medical image analysis. It first summarizes cutting-edge machine learning algorithms in medical imaging, including not only classical probabilistic modeling and learning methods, but also recent breakthroughs in deep learning, sparse representation/coding, and big data hashing. In the second part leading research groups around the world present a wide spectrum of machine learning methods with application to different medical imaging modalities, clinical domains, and organs. The biomedical imaging modalities include ultrasound, magnetic resonance imaging (MRI), computed tomography (CT), histology, and microscopy images. The targeted organs span the lung, liver, brain, and prostate, while there is also a treatment of examining genetic associations. Machine Learning and Medical Imaging is an ideal reference for medical

imaging researchers, industry scientists and engineers, advanced undergraduate and graduate students, and clinicians. Demonstrates the application of cutting-edge machine learning techniques to medical imaging problems Covers an array of medical imaging applications including computer assisted diagnosis, image guided radiation therapy, landmark detection, imaging genomics, and brain connectomics Features self-contained chapters with a thorough literature review Assesses the development of future machine learning techniques and the further application of existing techniques

Brain and Nature-Inspired Learning, Computation and Recognition - Licheng Jiao 2020-01-18

Brain and Nature-Inspired Learning, Computation and Recognition presents a systematic analysis of neural networks, natural computing, machine learning and compression, algorithms and applications inspired by the brain and biological mechanisms found in nature. Sections cover new developments and main applications, algorithms and simulations. Developments in brain and nature-inspired learning have promoted interest in image processing, clustering problems, change detection, control theory and other disciplines. The book discusses the main problems and applications pertaining to bio-inspired computation and recognition, introducing algorithm implementation, model simulation, and practical application of parameter setting. Readers will find solutions to problems in computation and recognition, particularly neural networks, natural computing, machine learning and compressed sensing. This volume offers a comprehensive and well-structured introduction to brain and nature-inspired learning, computation, and recognition. Presents an invaluable systematic introduction to brain and nature-inspired learning, computation and recognition Describes the biological

mechanisms, mathematical analyses and scientific principles behind brain and nature-inspired learning, calculation and recognition Systematically analyzes neural networks, natural computing, machine learning and compression, algorithms and applications inspired by the brain and biological mechanisms found in nature Discusses the theory and application of algorithms and neural networks, natural computing, machine learning and compression perception

Smart Machining Systems - Kunpeng Zhu 2021-11-23

This book provides the tools to enhance the precision, automation and intelligence of modern CNC machining systems. Based on a detailed description of the technical foundations of the machining monitoring system, it develops the general idea of design and implementation of smart machining monitoring systems, focusing on the tool condition monitoring system. The book is structured in two parts. Part I discusses the fundamentals of machining systems, including modeling of machining processes, mathematical basics of condition monitoring and the framework of TCM from a machine learning perspective. Part II is then focused on the applications of these theories. It explains sensory signal processing and feature extraction, as well as the cyber-physical system of the smart machining system. Its utilisation of numerous illustrations and diagrams explain the ideas presented in a clear way, making this book a valuable reference for researchers, graduate students and engineers alike.

Articulated Motion and Deformable Objects - Francisco José Perales 2016-07-06

This book constitutes the refereed proceedings of the 9th International Conference on Articulated Motion and Deformable Objects, AMDO 2016, held in Palma de Mallorca, Spain, in July 2016.The 20 papers presented were carefully reviewed and selected from 34 submissions. The conference dealt with the

following topics: advanced computer graphics and immersive videogames; human modeling and animation; human motion analysis and tracking; 3D human reconstruction and recognition; multimodal user interaction and applications; ubiquitous and social computing; design tools; input technology; programming user interfaces; 3D medical deformable models and visualization; deep learning methods for computer vision and graphics; multibiometric.

New Perspectives on Approximation and Sampling Theory - Ahmed I. Zayed 2014-11-03

Paul Butzer, who is considered the academic father and grandfather of many prominent mathematicians, has established one of the best schools in approximation and sampling theory in the world. He is one of the leading figures in approximation, sampling theory, and harmonic analysis. Although on April 15, 2013, Paul Butzer turned 85 years old, remarkably, he is still an active research mathematician. In celebration of Paul Butzer's 85th birthday, New Perspectives on Approximation and Sampling Theory is a collection of invited chapters on approximation, sampling, and harmonic analysis written by students, friends, colleagues, and prominent active mathematicians. Topics covered include approximation methods using wavelets, multi-scale analysis, frames, and special functions. New Perspectives on Approximation and Sampling Theory requires basic knowledge of mathematical analysis, but efforts were made to keep the exposition clear and the chapters self-contained. This volume will appeal to researchers and graduate students in mathematics, applied mathematics and engineering, in particular, engineers working in signal and image processing.

