Handbook Of Iris Recognition

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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

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what is iris recognition iris recognition is an automated method of biometric identification that uses mathematical pattern recognition techniques on video images of one or both of the irises of an individual s eyes whose complex patterns are unique stable and can be seen from some distance the discriminating powers of all biometric technologies depend on the amount of entropy they are able to encode and use in matching iris recognition is exceptional in this regard enabling the avoidance of collisions even in cross comparisons across massive populations its major limitation is that image acquisition from distances greater than a meter or two or without cooperation can be very difficult however the technology is in development and iris recognition can be accomplished from even up to 10 meters away or in a live camera feed how you will benefit i insights and validations about the following topics chapter 1 iris recognition chapter 2 retinal scan chapter 3 john daugman chapter 4 biometric points chapter 5 eye vein verification chapter 6 biometric device

chapter 7 private biometrics chapter 8 aadhaar chapter 9 biometrics in schools chapter 10 aadhaar act ii answering the public top questions about iris recognition iii real world examples for the usage of iris recognition in many fields who this book is for professionals undergraduate and graduate students enthusiasts hobbyists and those who want to go beyond basic knowledge or information for any kind of iris recognition

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

the book presents three most significant areas in biometrics and pattern recognition a step by step approach for design and implementation of dual tree complex wavelet transform dtcwt plus rotated complex wavelet filters rcwf is discussed in detail in addition to the above the book provides detailed analysis of iris images and two methods of iris segmentation it also discusses simplified study of some subspace based methods and distance measures for iris recognition backed by empirical studies and statistical success verifications

this dissertation focuses on iris biometrics although the iris is the most accurate biometric its adoption has been relatively slow conventional iris recognition systems utilize still eye images captured in ideal environments and require highly constrained subject presentation a drop in recognition performance is observed when these constraints are removed as the quality of the data acquired is affected by heterogeneous factors for iris recognition to be widely adopted it can therefore be argued that the image capture must be facilitated and better performance should be achieved in less constrained imaging conditions the research work presented in this

dissertation demonstrates how performance in iris recognition systems is improved by adopting avideo based approach the following components have been investigated in this study and presented in relevant publications 1 robust eye extraction method of eye images in face videos captured at a distance and on the move 2 selection of optimal frames in iris videos 3 iris segmentation in less constrained environments 4 an automated method for predicting inaccurate iris segmentation 5 optimization of iris codes for improved recognition the main results and novelties of this work include firstly the development of a fast and accurate method for detecting eye images in face videos secondly this work demonstrates that selection of optimal frames in nir iris videos lead to better recognition performance thirdly an accurate and robust iris segmentation model for eye images captured in uncontrolled conditions is proposed fourthly this research presents a fully automated segmentation evaluation model for detection of in correctly segmented iris images finally a new method for optimization of several iris codes into a single highly optimized iris code is introduced our results and experiments suggest that incorporation of the above methods in traditional iris recognition systems will be useful for the adoption of this technology by a larger community

in the present work many methods are combined to build a reliable and fast method for feature extraction in iris recognition system reliable techniques for iris image enhancement and circle detection are used these techniques can then be used to facilitate the further study of the statistics of iris also a program coding with matlab going through all the stages of the iris recognition is built it is helpful to understand the procedures of iris recognition and demonstrate the key issues of iris recognition the hamming distance has been employed for classification of iris templates and two templates have been found to match if a test of statistical independence failed the system performed with perfect recognition and resulted in false accepts and false reject rates of 0 01 and 0 61 respectively the accuracy of the system is found to be 99 38 therefore iris recognition is reliable and accurate biometric technology

iris biometrics from segmentation to template security provides critical analysis challenges and solutions on recent iris biometric research topics including image segmentation image compression watermarking advanced comparators template protection and more open source software is also provided on a dedicated website which includes feature extraction segmentation and matching schemes applied in this book to foster scientific exchange current state of the art approaches accompanied by comprehensive experimental

evaluations are presented as well this book has been designed as a secondary text book or reference for researchers and advanced level students in computer science and electrical engineering professionals working in this related field will also find this book useful as a reference

