Image Processing, Computer Vision & Pattern Recognition Knowledge

**Face Biometrics for Personal Identification**

**Multi-Sensory Multi-Modal Systems**

R. I. Hammoud, Delphi Electronics and Safety, Kokomo, IN, USA; B. R. Abidi, M. A. Abidi, The University of Tennessee, Knoxville, TN, USA (Eds.)

This book provides ample coverage of theoretical and experimental state-of-the-art work as well as new trends and directions in the biometrics field. It offers students and software engineers a thorough understanding of how some core low-level building blocks of a multi-biometric system are implemented. While this book covers a range of biometric traits, its main emphasis is placed on multi-sensory and multi-modal face biometrics algorithms and systems.

2007. XV, 275 p. 118 illus., 76 in color. (Signals and Communication Technology) Hardcover

ISBN 978-3-540-49344-0

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**Data Complexity in Pattern Recognition**

M. Basu, City University of New York, NY, USA; T. K. Ho, Bell Laboratories, Murray Hill, NJ, USA (Eds.)

Automatic pattern recognition has uses in science and engineering, social sciences and finance. This book examines data complexity and its role in shaping theory and techniques across many disciplines, probing strengths and deficiencies of current classification techniques, and the algorithms that drive them. The book offers guidance on choosing pattern recognition classification techniques, and helps the reader set expectations for classification performance.

2006. XIV, 300 p. (Advanced Information and Knowledge Processing) Hardcover

Imaging for Detection and Identification

J. Byrnes, Prometheus Inc., Newport, USA (Ed.)

This volume brings together many of the world’s leading experts in the development of new imaging methodologies to detect, identify, and counter security threats to society. It covers three broadly defined but interrelated areas: the mathematics and computer science of automatic detection and identification; image processing techniques for radar and sonar; and detection of anomalies in biomedical and chemical images. Written by experts from academia, government and industry. Accessible to a broad audience of scientists, engineers and mathematicians.


View-Dependent Character Animation

P. Chaudhuri, P. Kalra, S. Banerjee, Indian Institute of Technology, Delhi, India

Computer generated 3D animation has matured over the years into a complex art form. Creating moving camera character animations in 3D is a multi-faceted computer graphics and computer vision problem that requires a formal representation of the moving camera, and efficient algorithms to help author manage and render the multitude of character poses required for the animation. This well-researched book introduces view-dependent character animation, covering all the relevant background work.

2007. XII, 134 p. Hardcover

Digital Image Processing
An Algorithmic Introduction using Java

W. Burger, Fachhochschule Hagenberg, Österreich; M. J. Burge, National Science Foundation, Arlington, VA, USA

ISBN 978-1-84628-379-6 $69.95

Signal Processing for Image Enhancement and Multimedia Processing

E. Damiani, University of Milan, Italy; A. Dipanda, K. Yetongnon, L. Legrand, University of Dijon, France; P. Schelkens, Vrije University of Brussels, Belgium (Eds.)


Imaging Beyond the Pinhole Camera

K. Daniilidis, University of Pennsylvania, Philadelphia, PA, USA; R. Klette, The University of Auckland, New Zealand (Eds.)

This book traces progress in photography since the first pinhole, or camera obscura, architecture. The authors describe innovations such as photogrammetry, and omnidirectional vision for robotic navigation. The text shows how new camera architectures create a need to master related projective geometries for calibration, binocular stereo, static or dynamic scene understanding. Written by leading researchers in the field, this book also explores applications of alternative camera architectures.

2006. XII, 366 p. (Computational Imaging and Vision, Volume 33) Hardcover
**Machine Learning Techniques for Multimedia**

Y. Gong, NEC Laboratories America, Inc., San Jose, CA, USA; W. Xu, NEC Laboratories America, Inc., Cupertino, CA, USA

This volume introduces machine learning techniques that are particularly powerful and effective for modeling multimedia data and common tasks of multimedia content analysis. It systematically covers key machine learning techniques in an intuitive fashion and demonstrates their applications through case studies. Coverage includes examples of unsupervised learning, generative models and discriminative models. In addition, the book examines Maximum Margin Markov (M3) networks, which strive to combine the advantages of both the graphical models and Support Vector Machines (SVM).


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**Markov Models for Pattern Recognition**

From Theory to Applications

G. A. Fink, University of Dortmund, Germany

This comprehensive introduction to the Markov modeling framework describes the underlying theoretical concepts of Markov models as used for sequential data, covering Hidden Markov models and Markov chain models. It also presents the techniques necessary to build successful systems for practical applications. In addition, the book demonstrates the actual use of the technology in the three main application areas of pattern recognition methods based on Markov-Models: speech recognition, handwriting recognition, and biological sequence analysis. The book is suitable for experts as well as for practitioners.

ISBN 978-3-540-71766-9

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**Precision Landmark Location for Machine Vision and Photogrammetry**

Finding and Achieving the Maximum Possible Accuracy

J. A. Gutierrez, Emerson Corporation, St. Louis, MO, USA; B. S. Armstrong, University of Wisconsin, Milwaukee, WI, USA

This book addresses the problem of measurement error associated with determining the location of landmarks in images. The least possible photogrammetric uncertainty in a given situation is determined using the Cramér–Rao Lower Bound (CRLB). The monograph provides the reader with: the most complete treatment to date of precision landmark location and the engineering aspects of image capture and processing; detailed theoretical treatment of the CRLB, and more.