Intelligent Computing Theories and Application - De-Shuang Huang 2016-07-11

This two-volume set LNCS 9771 and LNCS 9772 constitutes - in conjunction with the volume LNAI 9773 - the refereed proceedings of the 12th International Conference on Intelligent

Computing, ICIC 2016, held in Lanzhou, China, in August 2016. The 221 full papers and 15 short papers of the three proceedings volumes were carefully reviewed and selected from 639 submissions. The papers are organized in topical sections such as signal processing and image processing; information security, knowledge discovery, and data mining; systems biology and intelligent computing in computational biology; intelligent computing in scheduling; information security; advances in swarm intelligence: algorithms and applications; machine learning and data analysis for medical and engineering applications; evolutionary computation and learning; independent component analysis; compressed sensing, sparse coding; social computing; neural networks; nature inspired computing and optimization; genetic algorithms; signal processing; pattern recognition; biometrics recognition; image processing; information security; virtual reality and human-computer interaction; healthcare informatics theory and methods; artificial bee colony algorithms; differential evolution; memetic algorithms; swarm intelligence and optimization; soft computing; protein structure and function prediction; advances in swarm intelligence: algorithms and applications; optimization, neural network, and signal processing; biomedical informatics and image processing; machine learning; knowledge discovery and natural language processing; nature inspired computing and optimization; intelligent control and automation; intelligent data analysis and prediction; computer vision; knowledge representation and expert system; bioinformatics.

Biometrics: Concepts, Methodologies, Tools, and Applications - Management Association, Information Resources 2016-08-30

Security and authentication issues are surging to the forefront of the research realm in global society. As technology continues to evolve, individuals are finding it easier to infiltrate

various forums and facilities where they can illegally obtain information and access. By implementing biometric authentications to these forums, users are able to prevent attacks on their privacy and security. Biometrics: Concepts, Methodologies, Tools, and Applications is a multi-volume publication highlighting critical topics related to access control, user identification, and surveillance technologies. Featuring emergent research on the issues and challenges in security and privacy, various forms of user authentication, biometric applications to image processing and computer vision, and security applications within the field, this publication is an ideal reference source for researchers, engineers, technology developers, students, and security specialists.

Sparse and Redundant Representations - Michael Elad 2014-10-20

A long long time ago, echoing philosophical and aesthetic principles that existed since antiquity, William of Ockham enounced the principle of parsimony, better known today as Ockham's razor: "Entities should not be multiplied without neces sity. " This principle enabled scientists to select the "best" physical laws and theories to explain the workings of the Universe and continued to guide scienti?c research, leadingtobeautifulresultsliketheminimaldescriptionlength approachtostatistical inference and the related Kolmogorov complexity approach to pattern recognition. However, notions of complexity and description length are subjective concepts anddependonthelanguage"spoken"whenpresentingideasandresults. The?eldof sparse representations, that recently underwent a Big Bang like expansion, explic itly deals with the Yin Yang interplay between the parsimony of descriptions and the "language" or "dictionary" used in them, and it became an extremely exciting area of investigation. It already yielded a rich crop of mathematically pleasing, deep and beautiful results that quickly translated into a

wealth of practical engineering applications. You are holding in your hands the ?rst guide book to Sparseland, and I am sure you'll ?nd in it both familiar and new landscapes to see and admire, as well as ex cellent pointers that will help you ?nd further valuable treasures. Enjoy the journey to Sparseland! Haifa, Israel, December 2009 Alfred M. Bruckstein vii Preface This book was originally written to serve as the material for an advanced one semester (fourteen 2 hour lectures) graduate course for engineering students at the Technion, Israel.

Mathematics in Image Processing - Hong-Kai Zhao 2013-06-12

The theme of the 2010 PCMI Summer School was Mathematics in Image Processing in a broad sense, including mathematical theory, analysis, computation algorithms and applications. In image processing, information needs to be processed, extracted and analyzed from visual content, such as photographs or videos. These demands include standard tasks such as compression and denoising, as well as high-level understanding and analysis, such as recognition and classification. Centered on the theme of mathematics in image processing, the summer school covered quite a wide spectrum of topics in this field. The summer school is particularly timely and exciting due to the very recent advances and developments in the mathematical theory and computational methods for sparse representation. This volume collects three self-contained lecture series. The topics are multi-resolution based wavelet frames and applications to image processing, sparse and redundant representation modeling of images and simulation of elasticity, biomechanics, and virtual surgery. Recent advances in image processing, compressed sensing and sparse representation are discussed.

