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# Advances in Biometrics

Sensors, Algorithms and Systems

 Springer

# Advances In Biometrics Sensors Algorithms And Systems

**Jucheng Yang, Shan Juan Xie**



## **Advances In Biometrics Sensors Algorithms And Systems:**

**Advances in Biometrics** N. K. Ratha, Venu Govindaraju, 2008 Recent advances in biometrics include new developments in sensors modalities and algorithms As new sensors are designed newer challenges emerge in the algorithms for accurate recognition Written for researchers advanced students and practitioners to use as a handbook this volume captures the very latest state of the art research contributions from leading international researchers It offers coverage of the entire gamut of topics in the field including sensors data acquisition pattern matching algorithms and issues that impact at the system level such as standards security networks and databases

### **AI Based Advancements in Biometrics and its Applications**

Balasubramaniam S, Seifedine Kadry, A. Prasanth, Rajesh Kumar Dhanaraj, 2024-11-15 This book delves into the history of biometrics the different systems that have been developed to date problems that have arisen from these systems the necessity of AI based biometrics systems different AI techniques developed to date including machine learning deep learning natural language processing and pattern recognition their potential uses and applications security and privacy issues in AI based Biometric systems current trends in AI based biometrics and presents case studies of AI based biometrics

**New Trends and Developments in Biometrics** Jucheng Yang, Shan Juan Xie, 2012-11-28 In recent years biometrics has developed rapidly with its worldwide applications for daily life New trends and novel developments have been proposed to acquire and process many different biometric traits The ignored challenges in the past and potential problems need to be thought together and deeply integrated The key objective of the book is to keep up with the new technologies on some recent theoretical development as well as new trends of applications in biometrics The topics covered in this book reflect well both aspects of development They include the new development in forensic speaker recognition 3D and thermo face recognition finger vein recognition contact less biometric system hand geometry recognition biometric performance evaluation multi biometric template protection and novel subfields in the new challenge fields The book consists of 13 chapters It is divided into four sections namely theory and method performance evaluation security and template protection and other applications The book was reviewed by editors Dr Jucheng Yang and Dr Shanjuan Xie We deeply appreciate the efforts of our guest editors Dr Norman Poh Dr Loris Nanni Dr Dongsun Park Dr Sook Yoon and Ms Congcong Xiong as well as a number of anonymous reviewers

**Advances in Biometrics** Venugopal Govindaraju, Nalini Kanta Ratha, 2007 *Handbook of Biometric Anti-Spoofing* Sébastien Marcel, Julian Fierrez, Nicholas Evans, 2023-02-23 The third edition of this authoritative and comprehensive handbook is the definitive work on the current state of the art of Biometric Presentation Attack Detection PAD also known as Biometric Anti Spoofing Building on the success of the previous editions this thoroughly updated third edition has been considerably revised to provide even greater coverage of PAD methods spanning biometrics systems based on face fingerprint iris voice vein and signature recognition New material is also included on major PAD competitions important databases for research and on the impact of recent international legislation Valuable insights are supplied by a

selection of leading experts in the field complete with results from reproducible research supported by source code and further information available at an associated website Topics and features reviews the latest developments in PAD for fingerprint biometrics covering recent technologies like Vision Transformers and review of competition series examines methods for PAD in iris recognition systems the use of pupil size measurement or multiple spectra for this purpose discusses advancements in PAD methods for face recognition based biometrics such as recent progress on detection of 3D facial masks and the use of multiple spectra with Deep Neural Networks presents an analysis of PAD for automatic speaker recognition ASV including a study of the generalization to unseen attacks describes the results yielded by key competitions on fingerprint liveness detection iris liveness detection and face anti spoofing provides analyses of PAD in finger vein recognition in signature biometrics and in mobile biometrics includes coverage of international standards in PAD and legal aspects of image manipulations like morphing This text reference is essential reading for anyone involved in biometric identity verification be they students researchers practitioners engineers or technology consultants Those new to the field will also benefit from a number of introductory chapters outlining the basics for the most important biometrics This text reference is essential reading for anyone involved in biometric identity verification be they students researchers practitioners engineers or technology consultants Those new to the field will also benefit from a number of introductory chapters outlining the basics for the most important biometrics