Mathematical Problems in Image Processing
Partial Differential Equations and the Calculus of Variations

G. Aubert, Université de Nice Sophia-Antipolis, Nice, France; P. Kornprobst, INRIA, Sophia Antipolis, France

The updated 2nd edition of this book presents a variety of image analysis applications, reviews their precise mathematics and shows how to discretize them. For the mathematical community, the book shows the contribution of mathematics to this domain, and highlights unsolved theoretical questions. For the computer vision community, it presents a clear, self-contained and global overview of the mathematics involved in image processing problems. The second edition offers a review of progress in image processing applications covered by the PDE framework, and updates the existing material. The book also provides programming tools for creating simulations with minimal effort.


Advances in Discrete Tomography and Its Applications

G. T. Herman, The City University of New York, New York, NY, USA; A. Kuba, University of Szeged, Szeged, Hungary (Eds.)

The book provides a unified presentation of new methods, algorithms, and select applications that are the foundations of multidimensional image construction and reconstruction. The self-contained survey chapters, written by leading mathematicians, engineers, and computer scientists, present cutting-edge research and results in the field. Three main areas are covered: theoretical results, algorithms, and practical applications. Following an historical and introductory overview of the field, the book explores the various mathematical and computational problems of discrete tomography with an emphasis on new applications.


Signal Processing Methods for Music Transcription

A. Klapuri, Tampere University of Technology, Tampere, Finland; M. Davy, Ecole Centrale de Lille, Villeneuve d’Ascq, France (Eds.)

This is the first book dedicated to uniting research related to signal processing algorithms and models for various aspects of music transcription such as pitch analysis, rhythm analysis, percussion transcription, source separation, instrument recognition, and music structure analysis. Following a clearly structured pattern, each chapter provides a comprehensive review of the existing methods for a certain subtopic while covering the most important state-of-the-art methods in detail.

2006. XII, 440 p. 124 illus. Hardcover
ISBN 978-0-387-30667-4

3D Imaging for Safety and Security

A. Koschan, The University of Tennessee, Knoxville, TN, USA; M. Pollefeys, University of North Carolina at Chapel Hill, NC, USA; M. Abidi, The University of Tennessee, Knoxville, TN, USA (Eds.)

The past decades have seen significant improvements in 3D imaging where the related techniques and technologies have advanced to a mature state. These exciting developments have sparked increasing interest in industry and academia in the challenges and opportunities afforded by 3D sensing. As a consequence, the emerging area of safety and security related imaging incorporates these important new technologies beyond the limitations of 2D image processing. This is the first book that covers the current state of the art in 3D imaging for safety and security.

Hexagonal Image Processing
A Practical Approach
L. Middleton, University of Southampton, UK; J. Sivaswamy, IIIT-Hyderabad, India

This book provides an introduction to the processing of hexagonally sampled images, includes a survey of the work done in the field, and presents a novel framework for hexagonal image processing (HIP) based on hierarchical aggregates. The strengths offered by hexagonal lattices over square lattices to define digital images are considerable: higher packing density, uniform connectivity of points (pixels) in the lattice better angular resolution by virtue of having more nearest neighbours superlative representation of curves.

Support Vector Machines for Pattern Classification
S. Abe, University of Kobe, Japan

Support vector machines (SVMs), were originally formulated for two-class classification problems, and have been accepted as a powerful tool for developing pattern classification and function approximations systems. This book provides a unique perspective of the state of the art in SVMs by taking the only approach that focuses on classification rather than covering the theoretical aspects. A comprehensive resource for the use of Support Vector Machines in Pattern Classification.

XML Indexing and Pattern Matching
B. Moon, University of Arizona, AZ, USA

Since Extensible Markup Language (XML) emerged as a new standard for information representation and exchange on the Internet, the problem of storing, indexing and querying XML documents has been in the forefront of database research issues. XML Indexing and Pattern Matching introduces and discusses issues and challenges in XML indexing and pattern matching. The book describes state of the art techniques in indexing, and offers solutions to problems that arise in the real-world applications. XML Indexing and Pattern Matching is structured for research scientists and practitioners in industry however it is also suitable for advanced-level students in computer science.

Handbook of Biometrics
A. K. Jain, Michigan State University, East Lansing, MI, USA; P. Flynn, University of Notre Dame, IN, USA; A. A. Ross, West Virginia University, Morgantown, WV, USA (Eds.)


Advances in Biometrics
Sensors, Systems and Algorithms
N. Ratha, IBM Thomas J. Watson Research Center, Hawthorne, NY, USA; V. Govindaraju, University of Buffalo, NY, USA (Eds.)

ISBN 978-1-84628-920-1
Reliable Face Recognition Methods
System Design, Implementation and Evaluation
H. Wechsler, George Mason University, Fairfax, VA, USA

This book seeks to comprehensively address the face recognition problem while gaining new insights from complementary fields of endeavor. These include neurosciences, statistics, signal and image processing, computer vision, machine learning and data mining. The book examines the evolution of research surrounding the field to date, explores new directions, and offers specific guidance on the most promising venues for future research and development. The book’s focused approach and its clarity of presentation make this an excellent reference work.