Latent Variable Analysis and Signal Separation - Emmanuel Vincent 2015-08-14

This book constitutes the proceedings of the 12th International Conference on Latent

Variable Analysis and Signal Separation, LVA/ICS 2015, held in Liberec, Czech Republic, in August 2015. The 61 revised full papers presented – 29 accepted as oral presentations and 32 accepted as poster presentations – were carefully reviewed and selected from numerous submissions. Five special topics are addressed: tensor-based methods for blind signal separation; deep neural networks for supervised speech separation/enhancement; joined analysis of multiple datasets, data fusion, and related topics; advances in nonlinear blind source separation; sparse and low rank modeling for acoustic signal processing.

Advances in Control, Signal Processing and Energy Systems - Tapan Kumar Basu 2019-09-14

This book comprises select proceedings of the National Conference on Control, Signal Processing, Energy and Power Systems (CSPES 2018). The book covers topics on both theoretical control systems and their applications across engineering domains such as automatic control, robotics, and adaptive controller design. It discusses several signal processing domains such as image, speech, biomedical signal processing and their applications in IOT, control, robotics, power and energy systems. The book emphasizes both conventional and non-conventional energy, environment, and green processes as related to energy and power systems engineering. The contents of this book will prove to be useful for students, researchers, academics, and professionals.

Optical Compressive Imaging - Adrian Stern 2016-11-17

This dedicated overview of optical compressive imaging addresses implementation aspects of the revolutionary theory of compressive sensing (CS) in the field of optical imaging and sensing. It overviews the technological opportunities and challenges involved in optical design and implementation, from basic theory to optical

architectures and systems for compressive imaging in various spectral regimes, spectral and hyperspectral imaging, polarimetric sensing, three-dimensional imaging, super-resolution imaging, lens-free, on-chip microscopy, and phase sensing and retrieval. The reader will gain a complete introduction to theory, experiment, and practical use for reducing hardware, shortening image scanning time, and improving image resolution as well as other performance parameters. Optics practitioners and optical system designers, electrical and optical engineers, mathematicians, and signal processing professionals will all find the book a unique trove of information and practical guidance. Delivers the first book on compressed sensing dealing with system development for a wide variety of optical imaging and sensing applications. Covers the fundamentals of CS theory, including noise and algorithms, as well as basic design approaches for data acquisition in optics. Addresses the challenges of implementing compressed sensing theory in the context of different optical imaging designs, from 3D imaging to tomography and microscopy. Provides an essential resource for the design of new and improved devices with improved image quality and shorter acquisition times. Adrian Stern, PhD, is associate professor and head of the Electro-Optical Engineering Unit at Ben-Gurion University of the Negev, Israel. He is an elected Fellow of SPIE.

Intelligent Computing and Applications - Durbadal Mandal 2015-02-23

The idea of the 1st International Conference on Intelligent Computing and Applications (ICICA 2014) is to bring the Research Engineers, Scientists, Industrialists, Scholars and Students together from in and around the globe to present the on-going research activities and hence to encourage research interactions between universities and industries. The conference provides opportunities for the delegates to exchange new ideas, applications and

experiences, to establish research relations and to find global partners for future collaboration. The proceedings covers latest progresses in the cutting-edge research on various research areas of Image, Language Processing, Computer Vision and Pattern Recognition, Machine Learning, Data Mining and Computational Life Sciences, Management of Data including Big Data and Analytics, Distributed and Mobile Systems including Grid and Cloud infrastructure, Information Security and Privacy, VLSI, Electronic Circuits, Power Systems, Antenna, Computational fluid dynamics & Heat transfer, Intelligent Manufacturing, Signal Processing, Intelligent Computing, Soft Computing, Bio-informatics, Bio Computing, Web Security, Privacy and E-Commerce, E-governance, Service Orient Architecture, Data Engineering, Open Systems, Optimization, Communications, Smart wireless and sensor Networks, Smart Antennae, Networking and Information security, Machine Learning, Mobile Computing and Applications, Industrial Automation and MES, Cloud Computing, Green IT, IT for Rural Engineering, Business Computing, Business Intelligence, ICT for Education for solving hard problems, and finally to create awareness about these domains to a wider audience of practitioners.

