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Image Super-Resolution and Applications Springer

Deep Learning through Sparse Representation and Low-Rank Modeling bridges classical sparse and low rank models-those that emphasize problem-specific Interpretability-with recent deep network models that have enabled a larger learning capacity and better utilization of BigData. It shows how the toolkit of deep learning is closely tied with the sparse/low rank methods and algorithms, providing a rich variety of theoretical and analytic tools to guide the design and interpretation of deep learning models. The development of the theory and models is supported by a wide variety of applications in computer vision, machine learning, signal processing, and data mining. This book will be highly useful for researchers, graduate students and practitioners working in the fields of computer vision, machine learning, signal processing, optimization and statistics. Combines classical sparse and low-rank models and algorithms with the latest advances in deep learning networks Shows how the structure and algorithms of sparse and low-rank methods improves the performance and interpretability of Deep Learning models Provides tactics on how to build and apply customized deep learning models for various applications

2020 IEEE CVF Conference on Computer Vision and Pattern Recognition (CVPR) John Wiley & Sons

Example-Based Super Resolution provides a thorough introduction and overview of example-based super resolution, covering the most successful algorithmic approaches and theories behind them with implementation insights. It also describes current challenges and explores future trends. Readers of this book will be able to understand the latest natural image patch statistical models and the performance limits of example-based super resolution algorithms, select the best state-of-the-art algorithmic alternative and tune it for specific use cases, and quickly put into practice implementations of the latest and most successful example-based super-resolution methods. Provides detailed coverage of techniques and implementation details that have been successfully introduced in diverse and demanding real-world applications Covers a wide variety of machine learning approaches, ranging from cross-scale self-similarity concepts and sparse coding, to the latest advances in deep learning Presents a statistical interpretation of the subspace of natural image patches that transcends super resolution and makes it a valuable source for any researcher on image processing or low-level vision

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Smart and Sustainable Intelligent Systems CRC Press
This thesis is focussed on super-resolution (SR) methods for improving automatic recognition
system (Optical Character Recognition, face recognition) in realistic contexts. SR methods
allow to generate high resolution images from low resolution ones. Unlike upsampling methods
such as interpolation, they restore spatial high frequencies and compensate artefacts such as
blur or jaggy edges. In particular, example-based approaches learn and model the relationship
between low and high resolution spaces via pairs of low and high resolution images. Artificial
Neural Networks are among the most efficient systems to address this problem. This work
demonstrate the interest of SR methods based on neural networks for improved automatic
recognition systems. By adapting the data, it is possible to train such Machine Learning
algorithms to produce high-resolution images. Convolutional Neural Networks are especially
efficient as they are trained to simultaneously extract relevant non-linear features while
learning the mapping between low and high resolution spaces. On document text images, the
proposed method improves OCR accuracy by +7.85 points compared with simple interpolation. The
creation of an annotated image dataset and the organisation of an international competition
(ICDAR2015) highlighted the interest and the relevance of such approaches. Moreover, if a
priori knowledge is available, it can be used by a suitable network architecture. For facial
images, face features are critical for automatic recognition. A two step method is proposed in
which image resolution is first improved, followed by specialised models that focus on the
essential features. An off-the-shelf face verification system has its performance improved
from +6.91 up to +8.15 points. Finally, to address the variability of real-world low-
resolution images, deep neural networks allow to absorb the diversity of the blurring kernels
that characterise the low-resolution images. With a single model, high-resolution images are
produced with natural image statistics, without any knowledge of the actual observation model
of the low-resolution image.
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Super Resolution of Images and Video Academic Press

The conference solicits high quality original research papers in any aspect of multimedia big data Topics include, but are not limited to New theory and models for multimedia big data computing Ultra high efficiency compression, coding and transmission for multimedia big data Content analysis and mining for multimedia big data Semantic retrieval of multimedia big data Deep learning and cloud computing for multimedia big data Green computing for multimedia big data (e g, high efficiency storage) Security and privacy in multimedia big data Multimedia big data systems Novel and incentive applications of multimedia big data in various fields (e g, search, healthcare, transportation, retail)

