

Fingerprint Recognition

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1. Introduction

Recognition of persons by means of biometric characteristics is an emerging phenomenon in modern society. It has received more and more attention during the last period due to the need for security in a wide range of applications. Among the many biometric features, the fingerprint is considered one of the most practical ones. Fingerprint recognition requires a minimal effort from the user, does not capture other information than strictly necessary for the recognition process, and provides relatively good performance. Another reason for the popularity of fingerprints is the relatively low price of fingerprint sensors, which enables easy integration into PC keyboards, smart cards and wireless hardware (Maltoni et al., 2009).

Fig. 1 presents a general framework for a general fingerprint identification system (FIS) (Ji & Yi, 2008). Fingerprint matching is the last step in Automatic Fingerprint Identification System (AFIS). Fingerprint matching techniques can be classified into three types:

- Correlation-based matching,
- Minutiae-based matching, and
- Non-Minutiae feature-based matching.

Minutiae-based matching is the most popular and widely used technique, being the basis of the fingerprint comparison.

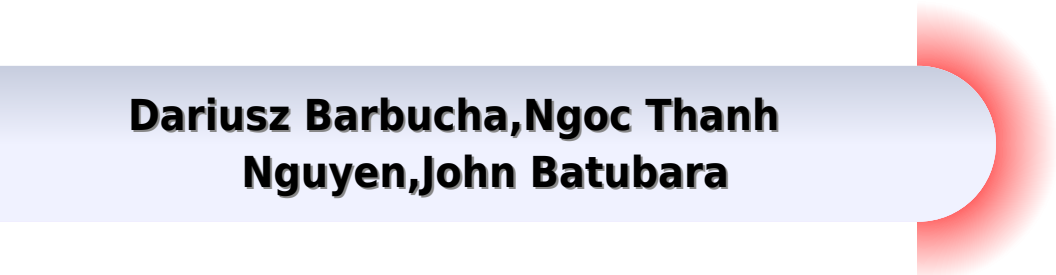
2. Previous work and motivation

In (Bazen & Gerez, 2003), a novel minutiae matching method is presented that describes elastic distortions in fingerprints by means of a thin-plate spline model, which is estimated using a local and a global matching stage. After registration of the fingerprints according to the estimated model, the number of matching minutiae can be counted using very tight matching thresholds. For deformed fingerprints, the algorithm gives considerably higher matching scores compared to rigid matching algorithms, while only taking 100 ms on a 1 GHz P-III machine. Furthermore, it is shown that the observed deformations are different from those described by theoretical models proposed in the literature.

In (Liang & Asano, 2006), minutia polygons are used to match distorted fingerprints. A minutia polygon describes not only the minutia type and orientation but also the minutia shape. This allows the minutia polygon to be bigger than the conventional tolerance box without losing matching accuracy. In other words, a minutia polygon has a higher ability to

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Handbook of Research on Network Forensics and Analysis Techniques Shrivastava, Gulshan, Kumar, Prabhat, Gupta, B. B., Bala, Suman, Dey, Nilanjan, 2018-04-06 With the rapid advancement in technology myriad new threats have emerged in online environments The broad spectrum of these digital risks requires new and innovative methods for protection against cybercrimes The Handbook of Research on Network Forensics and Analysis Techniques is a current research publication that examines the advancements and growth of forensic research from a relatively obscure tradecraft to an important part of many investigations Featuring coverage on a broad range of topics including cryptocurrency hand based biometrics and cyberterrorism this publication is geared toward professionals computer forensics practitioners engineers researchers and academics seeking relevant research on the development of forensic tools

Innovations in Computer Science and Engineering H. S. Saini, Rishi Sayal, A. Govardhan, Rajkumar Buyya, 2022-03-25 This book features a collection of high quality peer reviewed research papers presented at the 9th International Conference on Innovations in Computer Science Engineering ICICSE 2021 held at Guru Nanak Institutions Hyderabad India on September 3 4 2021 It covers the latest research in data science and analytics cloud computing machine learning data mining big data and analytics information security and privacy wireless and sensor networks and IoT applications artificial intelligence expert systems natural language processing image processing computer vision and artificial neural networks