Curves and Surfaces - Jean-Daniel Boissonnat 2012-01-06

This volume constitutes the thoroughly refereed post-conference proceedings of the 7th International Conference on Curves and Surfaces, held in Avignon, in June 2010. The conference had the overall theme: "Representation and Approximation of Curves and Surfaces and Applications". The 39 revised full papers presented together with 9 invited talks were carefully reviewed and selected from 114 talks presented at the conference. The topics addressed by the papers range from mathematical foundations to practical implementation on modern graphics processing

units and address a wide area of topics such as computer-aided geometric design, computer graphics and visualisation, computational geometry and topology, geometry processing, image and signal processing, interpolation and smoothing, scattered data processing and learning theory and subdivision, wavelets and multi-resolution methods.

High-Dimensional Data Analysis with Low-Dimensional Models - John Wright 2022-01-13

Connects fundamental mathematical theory with real-world problems, through efficient and scalable optimization algorithms.

Computer Vision – ECCV 2012 - Andrew Fitzgibbon 2012-09-26

The seven-volume set comprising LNCS volumes 7572-7578 constitutes the refereed proceedings of the 12th European Conference on Computer Vision, ECCV 2012, held in Florence, Italy, in October 2012. The 408 revised papers presented were carefully reviewed and selected from 1437 submissions. The papers are organized in topical sections on geometry, 2D and 3D shapes, 3D reconstruction, visual recognition and classification, visual features and image matching, visual monitoring: action and activities, models, optimisation, learning, visual tracking and image registration, photometry: lighting and colour, and image segmentation.

Image and Signal Processing - Abderrahim Elmoataz 2014-06-04

This book constitutes the refereed proceedings of the 6th International Conference, ICISP 2014, held in June/July 2014 in Cherbourg, France. The 76 revised full papers were carefully reviewed and selected from 164 submissions. The contributions are organized in topical sections on multispectral colour science, color imaging and applications, digital cultural heritage, document image analysis, graph-based representations, image filtering and representation, computer vision and pattern recognition, computer graphics, biomedical, and signal processing.

Optical Flow and Trajectory Estimation Methods - Joel Gibson 2016-09-01

This brief focuses on two main problems in the domain of optical flow and trajectory estimation: (i) The problem of finding convex optimization methods to apply sparsity to optical flow; and (ii) The problem of how to extend sparsity to improve trajectories in a computationally tractable way. Beginning with a review of optical flow fundamentals, it discusses the commonly used flow estimation strategies and the advantages or shortcomings of each. The brief also introduces the concepts associated with sparsity including dictionaries and low rank matrices. Next, it provides context for optical flow and trajectory methods including algorithms, data sets, and performance measurement. The second half of the brief covers sparse regularization of total variation optical flow and robust low rank trajectories. The authors describe a new approach that uses partially-overlapping patches to accelerate the calculation and is implemented in a coarse-to-fine strategy. Experimental results show that combining total variation and a sparse constraint from a learned dictionary is more effective than employing total variation alone. The brief is targeted at researchers and practitioners in the fields of engineering and computer science. It caters particularly to new researchers looking for cutting edge topics in optical flow as well as veterans of optical flow wishing to learn of the latest advances in multi-frame methods. /div

A Wavelet Tour of Signal Processing - Stephane Mallat 1999-09-14

This book is intended to serve as an invaluable reference for anyone concerned with the application of wavelets to signal processing. It has evolved from material used to teach "wavelet signal processing" courses in electrical engineering departments at Massachusetts Institute of Technology and Tel Aviv University, as well as applied mathematics departments at the Courant Institute of New York University

and École Polytechnique in Paris. Provides a broad perspective on the principles and applications of transient signal processing with wavelets Emphasizes intuitive understanding, while providing the mathematical foundations and description of fast algorithms Numerous examples of real applications to noise removal, deconvolution, audio and image compression, singularity and edge detection, multifractal analysis, and time-varying frequency measurements Algorithms and numerical examples are implemented in Wavelab, which is a Matlab toolbox freely available over the Internet Content is accessible on several level of complexity, depending on the individual reader's needs New to the Second Edition Optical flow calculation and video compression algorithms Image models with bounded variation functions Bayes and Minimax theories for signal estimation 200 pages rewritten and most illustrations redrawn More problems and topics for a graduate course in wavelet signal processing, in engineering and applied mathematics