*Second Generation Biometrics: The Ethical, Legal and Social Context* Emilio Mordini, Dimitros Tzovaras, 2012-05-02 While a sharp debate is emerging about whether conventional biometric technology offers society any significant advantages over other forms of identification and whether it constitutes a threat to privacy technology is rapidly progressing Politicians and the public are still discussing fingerprinting and iris scan while scientists and engineers are already testing futuristic solutions Second generation biometrics which include multimodal biometrics behavioural biometrics dynamic face recognition EEG and ECG biometrics remote iris recognition and other still more astonishing applications is a reality which promises to overturn any current ethical standard about human identification Robots which recognise their masters CCTV which detects intentions voice responders which analyse emotions these are only a few applications in progress to be developed This book is the first ever published on ethical social and privacy implications of second generation biometrics Authors include both distinguished scientists in the biometric field and prominent ethical privacy and social scholars This makes this book an invaluable tool for policy makers technologists social scientists privacy authorities involved in biometric policy setting Moreover it is a precious instrument to update scholars from different disciplines who are interested in biometrics and its wider social ethical and political implications

**Handbook of Fingerprint Recognition** Davide Maltoni, Dario Maio, Anil K. Jain, Jianjiang Feng, 2022-07-04 A major new professional reference work on fingerprint security systems and technology from leading international researchers in the field Handbook provides authoritative and comprehensive coverage of all major topics concepts and methods for fingerprint security systems

This unique reference work is an absolutely essential resource for all biometric security professionals researchers and systems administrators      Encyclopedia of Biometrics Stan Z. Li,2009-08-27 With an A Z format this encyclopedia provides easy access to relevant information on all aspects of biometrics It features approximately 250 overview entries and 800 definitional entries Each entry includes a definition key words list of synonyms list of related entries illustration s applications and a bibliography Most entries include useful literature references providing the reader with a portal to more detailed information      Technology in Forensic Science Deepak Rawtani,Chaudhery Mustansar Hussain,2020-11-02 The book Technology in Forensic Science provides an integrated approach by reviewing the usage of modern forensic tools as well as the methods for interpretation of the results Starting with best practices on sample taking the book then reviews analytical methods such as high resolution microscopy and chromatography biometric approaches and advanced sensor technology as well as emerging technologies such as nanotechnology and taggant technology It concludes with an outlook to emerging methods such as AI based approaches to forensic investigations      **Encyclopedia of Cryptography and Security** Henk C.A. van Tilborg,Sushil Jajodia,2014-07-08 Expanded into two volumes the Second Edition of Springer s Encyclopedia of Cryptography and Security brings the latest and most comprehensive coverage of the topic Definitive information on cryptography and information security from highly regarded researchers Effective tool for professionals in many fields and researchers of all levels Extensive resource with more than 700 contributions in Second Edition 5643 references more than twice the number of references that appear in the First Edition With over 300 new entries appearing in an A Z format the Encyclopedia of Cryptography and Security provides easy intuitive access to information on all aspects of cryptography and security As a critical enhancement to the First Edition s base of 464 entries the information in the Encyclopedia is relevant for researchers and professionals alike Topics for this comprehensive reference were elected written and peer reviewed by a pool of distinguished researchers in the field The Second Edition s editorial board now includes 34 scholars which was expanded from 18 members in the First Edition Representing the work of researchers from over 30 countries the Encyclopedia is broad in scope covering everything from authentication and identification to quantum cryptography and web security The text s practical style is instructional yet fosters investigation Each area presents concepts designs and specific implementations The highly structured essays in this work include synonyms a definition and discussion of the topic bibliographies and links to related literature Extensive cross references to other entries within the Encyclopedia support efficient user friendly searches for immediate access to relevant information Key concepts presented in the Encyclopedia of Cryptography and Security include Authentication and identification Block ciphers and stream ciphers Computational issues Copy protection Cryptanalysis and security Cryptographic protocols Electronic payment and digital certificates Elliptic curve cryptography Factorization algorithms and primality tests Hash functions and MACs Historical systems Identity based cryptography Implementation aspects for smart cards and standards Key management Multiparty

computations like voting schemes Public key cryptography Quantum cryptography Secret sharing schemes Sequences Web Security Topics covered Data Structures Cryptography and Information Theory Data Encryption Coding and Information Theory Appl Mathematics Computational Methods of Engineering Applications of Mathematics Complexity This authoritative reference will be published in two formats print and online The online edition features hyperlinks to cross references in addition to significant research

