3 Fundamentals Face Recognition Techniques

Since the 1960s, a significant effort has been underway to program computers to "see" the human face—to develop automated systems for identifying faces and distinguishing them from one another—commonly known as Facial Recognition Technology. While computer scientists are developing FRT in order to design more intelligent and interactive machines, businesses and states agencies view the technology as uniquely suited for "smart" surveillance—systems that automate the labor of monitoring in order to increase their efficacy and spread their reach. Tracking this technological pursuit, Our Biometric Future identifies FRT as a prime example of the failed technocratic approach to governance, where new technologies are pursued as shortsighted solutions to complex social problems. Culling news stories, press releases, policy statements, PR kits and other materials, Kelly Gates provides evidence that, instead of providing more security for more people, the pursuit of FRT is being driven by the priorities of corporations, law enforcement and state security agencies, all convinced of the technology's necessity and unhindered by its complicated and potentially destructive social consequences. By focusing on the politics of developing and deploying these technologies, Our Biometric Future argues not for the inevitability

of a particular technological future, but for its profound contingency and contestability.

In this report, the authors propose a heuristic with two dimensions--consent status and comparison type--to determine levels of privacy and accuracy in face recognition technologies. They also identify privacy and bias concerns.

Biometric user authentication techniques evoke an enormous interest by science, industry and society. Scientists and developers constantly pursue technology for automated determination or confirmation of the identity of subjects based on measurements of physiological or behavioral traits of humans. Biometric User Authentication for IT Security: From Fundamentals to Handwriting conveys general principals of passive (physiological traits such as fingerprint, iris, face) and active (learned and trained behavior such as voice, handwriting and gait) biometric recognition techniques to the reader. Unlike other publications in this area that concentrate on passive schemes, this professional book reflects a more comprehensive analysis of one particular active biometric technique: handwriting. Aspects that are thoroughly discussed include sensor characteristic dependency, attack scenarios, and the generation of cryptographic keys from handwriting. Face recognition has been actively studied over the past decade and continues to be a big research challenge. Just recently, researchers have begun to

investigate face recognition under unconstrained conditions. Unconstrained Face Recognition provides a comprehensive review of this biometric, especially face recognition from video, assembling a collection of novel approaches that are able to recognize human faces under various unconstrained situations. The underlying basis of these approaches is that, unlike conventional face recognition algorithms, they exploit the inherent characteristics of the unconstrained situation and thus improve the recognition performance when compared with conventional algorithms. Unconstrained Face Recognition is structured to meet the needs of a professional audience of researchers and practitioners in industry. This volume is also suitable for advanced-level students in computer science.

Biometrics is the study of methods for uniquely recognizing humans based on one or more intrinsic physical or behavioral traits. After decades of research activities, biometrics, as a recognized scientific discipline, has advanced considerably both in practical technology and theoretical discovery to meet the increasing need of biometric deployments. In this book, the editors provide both a concise and accessible introduction to the field as well as a detailed coverage on the unique research problems with their solutions in a wide spectrum of biometrics research ranging from voice, face, fingerprint, iris, handwriting, human behavior to multimodal biometrics. The contributions also present the pioneering

efforts and state-of-the-art results, with special focus on practical issues concerning system development. This book is a valuable reference for established researchers and it also gives an excellent introduction for beginners to understand the challenges.
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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.
The use of computer vision systems to control manufacturing processes and product quality has become increasingly important in food processing. Computer vision technology in the food and beverage industries reviews image acquisition and processing technologies and their applications in particular sectors of the food industry. Part one provides an introduction to computer vision in the food

and beverage industries, discussing computer vision and infrared techniques for image analysis, hyperspectral and multispectral imaging, tomographic techniques and image processing. Part two goes on to consider computer vision technologies for automatic sorting, foreign body detection and removal, automated cutting and image analysis of food microstructure. Current and future applications of computer vision in specific areas of the food and beverage industries are the focus of part three. Techniques for quality control of meats are discussed alongside computer vision in the poultry, fish and bakery industries, including techniques for grain quality evaluation, and the evaluation and control of fruit, vegetable and nut quality. With its distinguished editor and international team of expert contributors, Computer vision technology in the food and beverage industries is an indispensible guide for all engineers and researchers involved in the development and use of state-of-the-art vision systems in the food industry. Discusses computer vision and infrared techniques for image analysis, hyperspectral and multispectral imaging, tomographic techniques and image processing Considers computer vision technologies for automatic sorting, foreign body detection and removal, automated cutting and image analysis of food microstructure Examines techniques for quality control and computer vision in various industries including the poultry, fish and bakery, fruit, vegetable and nut