Curves and Surfaces - Pierre-Jean Laurent 2014-05-12

Curves and Surfaces provides information pertinent to the fundamental aspects of approximation theory with emphasis on approximation of images, surface compression, wavelets, and tomography. This book covers a variety of topics, including error estimates for multiquadratic interpolation, spline manifolds, and vector spline approximation. Organized into 77 chapters, this book begins with an overview of the method, based on a local Taylor expansion of the final curve, for computing the parameter values. This text then presents a vector approximation based on general spline function theory. Other chapters consider a nonparametric technique for estimating under random censorship the amplitude of a change point in change point hazard models. This book discusses as well the algorithm for ray tracing rational

parametric surfaces based on inversion and implicitization. The final chapter deals with the results concerning the norm of the interpolation operator and error estimates for a square domain. This book is a valuable resource for mathematicians.

Structural Health Monitoring - Ruqiang Yan 2017-04-29

This book highlights the latest advances and trends in advanced signal processing (such as wavelet theory, time-frequency analysis, empirical mode decomposition, compressive sensing and sparse representation, and stochastic resonance) for structural health monitoring (SHM). Its primary focus is on the utilization of advanced signal processing techniques to help monitor the health status of critical structures and machines encountered in our daily lives: wind turbines, gas turbines, machine tools, etc. As such, it offers a key reference guide for researchers, graduate students, and industry professionals who work in the field of SHM.

Emerging Technologies in Intelligent Applications for Image and Video Processing - Santhi, V. 2016-01-07

Image and Video Processing is an active area of research due to its potential applications for solving real-world problems. Integrating computational intelligence to analyze and interpret information from image and video technologies is an essential step to processing and applying multimedia data. Emerging Technologies in Intelligent Applications for Image and Video Processing presents the most current research relating to multimedia technologies including video and image restoration and enhancement as well as algorithms used for image and video compression, indexing and retrieval processes, and security concerns. Featuring insight from researchers from around the world, this publication is designed for use by engineers, IT specialists, researchers, and graduate level

students.

Sparse and Redundant Representations - Michael Elad 2010-08-12

A long long time ago, echoing philosophical and aesthetic principles that existed since antiquity, William of Ockham enounced the principle of parsimony, better known today as Ockham's razor: "Entities should not be multiplied without neces sity. " This principle enabled scientists to select the "best" physical laws and theories to explain the workings of the Universe and continued to guide scienti?c research, leadingtobeautifulresultslikettheminimaldescripti onlength approachtostatistical inference and the related Kolmogorov complexity approach to pattern recognition. However, notions of complexity and description length are subjective concepts anddependonthelanguage"spoken"whenpresenti ngideasandresults. The?eldof sparse representations, that recently underwent a Big Bang like expansion, explic itly deals with the Yin Yang interplay between the parsimony of descriptions and the "language" or "dictionary" used in them, and it became an extremely exciting area of investigation. It already yielded a rich crop of mathematically pleasing, deep and beautiful results that quickly translated into a wealth of practical engineering applications. You are holding in your hands the ?rst guide book to Sparseland, and I am sure you'll ?nd in it both familiar and new landscapes to see and admire, as well as ex cellent pointers that will help you ?nd further valuable treasures. Enjoy the journey to Sparseland! Haifa, Israel, December 2009 Alfred M. Bruckstein vii Preface This book was originally written to serve as the material for an advanced one semester (fourteen 2 hour lectures) graduate course for engineering students at the Technion, Israel.

Theory and Applications of Dependable Computer Systems - Wojciech Zamojski 2020-05-21

This book presents selected papers from the

Fifteenth International Conference on Dependability of Computer Systems (DepCoS-RELCOMEX), which illustrate the diversity of theoretical problems in analysis of performability, reliability and security of contemporary computer systems. Covering also methodologies and practical tools involved in this field, it is a valuable reference resource for scientists, researchers, practitioners and students who are dealing with these subjects. Established in 2006, DepCoS-RELCOMEX is an annual conference series organised by Wrocław University of Science and Technology. It focuses on the dependability and performability of contemporary computer systems – topics that can provide solutions to new challenges in evaluation of their reliability and efficiency. Since they are probably the most complex technical systems ever engineered by humans, the organization of modern computer systems cannot be modelled and analysed solely as structures (however complex and distributed) built only on the basis of technical resources. Instead they should be considered as a unique blend of interacting people (their needs and behaviours), networks (together with mobile properties, iCloud organisation, Internet of Everything) and a large number of users dispersed geographically and producing an unimaginable number of applications. This new, interdisciplinary approach is developing a continually increasing range of methods which apply also the latest findings in artificial intelligence (AI) and computational intelligence (CI).