**Leveraging Computer Vision to Biometric Applications** Arvind Selwal, Deepika Sharma, Mukesh Mann, Sudeshna Chakraborty, Valentina E. Balas, Ouh Eng Lieh, 2024-10-07 Computer vision is an effective solution in a diverse range of real life applications With the advent of the machine and deep learning paradigms this book adopts machine and deep learning algorithms to leverage digital image processing for designing accurate biometrical applications In this aspect it presents the advancements made in computer vision to biometric applications design approach using emerging technologies It discusses the challenges of designing efficient and accurate biometric based systems which is a key issue that can be tackled via computer vision based techniques Key Features Discusses real life applications of emerging techniques in computer vision systems Offers solutions on real time computer vision and biometrics applications to cater to the needs of current industry Presents case studies to offer ideas for developing new biometrics based products Offers problem based solutions in the field computer vision and real time biometric applications for secured human authentication Works as a ready resource for professionals and scholars working on emerging topics of computer vision for biometrics The book is for academic researchers scholars and students in Computer Science Information Technology Electronics and Electrical Engineering Mechanical Engineering management academicians researchers scientists and industry people working on computer vision and biometrics applications

**Multiple Classifier Systems** Jón Atli Benediktsson, Josef Kittler, Fabio Roli, 2009-06-10 These proceedings are a record of the Multiple Classifier Systems Workshop MCS 2009 held at the University of Iceland Reykjavik Iceland in June 2009 Being the eighth in a well established series of meetings providing an international forum for the discussion of issues in multiple classifier system design the workshop achieved its objective of bringing together researchers from diverse communities neural networks pattern recognition machine learning and statistics concerned with this research topic From more than 70 submissions the Program Committee selected 54 papers to create an interesting scientific program The special focus of MCS 2009 was on the application of multiple classifier systems in remote sensing This particular application uses multiple classifiers for raw data fusion feature level fusion and decision level fusion In addition to the excellent regular submission in the technical program outstanding contributions were made by invited speakers Melba Crawford from Purdue University and Zhi Hua Zhou of Nanjing University Papers of these talks are included in these workshop proceedings With the workshop application focus being on remote sensing Prof Crawford's expertise in the use of multiple classification systems in this context made the discussions on this topic at MCS 2009 particularly fruitful

**Developing Next-Generation Countermeasures for Homeland Security Threat**

**Prevention** Dawson, Maurice, Kisku, Dakshina Ranjan, Gupta, Phalguni, Sing, Jamuna Kanta, Li, Weifeng, 2016-08-30 In the modern world natural disasters are becoming more commonplace unmanned systems are becoming the norm and terrorism and espionage are increasingly taking place online All of these threats have made it necessary for governments and organizations to steel themselves against these threats in innovative ways Developing Next Generation Countermeasures for Homeland Security Threat Prevention provides relevant theoretical frameworks and empirical research outlining potential threats while exploring their appropriate countermeasures This relevant publication takes a broad perspective from network security surveillance reconnaissance and physical security all topics are considered with equal weight Ideal for policy makers IT professionals engineers NGO operators and graduate students this book provides an in depth look into the threats facing modern society and the methods to avoid them *Digital Forensics and Cyber Crime* Sanjay Goel, Ersin Uzun, Mengjun Xie, Sumantra Sarkar, 2025-05-24 The two volume set LNICST 613 and 614 constitutes the refereed post conference proceedings of the 15th EAI International Conference on Digital Forensics and Cyber Crime ICDF2C 2024 held in Dubrovnik Croatia during October 9 10 2024 The 40 full papers presented here were carefully selected and reviewed from 90 submissions These papers have been organized in the following topical sections Part I Artificial Intelligence Multimedia Forensics Intrusion Detection Intrusion and Fraud Detection Large Language Models Advances in Security and Forensics Advances in Security and Forensics Part II Security Analytics Threat Intelligence Multimedia Forensics Generative AI Emerging Threats **Breakthroughs in Digital Biometrics and Forensics** Kevin Daimi, Guillermo Francia III, Luis Hernández Encinas, 2022-10-14 This book focuses on a wide range of breakthroughs related to digital biometrics and forensics The authors introduce the concepts techniques methods approaches and trends needed by cybersecurity specialists and educators for keeping current their biometrics and forensics knowledge Furthermore the book provides a glimpse of future directions where biometrics and forensics techniques policies applications and theories are headed Topics include multimodal biometrics soft biometrics mobile biometrics vehicle biometrics vehicle forensics integrity verification of digital content people identification biometric based cybercrime investigation among others The book is a rich collection of carefully selected and reviewed manuscripts written by diverse digital biometrics and forensics experts in the listed fields and edited by prominent biometrics and forensics researchers and specialists Biometry Ricardo A. Ramirez-Mendoza, Jorge de J. Lozoya-Santos, Ricardo Zavala-Yoé, Luz María Alonso-Valerdi, Ruben Morales-Menendez, Belinda Carrión, Pedro Ponce Cruz, Hugo G. Gonzalez-Hernandez, 2022-07-07 Biometrics provide quantitative representations of human features physiological and behavioral This book is a compilation of biometric technologies developed by various research groups in Tecnológico de Monterrey Mexico It provides a summary of biometric systems as a whole explaining the principles behind physiological and behavioral biometrics and exploring different types of commercial and experimental technologies and current and future applications in the fields of security military criminology healthcare education business and marketing