Multispectral Biometrics David Zhang, Zhenhua Guo, Yazhuo Gong, 2015-09-14 Describing several new biometric technologies such as high resolution fingerprint finger knuckle print multi spectral backhand 3D fingerprint tongueprint 3D ear and multi spectral iris recognition technologies this book analyzes a number of efficient feature extraction matching and fusion algorithms and how potential systems have been developed Focusing on how to develop new biometric technologies based on the requirements of applications and how to design efficient algorithms to deliver better performance the work is based on the author's research with experimental results under different challenging conditions described in the text The book offers a valuable resource for researchers professionals and postgraduate students working in the fields of computer vision pattern recognition biometrics and security applications amongst others

Automatic Fingerprint Recognition Systems Nalini Ratha, Ruud Bolle, 2007-05-08 An authoritative survey of intelligent fingerprint recognition concepts technology and systems is given Editors and contributors are the leading researchers and applied R D developers of this personal identification biometric security topic and technology Biometrics and pattern recognition researchers and professionals will find the book an indispensable resource for current knowledge and technology in the field

Autonomy of Migration? Stephan Scheel, 2019-03-20 Examining how migrants appropriate mobility in the context of biometric border controls this volume mobilises new analytics and empirics in the debates about the politics of migration and provides an analytically effective and politically significant tool for the study of contemporary migration Drawing from the tension between the EU's attempt to

achieve watertight border controls by means of biometric technologies and migrants persistence to move to and live in the EU the volume pursues two interrelated objectives first it studies the encounters between migrants and the Visa Information System VIS one of the largest biometric databases in the world from the perspective of mobility in order to investigate how migrants appropriate mobility via Schengen visa within and against this biometric border regime Second it addresses criticisms of autonomy of migration in order to develop it as a viable approach for border migration and critical security studies Hence the book is driven by two interrelated research questions what does the assertion of moments of autonomy of migration refer to in the context of border regimes that use biometrics to turn migrants bodies into a means of mobility control And how do migrants appropriate mobility via Schengen visa within and against biometric border regimes This book will be of great interest to scholars in border migration and critical security studies as well as researchers engaged in citizenship studies surveillance studies political theory critical IR theory and international political sociology

Expert Psychological Testimony for the Courts Mark Costanzo, Daniel Krauss, Kathy Pezdek, 2020-07-24 During the past two decades the frequency and range of expert testimony by psychologists have increased dramatically Courts now routinely hear expert testimony from clinical cognitive developmental and social psychologists Expert Psychological Testimony for the Courts provides a comprehensive research based analysis of the content ethics and impact of expert testimony This book features leading scholars who have contributed to the scientific foundation for expert testimony and who have also served as expert witnesses The opening chapter explores issues surrounding the admissibility of expert testimony and the closing chapter explores the ethics and limits of psychological testimony Each of the intervening chapters focuses on a different area of expert testimony forensic identification police interrogations and false confessions eyewitness identification sexual harassment mitigation in capital cases the insanity defense battered women future dangerousness and child custody These chapters describe the typical content of expert testimony in a particular area evaluate the scientific foundation for testimony examine how jurors respond to expert testimony and suggest ways in which legal standards or procedures might be modified in light of psychological research This groundbreaking book should be on the shelf of every social scientist interested in the legal system and every trial attorney who is likely to retain a psychologist as an expert witness It can also serve as a text for advanced courses in psychology legal studies criminal justice law and sociology

Handbook of Research on Computational Forensics, Digital Crime, and Investigation: Methods and Solutions Li, Chang-Tsun, 2009-11-30 This book provides a media for advancing research and the development of theory and practice of digital crime prevention and forensics embracing a broad range of digital crime and forensics disciplines Provided by publisher