Blind Source Separation - Ganesh R. Naik 2014-05-21

Blind Source Separation intends to report the new results of the efforts on the study of Blind Source Separation (BSS). The book collects novel research ideas and some training in BSS, independent component analysis (ICA), artificial intelligence and signal processing applications. Furthermore, the research results previously

scattered in many journals and conferences worldwide are methodically edited and presented in a unified form. The book is likely to be of interest to university researchers, R&D engineers and graduate students in computer science and electronics who wish to learn the core principles, methods, algorithms and applications of BSS. Dr. Ganesh R. Naik works at University of Technology, Sydney, Australia; Dr. Wenwu Wang works at University of Surrey, UK.

Smart Algorithms for Multimedia and Imaging - Michael N. Rychagov 2021-05-05

This book presents prospective, industrially proven methods and software solutions for storing, processing, and viewing multimedia content on digital cameras, camcorders, TV, and mobile devices. Most of the algorithms described here are implemented as systems on chip firmware or as software products and have low computational complexity and memory consumption. In the four parts of the book, which contains a total of 16 chapters, the authors address solutions for the conversion of images and videos by super-resolution, depth estimation and control and mono-to-stereo (2D to 3D) conversion; display applications by video editing; the real-time detection of sport episodes; and the generation and reproduction of natural effects. The practical principles of machine learning are illustrated using technologies such as image classification as a service, mobile user profiling, and automatic view planning with dictionary-based compressed sensing in magnetic resonance imaging. The implementation of these technologies in mobile devices is discussed in relation to algorithms using a depth camera based on a colour-coded aperture, the animated graphical abstract of an image, a motion photo, and approaches and methods for iris recognition on mobile platforms. The book reflects the authors' practical experience in the development of algorithms for industrial R&D and the commercialization of technologies. Explains digital techniques for

digital cameras, camcorders, TV, mobile devices; Offers essential algorithms for the processing pipeline in multimedia devices and accompanying software tools; Features advanced topics on data processing, addressing current technology challenges.

Geometrical Multiresolution Adaptive Transforms - Agnieszka Lisowska 2014-03-24

Modern image processing techniques are based on multiresolution geometrical methods of image representation. These methods are efficient in sparse approximation of digital images. There is a wide family of functions called simply 'X-lets', and these methods can be divided into two groups: the adaptive and the nonadaptive. This book is devoted to the adaptive methods of image approximation, especially to multismoothlets. Besides multismoothlets, several other new ideas are also covered. Current literature considers the black and white images with smooth horizon function as the model for sparse approximation but here, the class of blurred multihorizon is introduced, which is then used in the approximation of images with multiedges. Additionally, the semi-anisotropic model of multiedge representation, the introduction of the shift invariant multismoothlet transform and sliding multismoothlets are also covered. Geometrical Multiresolution Adaptive Transforms should be accessible to both mathematicians and computer scientists. It is suitable as a professional reference for students, researchers and engineers, containing many open problems and will be an excellent starting point for those who are beginning new research in the area or who want to use geometrical multiresolution adaptive methods in image processing, analysis or compression.

Independent Component Analysis and Blind Signal Separation - Carlos G. Puntonet 2004-09-17

tionsalso,apartfromsignalprocessing,withother?eldssuchasstatisticsandarti?cial neuralnetworks.

As long as we can ?nd a system that emits signals propagated through a mean, andthosesignalsarereceivedbyasetofsensorsandt hereisaninterestinrecovering the originalsources,we have a potential?eld ofapplication forBSS and ICA. Inside thatwiderangeofapplicationswecan?nd,forinstanc e:noisereductionapplications, biomedicalapplications,audiosystems,telecommu nications,andmanyothers. This volume comes out just 20 years after the ?rst contributionsin ICA and BSS 1 appeared . Thereinafter,the numberof research groupsworking in ICA and BSS has been constantly growing, so that nowadays we can estimate that far more than 100 groupsareresearchinginthese?elds. Asproofoftherecognitionamongthescienti?ccomm unityofICAandBSSdev- opmentstherehavebeennumerousspecialsessions andspecialissuesinseveralwell- 1 J.Herault, B.Ans,“Circuits neuronaux à synapses modi?ables: décodage de messages c- posites para apprentissage non supervise”, C.R. de l'Académie des Sciences, vol. 299, no. III-13,pp.525–528,1984.