Examples of biometric systems using brain signals or electroencephalography EEG are given Mobile and home EEG use in children's natural environments is covered At the same time some examples focus on the relevance of such technology in monitoring epileptic encephalopathies in children Using reliable physiological signal acquisition techniques functional Human Machine Interfaces HMI and Brain Computer Interfaces BCI become possible This is the case of an HMI used for assistive navigation systems controlled via voice commands head and eye movements A detailed description of the BCI framework is presented and applications of user centered BCIs oriented towards rehabilitation human performance and treatment monitoring are explored Massive data acquisition also plays an essential role in the evolution of biometric systems Machine learning deep learning and Artificial Intelligence AI are crucial allies here They allow the construction of models that can aid in early diagnosis seizure detection and data centered medical decisions Such techniques will eventually lead to a more concise understanding of humans

Handbook of Remote Biometrics Massimo Tistarelli, Stan Z. Li, Rama Chellappa, 2009-06-02 The development of technologies for the identification of individuals has driven the interest and curiosity of many people Spearheaded and inspired by the Bertillon coding system for the classification of humans based on physical measurements scientists and engineers have been trying to invent new devices and classification systems to capture the human identity from its body measurements One of the main limitations of the precursors of today's biometrics which is still present in the vast majority of the existing biometric systems has been the need to keep the device in close contact with the subject to capture the biometric measurements This clearly limits the applicability and convenience of biometric systems This book presents an important step in addressing this limitation by describing a number of methodologies to capture meaningful biometric information from a distance Most materials covered in this book have been presented at the International Summer School on Biometrics which is held every year in Alghero Italy and which has become a flagship activity of the IAPR Technical Committee on Biometrics IAPR TC4 The last four chapters of the book are derived from some of the best presentations by the participating students of the school The educational value of this book is also highlighted by the number of proposed exercises and questions which will help the reader to better understand the proposed topics

*Handbook of Iris Recognition* Kevin W. Bowyer, Mark J. Burge, 2016-07-28 The definitive work on iris recognition technology this comprehensive handbook presents a broad overview of the state of the art in this exciting and rapidly evolving field Revised and updated from the highly successful original this second edition has also been considerably expanded in scope and content featuring four completely new chapters Features provides authoritative insights from an international selection of preeminent researchers from government industry and academia reviews issues covering the full spectrum of the iris recognition process from acquisition to encoding presents surveys of topical areas and discusses the frontiers of iris research including cross wavelength matching iris template aging and anti spoofing describes open source software for the iris recognition pipeline and datasets of iris images includes new content on liveness detection correcting off



angle iris images subjects with eye conditions and implementing software systems for iris recognition      *Handbook of Iris Recognition* Mark J. Burge, Kevin Bowyer, 2013-01-12 This authoritative collection introduces the reader to the state of the art in iris recognition technology Topics and features with a Foreword by the father of iris recognition Professor John Daugman of Cambridge University presents work from an international selection of preeminent researchers reflecting the uses of iris recognition in many different social contexts provides viewpoints from researchers in government industry and academia highlighting how iris recognition is both a thriving industry and an active research area surveys previous developments in the field and covers topics ranging from the low level e g physics of iris image acquisition to the high level e g alternative non Daugman approaches to iris matching introduces many active and open areas of research in iris recognition including cross wavelength matching and iris template aging This book is an essential resource for anyone wishing to improve their understanding of iris recognition technology      Biometrics and Identity Management Ben Schouten, Niels Christian Juul, Andrzej Drygajlo, Massimo Tistarelli, 2008-12-23 A key driving factor for biometrics is the widespread national and international deployment of biometric systems that has been initiated in the past two years and is about to accelerate While nearly all current biometric deployments are government led and principally concerned with national security and border control scenarios it is now apparent that the widespread availability of biometrics in everyday life will also spin out an ever increasing number of private applications in other domains Crucial to this vision is the management of the user's identity which does not only imply the creation and update of a biometric template but requires the development of instruments to properly handle all the data and operations related to the user identity COST Action 2101 on Biometrics for Identity Documents and Smart Cards has emerged as a valuable and effective platform for close collaboration of European scientists from academia and industry researching biometrics for identity documents and smartcards This has led to the continuous advances achieved in various classes of biometrics and their implementations in the identity management domain These contributions to knowledge in this field were first presented at the First European Workshop on Biometrics and Identity Management BioID 2008 organized in Roskilde Denmark during May 7-9 2008

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