Image-Based Rendering Springer

Introduces the detailed basis and recent development of single molecule/particle nanocatalysis based on single molecule techniques This unique book introduces and summarizes the recent development of single molecule/particle nanocatalysis to provide both comprehensive coverage of fundamentals for different methods now in widespread use and the extensive applications in different catalytic systems. Chapters are mainly based on different detection methods, including single molecule fluorescence microscopy, surface plasmon resonance spectroscopy, X-ray microscopy, and surface enhanced Raman spectroscopy. The book also includes numerous basic principles of different methods and application examples and features illustrations that help clarify presentations. Single Particle Nanocatalysis: Fundamentals and Applications starts with the history and development of single molecule techniques for nanocatalysis. It then shows readers how single molecule fluorescence microscopy (SMFM) reveals catalytic kinetics and dynamics of individual nanocatalysts. Next, it examines traditional SMFM-based single molecule nanocatalysis without super-resolution (SR) imaging, before moving on to the topic of SMFM-based SR imaging in single molecule nanocatalysis. Following chapters cover scanning electrochemical microscopy for single particle nanocatalysis; surface plasmon resonance spectroscopy for single particle nanocatalysis/reactions; X-ray-based microscopy of single-particle nanocatalysis; and surface-enhanced Raman spectroscopy for single particle nanocatalysis. The book finishes by introducing some less-practiced techniques for single particle nanocatalysis/electrochemistry. -Presents a systematical and complete introduction to the subject of single particle nanocatalysis?covering all of its fundamentals and applications -Helps readers fully understand the basis, role, and recent development of single molecule nanocatalysis -Teaches researchers how to gain new knowledge to successfully conduct their own studies within this rapidly increasing new area of research Single Particle Nanocatalysis: Fundamentals and Applications is an excellent reference book for experts in this area as well as for general researchers who want to learn how to study nanocatalysis at single molecule/particle level.

High Resolution Imaging in Microscopy and Ophthalmology Oxford University Press

This book describes how to see atoms using electron microscopes. This new edition includes updated sections on applications and new uses of atomic-resolution transmission electron microscopy. Several new chapters and sources of software for image interpretation and electron-optical design have also been added.

Single Image Super-resolution Based on Neural Networks for Text and Face Recognition Springer Science & Business Media

This open access book provides a comprehensive overview of the application of the newest laser and microscope/ophthalmoscope technology in the field of high resolution imaging in microscopy and ophthalmology. Starting by describing High-Resolution 3D Light Microscopy with STED and RESOLFT, the book goes on to cover retinal and anterior segment imaging and image-guided treatment and also discusses the development of adaptive optics in vision science and ophthalmology. Using an interdisciplinary approach, the reader will learn about the latest developments and most up to date technology in the field and how these translate to a medical setting. High Resolution Imaging in Microscopy and Ophthalmology – New Frontiers in Biomedical Optics has been written by leading experts in the field and offers insights on engineering, biology, and medicine, thus being a valuable addition for scientists, engineers, and clinicians with technical and medical interest who would like to understand the equipment, the applications and the medical/biological background. Lastly, this book is dedicated to the memory of Dr. Gerhard Zinser, co-founder of Heidelberg Engineering GmbH, a scientist, a husband, a brother, a colleague, and a friend.

Bildverarbeitung für die Medizin 2019 CRC Press

This book contains some selected papers from the International Conference on Extreme Learning Machine 2015, which was held in Hangzhou, China, December 15-17, 2015. This conference brought together researchers and engineers to share and exchange R&D experience on both theoretical studies and practical applications of the Extreme Learning Machine (ELM) technique and brain learning. This book covers theories, algorithms ad applications of ELM. It gives readers a glance of the most recent advances of ELM.

Single Molecule Tools, Part B: Super-Resolution, Particle Tracking, Multiparameter, and Force Based Methods Springer Nature