industry

Because of the accelerating progress in biometrics research and the latest nation-state threats to security, this book's publication is not only timely but also much needed. This volume contains seventeen peer-reviewed chapters reporting the state of the art in biometrics research: security issues, signature verification, fingerprint identification, wrist vascular biometrics, ear detection, face detection and identification (including a new survey of face recognition), person re-identification, electrocardiogram (ECT) recognition, and several multi-modal systems. This book will be a valuable resource for graduate students, engineers, and researchers interested in understanding and investigating this important field of study.

The three-volume set LNCS 9913, LNCS 9914, and LNCS 9915 comprises the refereed proceedings of the Workshops that took place in conjunction with the 14th European Conference on Computer Vision, ECCV 2016, held in Amsterdam, The Netherlands, in October 2016. 27 workshops from 44 workshops proposals were selected for inclusion in the proceedings. These address the following themes: Datasets and Performance Analysis in Early Vision; Visual Analysis of Sketches; Biological and Artificial Vision; Brave New Ideas for Motion Representations; Joint Imagenet and MS Coco Visual Recognition Challenge; Geometry Meets Deep Learning; Action and Anticipation for Visual Learning; Computer Vision for Road Scene Understanding and Autonomous Driving; Challenge on Automatic Personality Analysis; BioImage Computing;

Benchmarking Multi-Target Tracking: MOTChallenge; Assistive Computer Vision and Robotics; Transferring and Adapting Source Knowledge in Computer Vision; Recovering 6D Object Pose; Robust Reading; 3D Face Alignment in the Wild and Challenge; Egocentric Perception, Interaction and Computing; Local Features: State of the Art, Open Problems and Performance Evaluation; Crowd Understanding; Video Segmentation; The Visual Object Tracking Challenge Workshop; Web-scale Vision and Social Media; Computer Vision for Audio-visual Media; Computer VISion for ART Analysis; Virtual/Augmented Reality for Visual Artificial Intelligence; Joint Workshop on Storytelling with Images and Videos and Large Scale Movie Description and Understanding Challenge.

This book constitutes the proceedings of the First Indo-Japanese conference on Perception and Machine Intelligence, PerMIn 2012, held in Kolkata, India, in January 2012. The 41 papers, presented together with 1 keynote paper and 3 plenary papers, were carefully reviewed and selected for inclusion in the book. The papers are organized in topical sections named perception; human-computer interaction; e-nose and e-tongue; machine intelligence and application; image and video processing; and speech and signal processing.

Spread in 133 articles divided in 20 sections the present treatises broadly discusses: Part 1: Image Processing Part 2: Radar and Satellite Image Processing Part 3: Image Filtering Part 4: Content Based Image Retrieval Part 5: Color Image Processing and

Video Processing Part 6: Medical Image Processing Part 7: Biometric Part 8: Network Part 9: Mobile Computing Part 10: Pattern Recognition Part 11: Pattern Classification Part 12: Genetic Algorithm Part 13: Data Warehousing and Mining Part 14: Embedded System Part 15: Wavelet Part 16: Signal Processing Part 17: Neural Network Part 18: Nanotechnology and Quantum Computing Part 19: Image Analysis Part 20: Human Computer Interaction

This book constitutes the refereed proceedings of the 4th International Conference on Computational Modeling of Objects Presented in Images, CompIMAGE 2014, held in Pittsburgh, PA, USA, in September 2014. The 29 revised full papers presented together with 10 short papers and 6 keynote talks were carefully reviewed and selected from 54 submissions. The papers cover the following topics: medical treatment, imaging and analysis; image registration, denoising and feature identification; image segmentation; shape analysis, meshing and graphs; medical image processing and simulations; image recognition, reconstruction and predictive modeling; image-based modeling and simulations; and computer vision and data-driven investigations.