Systems, Signals and Image Processing Gregor Rozinaj, Radoslav Vargic, 2022-03-01 This volume constitutes selected papers presented at the 28th International Conference on Systems Signals and Image Processing IWSSIP 2021 held in Bratislava Slovakia in June 2021 Due to the COVID 19 pandemic the conference was held online The presented 14 full and 5 short papers were thoroughly

reviewed and selected from the 76 submissions The papers focus on various aspects of advanced signal processing in different scientific areas including filter design Fourier and other transforms feature extraction machine learning and system adaptation to user oriented products like 5G networks IoT virtual teleport or tele surgery operations **Digital Image**

Analysis Rama Chellappa,Alexander A. Sawchuk,1985 HCI International 2023 - Late Breaking Papers Jessie Y. C. Chen,Gino Fragomeni,Xiaowen Fang,2023-11-30 This seven volume set LNCS 14054 14060 constitutes the proceedings of the 25th International Conference HCI International 2023 in Copenhagen Denmark in July 2023 For the HCCII 2023 proceedings a total of 1578 papers and 396 posters was carefully reviewed and selected from 7472 submissions Additionally 267 papers and 133 posters are included in the volumes of the proceedings published after the conference as Late Breaking Work These papers were organized in the following topical sections HCI Design and User Experience Cognitive Engineering and Augmented Cognition Cultural Issues in Design Technologies for the Aging Population Accessibility and Design for All Designing for Health and Wellbeing Information Design Visualization Decision making and Collaboration Social Media Creative Industries and Cultural Digital Experiences Digital Human Modeling Ergonomics and Safety HCI in Automated Vehicles and Intelligent Transportation Sustainable GreenSmart Cities and Smart Industry eXtended Reality Interactions Gaming and Gamification Experiences Interacting with Artificial Intelligence Security Privacy Trust and Ethics Learning Technologies and Learning Experiences eCommerce Digital Marketing and eFinance **Biometric Recognition** Jianjiang Feng,Junping Zhang,Manhua Liu,Yuchun Fang,2021-09-09 The LNCS volume 12878 constitutes the proceedings of the 15th Chinese Conference on Biometric Recognition held in Shanghai China in September 2021 The 53 papers presented in this book were carefully reviewed and selected from 72 submissions The papers cover a wide range of topics such as multi modal biometrics and emerging biometrics hand biometrics facial biometrics and speech biometrics **Biometric Recognition** Jie Zhou,Yunhong Wang,Zhenan Sun,Zhenhong Jia,Jianjiang Feng,Shiguang Shan,Kurban Ubul,Zhenhua Guo,2018-08-08 The LNCS volume 10996 constitutes the proceedings of the 13th Chinese Conference on Biometric Recognition held in Urumchi China in August 2018 The 79 regular papers presented in this book were carefully reviewed and selected from 112 submissions The papers cover a wide range of topics such as Biometrics Speech recognition Activity recognition and understanding Online handwriting recognition System forensics Multi factor authentication Graphical and visual passwords

Handbook of Research on Computational Intelligence for Engineering, Science, and Business Bhattacharyya, Siddhartha,Dutta, Paramartha,2012-11-30 Using the same strategy for the needs of image processing and pattern recognition scientists and researchers have turned to computational intelligence for better research throughputs and end results applied towards engineering science business and financial applications Handbook of Research on Computational Intelligence for Engineering Science and Business discusses the computation intelligence approaches initiatives and applications in the engineering science and business fields This reference aims to highlight computational intelligence as no

longer limited to computing related disciplines and can be applied to any effort which handles complex and meaningful information

New Trends in Intelligent Information and Database Systems Dariusz Barbucha, Ngoc Thanh Nguyen, John Batubara, 2015-03-22 Intelligent information and database systems are two closely related subfields of modern computer science which have been known for over thirty years They focus on the integration of artificial intelligence and classic database technologies to create the class of next generation information systems The book focuses on new trends in intelligent information and database systems and discusses topics addressed to the foundations and principles of data information and knowledge models methodologies for intelligent information and database systems analysis design and implementation their validation maintenance and evolution They cover a broad spectrum of research topics discussed both from the practical and theoretical points of view such as intelligent information retrieval natural language processing semantic web social networks machine learning knowledge discovery data mining uncertainty management and reasoning under uncertainty intelligent optimization techniques in information systems security in databases systems and multimedia data analysis Intelligent information systems and their applications in business medicine and industry database systems applications and intelligent internet systems are also presented and discussed in the book The book consists of 38 chapters based on original works presented during the 7th Asian Conference on Intelligent Information and Database Systems ACIIDS 2015 held on 23-25 March 2015 in Bali Indonesia The book is divided into six parts related to Advanced Machine Learning and Data Mining Intelligent Computational Methods in Information Systems Semantic Web Social Networks and Recommendation Systems Cloud Computing and Intelligent Internet Systems Knowledge and Language Processing and Intelligent Information and Database Systems Applications