The rapid increase in computing power and communication speed, coupled with computer storage facilities availability, has led to a new age of multimedia app- cations. Multimedia is practically everywhere and all around us we can feel its presence in almost all applications ranging from online video databases, IPTV, - teractive multimedia and more recently in multimedia based social interaction. These new growing applications require high-quality data storage, easy access to multimedia content and reliable delivery. Moving ever closer to commercial - ployment also aroused a higher awareness of security and intellectual property management issues. All the aforementioned requirements resulted in higher demands on various - eas of research (signal processing, image/video processing and analysis, com- nication protocols, content search, watermarking, etc.). This book covers the most prominent research issues in multimedia and is divided into four main sections: i) content based retrieval, ii) storage and remote access, iii) watermarking and co- right protection and iv) multimedia applications. Chapter 1 of the first section presents an analysis on how color is used and why is it crucial in nowadays multimedia applications. In chapter 2 the authors give an overview of the advances in video abstraction for fast content browsing, transm- sion, retrieval and skimming in large video databases and chapter 3 extends the discussion on video summarization even further. Content retrieval problem is tackled in chapter 4 by describing a novel method for producing meaningful s- ments suitable for MPEG-7 description based on binary partition trees (BPTs).

Recent Advances in Fluorescent Probes for Super-Resolution Microscopy John Wiley & Sons

A comprehensive volume that brings together authoritative overviews of single molecule science techniques from a biological perspective.

Deep Learning through Sparse and Low-Rank Modeling Springer Nature

The world is experiencing an unprecedented period of change and growth through all the electronic and technilogical developments and everyone on the planet has been impacted. What was once 'science fiction', today it is a reality. This book explores the world of many of once unthinkable advancements by explaining current technologies in great detail. Each chapter focuses on a different aspect - Machine Vision, Pattern Analysis and Image Processing - Advanced Trends in Computational Intelligence and Data Analytics - Futuristic Communication Technologies - Disruptive Technologies for Future Sustainability. The chapters include the list of topics that spans all the areas of smart intelligent systems and computing such

as: Data Mining with Soft Computing, Evolutionary Computing, Quantum Computing, Expert Systems, Next Generation Communication, Blockchain and Trust Management, Intelligent Biometrics, Multi-Valued Logical Systems, Cloud Computing and security etc. An extensive list of bibliographic references at the end of each chapter guides the reader to probe further into application area of interest to him/her.

Super-Resolution Imaging Springer Nature

This book is devoted to the issue of image super-resolution—obtaining high-resolution images from single or multiple low-resolution images. Although there are numerous algorithms available for image interpolation and super-resolution, there's been a need for a book that establishes a common thread between the two processes. Filling this need, Image Super-Resolution and Applications presents image interpolation as a building block in the super-resolution reconstruction process. Instead of approaching image interpolation as either a polynomial-based problem or an inverse problem, this book breaks the mold and compares and contrasts the two approaches. It presents two directions for image super-resolution: super-resolution with a priori information and blind super-resolution reconstruction of images. It also devotes chapters to the two complementary steps used to obtain high-resolution images: image registration and image fusion. Details techniques for color image interpolation and interpolation for pattern recognition Analyzes image interpolation as an inverse problem Presents image registration methodologies Considers image fusion and its application in image super resolution Includes simulation experiments along with the required MATLAB® code Supplying complete coverage of image-super resolution and its applications, the book illustrates applications for image interpolation and super-resolution in medical and satellite image processing. It uses MATLAB® programs to present various techniques, including polynomial image interpolation and adaptive polynomial image interpolation. MATLAB codes for most of the simulation experiments supplied in the book are included in the appendix.

ICDSMLA 2020 Springer Science & Business Media

The first source on this expanding analytical science, this reference explores advances in the instrumentation, design, and application of techniques with electrogenerated chemiluminescence (ECL), examining the use and impact of ECL-based assays in clinical diagnostics, life science research, environmental testing, food and water evaluation, and th

2018 IEEE Fourth International Conference on Multimedia Big Data (BigMM) John Wiley & Sons

This two-volume book presents outcomes of the 7th International Conference on Soft Computing for Problem Solving, SocProS 2017. This conference is a joint technical collaboration between the Soft Computing Research Society, Liverpool Hope University (UK), the Indian Institute of Technology Roorkee, the South Asian University New Delhi and the National Institute of Technology Silchar, and brings together researchers, engineers and practitioners to discuss thought-provoking developments and challenges in order to select potential future directions The book presents the latest advances and innovations in the interdisciplinary areas of soft computing, including original research papers in the areas including, but not limited to, algorithms (artificial immune systems, artificial neural networks, genetic algorithms, genetic programming, and particle swarm optimization) and applications (control systems, data mining and clustering, finance, weather forecasting, game theory, business and forecasting applications). It is a valuable resource for both young and experienced researchers dealing with complex and intricate real-world problems for which finding a solution by traditional methods is a difficult task.