The latest trends in Information Technology represent a new intellectual paradigm for scientific exploration and visualization of scientific phenomena. The present treatise covers almost all the emerging technologies in the field. Academicians, engineers, industralists, scientists and researchers engaged in teaching, research and development of Computer Science and Information Technology will find the book useful

for their future academic and research work. The present treatise comprising 225 articles broadly covers the following topics exhaustively. 01. Advance Networking and Security/Wireless Networking/Cyber Laws 02. Advance Software Computing 03. Artificial Intelligence/Natural Language Processing/ Neural Networks 04. Bioinformatics/Biometrics 05. Data Mining/E-Commerce/E-Learning 06. Image Processing, Content Based Image Retrieval, Medical and Bio-Medical Imaging, Wavelets 07. Information Processing/Audio and Text Processing/Cryptology, Steganography and Digital Watermarking 08. Pattern Recognition/Machine Vision/Image Motion, Video Processing 09. Signal Processing and Communication/Remote Sensing 10. Speech Processing & Recognition, Human Computer Interaction 11. Information and Communication Technology

This book constitutes the refereed proceedings of the 14th Scandinavian Conference on Image Analysis, SCIA 2005, held in Joensuu, Finland in June 2005. The 124 papers presented together with 6 invited papers were carefully reviewed and selected from 236 submissions. The papers are organized in topical sections on image segmentation and understanding, color image processing, applications, theory, medical image processing, image compression, digitalization of cultural heritage, computer vision, machine vision, and pattern recognition.

Major strides have been made in face processing in the last ten years due to the fast growing need for security in various locations around the globe. A human eye can

discern the details of a specific face with relative ease. It is this level of detail that researchers are striving to create with ever evolving computer technologies that will become our perfect mechanical eyes. The difficulty that confronts researchers stems from turning a 3D object into a 2D image. That subject is covered in depth from several different perspectives in this volume. Face Processing: Advanced Modeling and Methods begins with a comprehensive introductory chapter for those who are new to the field. A compendium of articles follows that is divided into three sections. The first covers basic aspects of face processing from human to computer. The second deals with face modeling from computational and physiological points of view. The third tackles the advanced methods, which include illumination, pose, expression, and more. Editors Zhao and Chellappa have compiled a concise and necessary text for industrial research scientists, students, and professionals working in the area of image and signal processing. Contributions from over 35 leading experts in face detection, recognition and image processing Over 150 informative images with 16 images in FULL COLOR illustrate and offer insight into the most up-to-date advanced face processing methods and techniques Extensive detail makes this a need-to-own book for all involved with image and signal processing

Machine learning (ML) and deep learning (DL) algorithms are invaluable resources for Industry 4.0 and allied areas and are considered as the future of computing. A subfield called neural networks, to recognize and understand patterns in data, helps a machine

carry out tasks in a manner similar to humans. The intelligent models developed using ML and DL are effectively designed and are fully investigated – bringing in practical applications in many fields such as health care, agriculture and security. These algorithms can only be successfully applied in the context of data computing and analysis. Today, ML and DL have created conditions for potential developments in detection and prediction. Apart from these domains, ML and DL are found useful in analysing the social behaviour of humans. With the advancements in the amount and type of data available for use, it became necessary to build a means to process the data and that is where deep neural networks prove their importance. These networks are capable of handling a large amount of data in such fields as finance and images. This book also exploits key applications in Industry 4.0 including: · Fundamental models, issues and challenges in ML and DL. · Comprehensive analyses and probabilistic approaches for ML and DL. · Various applications in healthcare predictions such as mental health, cancer, thyroid disease, lifestyle disease and cardiac arrhythmia. · Industry 4.0 applications such as facial recognition, feather classification, water stress prediction, deforestation control, tourism and social networking. · Security aspects of Industry 4.0 applications suggest remedial actions against possible attacks and prediction of associated risks. - Information is presented in an accessible way for students, researchers and scientists, business innovators and entrepreneurs, sustainable assessment and management professionals. This book equips readers with

a knowledge of data analytics, ML and DL techniques for applications defined under the umbrella of Industry 4.0. This book offers comprehensive coverage, promising ideas and outstanding research contributions, supporting further development of ML and DL approaches by applying intelligence in various applications.