Published Scientific Papers of the National Institutes of Health National Institutes of Health (U.S.), 1959

Criminal Justice Research: Inspiration Influence and Ideation Ian McKenzie, Ray Bull, 2017-11-01 This title was first published in 2002 A collection of criminal justice researchers select a number of books documents papers and such like that they believe to be important and influential in the field of criminal justice research Each author has written a description and critique of the selected item and have discussed the impact of each of them with regards to formulating or developing their own research The authors also speculate on the direction they believe the area in question might be expected to develop in the first 10-15 years of the 21st century The definition of criminal justice in this book is a broad one and that is reflected in the combination of criminologists psychologists sociologists and experts on social and public administration In all the book attempts to examine the inspirations influences and thought processes which underpin criminal justice research efforts

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.

Pervasive Computing Kenneth P. Fishkin, Bernt Schiele, Paddy Nixon, Aaron Quigley, 2006-05-19. This book constitutes the refereed proceedings of the 4th International Conference on Pervasive Computing PERVASIVE 2006 held in Dublin, Ireland in May 2006. The 24 revised full papers presented here are organized in topical sections on activity recognition, location sensors, sensor processing and platforms, toolkits and gaming, security, pointing, interaction and displays, and smart homes and beyond.

The Biometric Computing Karm Veer Arya, Robin Singh Bhadoria, 2019-11-05. The Biometric Computing: Recognition, Registration presents introduction of biometrics along with detailed analysis for identification and recognition methods. This book forms the required platform for understanding biometric computing and its implementation for securing target system. It also provides the comprehensive analysis on algorithms, architectures and interdisciplinary connection of biometric computing along with detailed case studies for newborns and resolution spaces. The strength of this book is its unique approach starting with how biometric computing works to research paradigms and gradually moves towards its advancement. This book is divided into three parts that comprises basic fundamentals and definitions, algorithms and methodologies, and futuristic research and case studies. Features: A clear view to the fundamentals of Biometric Computing; Identification and recognition approach for different human characteristics; Different methodologies and algorithms for human identification using biometrics traits such as face, Iris, fingerprint, palm print, voiceprint, etc.; Interdisciplinary connection of biometric computing with the fields like deep neural network, artificial intelligence, Internet of Biometric Things, low resolution face recognition, etc. This book is an edited volume by prominent invited researchers and practitioners around the globe in the field of biometrics, describes the fundamental and recent advancement in biometric recognition and registration. This book is a perfect research handbook for young practitioners who are intending to carry out their research in the field of Biometric Computing and will be used by industry professionals, graduate and researcher students in the field of computer science and engineering.

Innovations in Computational Intelligence and Computer Vision Satyabrata Roy, Deepak Sinwar, Nilanjan Dey, Thinagar Perumal, João Manuel R. S. Tavares, 2025-01-01. This volume comprises of research papers presented at the 4th International

Conference on Innovations in Computational Intelligence and Computer Vision ICICV 2024 organized by Department of Computer and Communication Engineering Manipal University Jaipur India during April 4 5 2024 The book includes a collection of innovative ideas from researchers scientists academics industry professionals and students The book covers a variety of topics such as artificial intelligence and computer vision image processing and video analysis applications and services of artificial intelligence and computer vision interdisciplinary areas combining artificial intelligence and computer vision and other innovative practices

Fingerprint Recognition Springer Research Papers 201 Book Review: Unveiling the Magic of Language

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