High-Resolution Electron Microscopy John Wiley & Sons

In den letzten Jahren hat sich der Workshop "Bildverarbeitung für die Medizin" durch erfolgreiche Veranstaltungen etabliert. Ziel ist auch 2019 wieder die Darstellung aktueller Forschungsergebnisse und die Vertiefung der Gespräche zwischen Wissenschaftlern, Industrie und Anwendern. Die Beiträge dieses Bandes - einige davon in englischer Sprache - umfassen alle Bereiche der medizinischen Bildverarbeitung, insbesondere Bildgebung und -akquisition, Maschinelles Lernen, Bildsegmentierung und Bildanalyse, Visualisierung und Animation, Zeitreihenanalyse, Computerunterstützte Diagnose, Biomechanische Modellierung, Validierung und Qualitätssicherung, Bildverarbeitung in der Telemedizin u.v.m.

Image Mosaicing and Super-resolution Springer Science & Business Media

Authors Katsaggelos, Molina, and Mateos present in a systematic way the building blocks of the Bayesian framework, which is also used as a reference in reviewing and comparing Super Resolution (SR) approaches which have appeared in the literature. This work should serve as a reference to the graduate student who would like to work in this area, to the practicing engineer, and scientists applying some of the tools and results to other related problems.The authors present a case that there is a strong relationship between the tools and techniques developed for SR and a number of other inverse problems encountered in signal processing (e.g., image restoration, and motion estimation). SR techniques can also be an integral part of an image and video codec and they can drive the development of new coder-decoders (codecs) and standards.

Super-Resolution Imaging in Biomedicine CRC Press

Power, Energy and High Voltage Engineering Signal and Image Processing Computer, Embedded and Intelligent Systems and Data Engineering Communication and Information Technology Control, Robotics and Automation Electronics, Instrumentation and Bio Medical Engineering

Proceedings of ELM-2015 Volume 2 Springer

This book encompasses the full breadth of the super-resolution imaging field, representing modern techniques that exceed the traditional diffraction limit, thereby opening up new applications in biomedicine. It shows readers how to use the new tools to increase resolution in sub-nanometer-scale images of living cells and tissue, which leads to new information about molecules, pathways and dynamics. The book highlights the advantages and disadvantages of the techniques, and gives state-of-the-art examples of applications using microscopes currently available on the market. It covers key techniques such as stimulated emission depletion (STED), structured illumination microscopy (SSIM), photoactivated localization microscopy (PALM), and stochastic optical reconstruction microscopy (STORM). It will be a useful reference for biomedical researchers who want to work with super-resolution imaging, learn the proper technique for their application, and simultaneously obtain a solid footing in other techniques.

Super-Resolution Microscopy Springer

This book is intended to attract the attention of practitioners and researchers in academia and industry interested in challenging paradigms of image and video coding algorithms with an emphasis on recent technological developments. All the chapters are well demonstrated by various researchers around the world covering the field of image and video processing. This book highlights the current research in the image and video processing area such as image fusion, image segmentation and classification, image compression, machine vision algorithms and video compression. The entire work available in the book is mainly focusing on researchers who can do quality research in the area of image and video processing and related fields. Each chapter is an independent research which will definitely motivate the young researchers to ponder into. These eleven chapters available in five sections will be an eye-opener for all who are doing systematic research in these fields.

Pattern Recognition Springer

This book encompasses the full breadth of the super-resolution imaging field, representing modern techniques that exceed the traditional diffraction limit, thereby opening up new applications in biomedicine. It shows readers how to use the new tools to increase resolution in sub-nanometer-scale images of living cells and tissue, which leads to new information about molecules, pathways and dynamics. The book highlights the advantages and disadvantages of the techniques, and gives state-of-the-art examples of applications using microscopes currently available on the market. It covers key techniques such as stimulated emission depletion (STED), structured illumination microscopy (SSIM), photoactivated localization microscopy (PALM), and stochastic optical reconstruction microscopy (STORM). It will be a useful reference for biomedical researchers who want to work with super-