This book constitutes the thoroughly refereed post-conference proceedings of the 7th Pacific Rim Symposium on Image and Video Technology, PSIVT 2015, held in Auckland, New Zealand, in November 2015. The total of 61 revised papers was carefully reviewed and selected from 133 submissions. The papers are organized in topical sections on color and motion, image/video coding and transmission, computational photography and arts, computer vision and applications, image segmentation and classification, video surveillance, biomedical image processing and analysis, object and pattern recognition, computer vision and pattern recognition, image/video processing and analysis, and pattern recognition.

Image Processing and Pattern RecognitionFundamentals and TechniquesJohn Wiley & Sons

The book is a collection of selected high quality research papers presented at the International Conference on Computing in Engineering and Technology (ICCET 2019), held on January 10–11, 2019 at Deogiri Institute of Engineering and Management Studies, Aurangabad, India. Focusing on frontier topics and next-generation technologies, it presents original and innovative research from academics, scientists,

students, and engineers alike.

The three volume set LNICST 84 - LNICST 86 constitute the refereed proceedings ofthe Second International Conference on Computer Science and InformationTechnology, CCSIT 2012, held in Bangalore, India, in January 2012. The 66 revised full papers presented in this volume were carefully reviewed andselected from numerous submissions. The papers are organized in topical sectionson networks and communications; wireless and mobile networks; and network security.

This book constitutes the refereed proceedings of the 7th International Symposium on Security in Computing and Communications, SSCC 2019, held in Trivandrum, India, in December 2019. The 22 revised full papers and 7 revised short papers presented were carefully reviewed and selected from 61 submissions. The papers cover wide research fields including cryptography, database and storage security, human and societal aspects of security and privacy.

Pattern recognition has gained significant attention due to the rapid explosion of internet- and mobile-based applications. Among the various pattern recognition applications, face recognition is always being the center of attraction. With so much of unlabeled face images being captured and made available on internet (particularly on social media), conventional supervised means of classifying face images become challenging. This clearly warrants for semi-supervised classification and subspace projection. Another important concern in face recognition system is the proper and

stringent evaluation of its capability. This book is edited keeping all these factors in mind. This book is composed of five chapters covering introduction, overview, semi-supervised classification, subspace projection, and evaluation techniques.

This focus paper explores fundamental rights implications that should be taken into account when developing, deploying, using and regulating facial recognition technologies. It draws on recent analyses and data (Section 3 and Section 4) and evidence from interviews conducted with experts and representatives of national authorities who are testing facial recognition technologies (Section 5). The last sections (Section 6 and Section 7) provide a brief legal analysis summarising applicable European Union (EU) and Council of Europe law. The paper forms part of FRA's larger research project on artificial intelligence, big data and fundamental rights. It is the first paper to focus on the uses of facial recognition technology, and builds on the agency's extensive past work on the fundamental rights implications of the use of biometric data in large-scale EU information systems in the field of migration, asylum and borders. Facial recognition technology (FRT) makes it possible to compare digital facial images to determine whether they are of the same person. Comparing footage obtained from video cameras (CCTV) with images in databases is referred to as 'live facial recognition technology'. Examples of national law enforcement authorities in the EU using such technology are sparse - but several are testing its potential. This paper therefore looks at the fundamental rights implications of relying on live FRT, focusing on its use for law

enforcement and border-management purposes.

The past few years have witnessed rapid scienti?c and technological devel-ments in human-centered, seamless computing environments, interfaces, de-ces, and systems with applications ranging from business and communication to entertainment and learning. These developments are collectively best charac-rized as Active Media Technology (AMT), a new area of information technology and computer science that emphasizes the proactive, seamless roles of interfaces and systems as well as new digital media in all aspects of human life. This - lume contains the papers presented at the Sixth International Computer Science Conference: Active Media Technology (AMT 2001), the ?rst conference of its kind, capturing the state of research and development in AMT and the latest architectures, prototypes, tools, and ?elded systems that demonstrate or enable AMT. The volume is organized into the following eight parts: I. Smart Digital - dia; II. Web Personalization; III. Active Interfaces; IV. Autonomous Agent - proaches; V. Facial Image Processing; VI. AMT-Supported Commerce, Business, Learning, and Health Care; VII. Tools and Techniques; and VIII. Algorithms.

This book provides an integrated solution for security and safety in the home, covering both assistance in health monitoring and safety from strangers/intruders who want to enter the home with harmful intentions. It defines a system whereby

recognition of a person/stranger at the door is done using three modules: Face Recognition, Voice Recognition and Similarity Index. These three modules are taken together to provide a percentage likelihood that the individual is in the "known" or "unknown" category. The system can also continuously monitor the health parameters of a vulnerable person living alone at home and aid them in calling for help in an emergency. The authors have analyzed a number of existing biometric techniques to provide security for an individual living alone at home. These biometric techniques have been tested using MATLAB® image processing and signal processing toolboxes, and results have been calculated on the basis of recognition rate. A major contribution in providing security is a hybrid algorithm proposed by the author named PICA, which combines features of both PCA (Principle Component Analysis) and ICA (Independent Component Analysis) algorithms. This hybrid approach gives better performance recognition than either system alone. The second proposed hybrid algorithm for voice recognition is named as a MFRASTA algorithm by combining features of MFCC (Mel Frequency Cepstral Coefficient) and RASTA-PLP (RelAtive SpecTrA-Perceptual Linear Prediction) algorithm. After performing experiments, results are collected on the basis of recognition rate. The authors have also proposed a third technique named as a Similarity Index to provide trust-based security for an

individual. This technique is text independent in which a person is recognized by pronunciation, frequency, tone, pitch, etc., irrespective of the content spoken by the person. By combining these three techniques, a high recognition rate is provided to the person at the door and high security to the individual living independently at home. In the final contribution, the authors have proposed a fingertip-based application for health monitoring by using the concept of sensors. This application is developed using iPhone 6's camera. When a person puts their fingertip on a camera lens, with the help of brightness of the skin, the person's heartbeat will be monitored. This is possible even with a low-quality camera. In case of any emergency, text messages will be sent to the family members of the individual living alone by using 3G Dongle and MATLAB tool. Results show that the proposed work outperforms all the existing techniques used in face recognition, voice recognition, and health monitoring alone.

A comprehensive guide to the essential principles of image processing and pattern recognition Techniques and applications in the areas of image processing and pattern recognition are growing at an unprecedented rate. Containing the latest state-of-the-art developments in the field, Image Processing and Pattern Recognition presents clear explanations of the fundamentals as well as the most recent applications. It explains the essential principles so readers will not only be

able to easily implement the algorithms and techniques, but also lead themselves to discover new problems and applications. Unlike other books on the subject, this volume presents numerous fundamental and advanced image processing algorithms and pattern recognition techniques to illustrate the framework. Scores of graphs and examples, technical assistance, and practical tools illustrate the basic principles and help simplify the problems, allowing students as well as professionals to easily grasp even complicated theories. It also features unique coverage of the most interesting developments and updated techniques, such as image watermarking, digital steganography, document processing and classification, solar image processing and event classification, 3-D Euclidean distance transformation, shortest path planning, soft morphology, recursive morphology, regulated morphology, and sweep morphology. Additional topics include enhancement and segmentation techniques, active learning, feature extraction, neural networks, and fuzzy logic. Featuring supplemental materials for instructors and students, Image Processing and Pattern Recognition is designed for undergraduate seniors and graduate students, engineering and scientific researchers, and professionals who work in signal processing, image processing, pattern recognition, information security, document processing, multimedia systems, and solar physics.

Automatie object recognition is a multidisciplinary research area using con cepts and tools from mathematics, computing, optics, psychology, pattern recognition, artificial intelligence and various other disciplines. The purpose of this research is to provide a set of coherent paradigms and algorithms for the purpose of designing systems that will ultimately emulate the functions performed by the Human Visual System (HVS). Hence, such systems should have the ability to recognise objects in two or three dimensions independently of their positions, orientations or scales in the image. The HVS is employed for tens of thousands of recognition events each day, ranging from navigation (through the recognition of landmarks or signs), right through to communication (through the recognition of characters or people themselves). Hence, the motivations behind the construction of recognition systems, which have the ability to function in the real world, is unquestionable and would serve industrial (e.g. quality control), military (e.g. automatie target recognition) and community needs (e.g. aiding the visually impaired). Scope, Content and Organisation of this Book This book provides a comprehensive, yet readable foundation to the field of object recognition from which research may be initiated or guided. It repre sents the culmination of research topics that I have either covered personally or in conjunction with my PhD students. These areas include image acqui sition, 3-D object reconstruction,

object modelling, and the matching of ob jects, all of which are essential in the construction of an object recognition system.

This is Volume II of a three volume set constituting the refereed proceedings of the Third International Symposium on Neural Networks, ISNN 2006. 616 revised papers are organized in topical sections on neurobiological analysis, theoretical analysis, neurodynamic optimization, learning algorithms, model design, kernel methods, data preprocessing, pattern classification, computer vision, image and signal processing, system modeling, robotic systems, transportation systems, communication networks, information security, fault detection, financial analysis, bioinformatics, biomedical and industrial applications, and more.

Although the history of computer-aided face recognition stretches back to the 1960s, automatic face recognition remains an unsolved problem and still offers a great challenge to computer-vision and pattern recognition researchers. This handbook is a comprehensive account of face recognition research and technology, written by a group of leading international researchers. Twelve chapters cover all the sub-areas and major components for designing operational face recognition systems. Background, modern techniques, recent results, and challenges and future directions are considered. The book is aimed at practitioners and professionals planning to work in face recognition or wanting to

become familiar with the state-of- the-art technology. A comprehensive handbook, by leading research authorities, on the concepts, methods, and algorithms for automated face detection and recognition. Essential reference resource for researchers and professionals in biometric security, computer vision, and video image analysis.

This book constitutes the refereed post-conference proceedings of the 5th International Conference on Computational Modeling of Objects Presented in Images, CompIMAGE 2016, held in Niagara Falls, NY, USA, in September 2016. The 18 revised full papers presented together with 1 invited paper were carefully reviewed and selected from 30 submissions. The papers cover the following topics: theoretical contributions and application-driven contributions.

In todayOCOs digital infrastructure we have to interact with an increasing number of systems, both in the physical and virtual world. Identity management (IdM) -- the process of identifying an individual and controlling access to resources based on their associated privileges -- is becoming progressively complex. This has brought the spotlight on the importance of effective and efficient means of ascertaining an individualOCOs identity. Biometric technologies like fingerprint recognition, face recognition, iris recognition etc. have a long history of use in law enforcement applications and are now transitioning towards commercial

applications like password replacements, ATM authentication and others.This unique book provides you with comprehensive coverage of commercially available biometric technologies, their underlying principles, operational challenges and benefits, and deployment considerations. It also offers a look at the future direction these technologies are taking. By focusing on factors that drive the practical implementation of biometric technologies, this book serves to bridge the gap between academic researchers and industry practitioners. This book focuses on design, development, and deployment issues related to biometric technologies, including operational challenges, integration strategies, technical evaluations of biometric systems, standardization and privacy preserving principles, and several open questions which need to be answered for successful deployments."

As modern technologies continue to develop and evolve, the ability of users to adapt with new systems becomes a paramount concern. Research into new ways for humans to make use of advanced computers and other such technologies through artificial intelligence and computer simulation is necessary to fully realize the potential of tools in the 21st century. Advanced Methodologies and Technologies in Artificial Intelligence, Computer Simulation, and Human-Computer Interaction provides emerging research in advanced trends in robotics, AI, simulation, and human-computer interaction. Readers

will learn about the positive applications of artificial intelligence and human-computer interaction in various disciples such as business and medicine. This book is a valuable resource for IT professionals, researchers, computer scientists, and researchers invested in assistive technologies, artificial intelligence, robotics, and computer simulation.

Step-by-step tutorials on deep learning neural networks for computer vision in python with Keras.

This handbook on the concepts, methods, and algorithms for automated face detection and recognition covers all the sub-areas and major components for designing operational face recognition systems. It also details essential background information.

Biometrics in a Data Driven World: Trends, Technologies, and Challenges aims to inform readers about the modern applications of biometrics in the context of a data-driven society, to familiarize them with the rich history of biometrics, and to provide them with a glimpse into the future of biometrics. The first section of the book discusses the fundamentals of biometrics and provides an overview of common biometric modalities, namely face, fingerprints, iris, and voice. It also discusses the history of the field, and provides an overview of emerging trends and opportunities. The second section of the book introduces readers to a wide range of biometric applications. The next part of the book is dedicated to the discussion of case studies of biometric modalities currently used on mobile applications. As smartphones and tablet computers

are rapidly becoming the dominant consumer computer platforms, biometrics-based authentication is emerging as an integral part of protecting mobile devices against unauthorized access, while enabling new and highly popular applications, such as secure online payment authorization. The book concludes with a discussion of future trends and opportunities in the field of biometrics, which will pave the way for advancing research in the area of biometrics, and for the deployment of biometric technologies in real-world applications. The book is designed for individuals interested in exploring the contemporary applications of biometrics, from students to researchers and practitioners working in this field. Both undergraduate and graduate students enrolled in college-level security courses will also find this book to be an especially useful companion. The main theme of this publication is the fundamental features of verbal and nonverbal communication and their relationships with the identification of a person, his/her socio-cultural background and personal traits. The problem of understanding human behaviour in terms of personal traits, and the possibility of an algorithmic implementation that exploits personal traits to identify a person unambiguously, are among the great challenges of modern science and technology. On the one hand, there is the theoretical question of what makes each individual unique among all others that share similar traits, and what makes a culture unique among various cultures. On the other hand, there is the technological need to be able to protect people from individual disturbance and dangerous behaviour that could damage an entire community. As

regards to the problem of understanding human behaviour, one of the most interesting research areas is that related to human interaction and face-to-face communication. It is in this context that knowledge is shared and personal traits acquire their significance. An in-depth description of the state-of-the-art of 3D shape analysis techniques and their applications This book discusses the different topics that come under the title of "3D shape analysis". It covers the theoretical foundations and the major solutions that have been presented in the literature. It also establishes links between solutions proposed by different communities that studied 3D shape, such as mathematics and statistics, medical imaging, computer vision, and computer graphics. The first part of 3D Shape Analysis: Fundamentals, Theory, and Applications provides a review of the background concepts such as methods for the acquisition and representation of 3D geometries, and the fundamentals of geometry and topology. It specifically covers stereo matching, structured light, and intrinsic vs. extrinsic properties of shape. Parts 2 and 3 present a range of mathematical and algorithmic tools (which are used for e.g., global descriptors, keypoint detectors, local feature descriptors, and algorithms) that are commonly used for the detection, registration, recognition, classification, and retrieval of 3D objects. Both also place strong emphasis on recent techniques motivated by the spread of commodity devices for 3D acquisition. Part 4 demonstrates the use of these techniques in a selection of 3D shape analysis applications. It covers 3D face recognition, object recognition in 3D scenes, and 3D shape retrieval. It also discusses examples of

semantic applications and cross domain 3D retrieval, i.e. how to retrieve 3D models using various types of modalities, e.g. sketches and/or images. The book concludes with a summary of the main ideas and discussions of the future trends. 3D Shape Analysis: Fundamentals, Theory, and Applications is an excellent reference for graduate students, researchers, and professionals in different fields of mathematics, computer science, and engineering. It is also ideal for courses in computer vision and computer graphics, as well as for those seeking 3D industrial/commercial solutions. This book features high-quality papers presented at the International Conference on Computational Intelligence and Communication Technology (CICT 2019) organized by ABES Engineering College, Ghaziabad, India, and held from February 22 to 23, 2019. It includes the latest advances and research findings in fields of computational science and communication such as communication & networking, web & informatics, hardware and software designs, distributed & parallel processing, advanced software engineering, advanced database management systems and bioinformatics. As such, it is of interest to research scholars, students, and engineers around the globe. The fields of computer vision and image processing are constantly evolving as new research and applications in these areas emerge. Staying abreast of the most up-to-date developments in this field is necessary in order to promote further research and apply these developments in real-world settings. Computer Vision: Concepts, Methodologies, Tools, and Applications is an innovative reference source for the latest

academic material on development of computers for gaining understanding about videos and digital images. Highlighting a range of topics, such as computational models, machine learning, and image processing, this multi-volume book is ideally designed for academicians, technology professionals, students, and researchers interested in uncovering the latest innovations in the field.

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