biometric systems recognize individuals based on their physical or behavioral traits viz face iris and voice iris the colored annular region around the pupil is one of the most popular biometric traits due to its uniqueness accuracy and stability however its widespread usage raises security concerns against various adversarial attacks another challenge is to match iris images with other compatible biometric modalities i e face to increase the scope of human identification therefore the focus of this thesis is two fold firstly enhance the security of the iris recognition system by detecting adversarial attacks and secondly accentuate its performance in iris face matching to enhance the security of the iris biometric system we work over two types of adversarial attacks presentation and morph attacks a presentation attack pa occurs when an adversary presents a fake or altered biometric sample plastic eye cosmetic contact lens etc to a biometric system to obfuscate their own identity or impersonate another identity we propose three deep learning based iris pa detection frameworks corresponding to three different imaging modalities namely nir spectrum visible spectrum and optical coherence tomography oct imaging inputting a nir image visible spectrum video and cross sectional oct image respectively the techniques perform effectively to detect known iris pas as well as generalize well across unseen attacks unseen sensors and multiple datasets we also presented the explainability and interpretability of the results from the techniques our other focuses are robustness analysis and continuous update retraining of the trained iris pa detection models another burgeoning security threat to biometric systems is morph attacks a morph attack entails the generation of an image morphed image that embodies multiple different identities typically a biometric image is associated with a single identity in this work we first demonstrate the vulnerability of iris recognition techniques to morph attacks and then develop techniques to detect the morphed iris images the second focus of the thesis is to improve the performance of a cross modal system where iris images are matched against face images cross modality matching involves various challenges such as cross spectral cross resolution cross pose and cross temporal to address these challenges we extract common features present in both images using a multi channel convolutional network and also generate synthetic data to augment insufficient training data using a dual variational autoencoder framework the two focus areas of this thesis improve the acceptance and widespread

usage of the iris biometric system

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

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this book covers iris and periocular recognition a prominent field in biometrics recognition and identity science in the areas of security computing and communications research and technologies selected topics cover a wide spectrum of current research focusing on periocular recognition to augment the biometric performance of the iris in unconstrained environments paving the way for multi spectral biometric recognition on mobile devices divided into three parts this text covers the most recent research and future directions as well as security related topics

biometrics is a rapidly evolving field with applications ranging from accessing one s computer to gaining entry into a country the deployment of large scale biometric systems in both commercial and government applications has increased public awareness of this technology recent years have seen significant growth in biometric research resulting in the development of innovative sensors new algorithms enhanced test methodologies and novel applications this book addresses this void by inviting some of the prominent researchers in biometrics to contribute chapters describing the fundamentals as well as the latest innovations in their respective areas of expertise

in the last few years biometric techniques have proven their ability to provide secure access to shared resources in various domains furthermore software agents and multi agent systems mas have shown their efficiency in resolving critical network problems iris biometric model for secured network access proposes a new model the iriscryptoagentsystem icas which is based on a biometric

method for authentication using the iris of the eyes and an asymmetric cryptography method using rivest shamir adleman rsa in an agent based architecture it focuses on the development of new methods in biometric authentication in order to provide greater efficiency in the icas model it also covers the pretopological aspects in the development of the indexed hierarchy to classify drva iris templates the book introduces biometric systems cryptography and multi agent systems mas and explains how they can be used to solve security problems in complex systems examining the growing interest to exploit mas across a range of fields through the integration of various features of agents it also explains how the intersection of biometric systems cryptography and mas can apply to iris recognition for secure network access the book presents the various conventional methods for the localization of external and internal edges of the iris of the eye based on five simulations and details the effectiveness of each it also improves upon existing methods for the localization of the external and internal edges of the iris and for removing the intrusive effects of the eyelids

the two volume set lncs 5072 and 5073 constitutes the refereed proceedings of the international conference on computational science and its applications iccsa 2008 held in perugia italy in june july 2008 the two volumes contain papers presenting a wealth of original research results in the field of computational science from foundational issues in computer science and mathematics to advanced applications in virtually all sciences making use of computational techniques the topics of the fully refereed papers are structured according to the five major conference themes computational methods algorithms and scientific applications high performance technical computing and networks advanced and emerging applications geometric modelling graphics and visualization as well as information systems and information technologies moreover submissions from more than 20 workshops and technical sessions in the areas such as embedded systems geographical analysis computational geometry computational geomatics computer graphics virtual reality computer modeling computer algebra mobile communications wireless networks computational forensics data storage information security web learning software engineering computational intelligence digital security biometrics molecular structures material design ubiquitous computing symbolic computations web systems and intelligence and e education contribute to this publication

the iris recognition system utilizes image processing and computer vision in order to identify human beings most effective algorithms are employed to gather suitable patterns from an iris image then mathematical analysis is carried out for collecting required features

using efficient image enhancement techniques and feature extraction methodologies the extracted features through six different schemes are compared exhaustively for matching with the iris images of individuals already stored in the database the low cost of development of the proposed iris recognition system encourages its application in majority of the organizations and establishments the experimental work presented in this book provides detailed and critical analysis using three experiments various components of the developed system operate accurately and give an excellent performance in terms of iris recognition accuracy

this book provides the new results in wavelet filter banks based feature extraction and the classifier in the field of iris image recognition it provides the broad treatment on the design of separable non separable wavelets filter banks and the classifier the design techniques presented in the book are applied on iris image analysis for person authentication this book also brings together the three strands of research wavelets iris image analysis and classifier it compares the performance of the presented techniques with state of the art available schemes this book contains the compilation of basic material on the design of wavelets that avoids reading many different books therefore it provides an easier path for the new comers researchers to master the contents in addition the designed filter banks and classifier can also be effectively used than existing filter banks in many signal processing applications like pattern classification data compression watermarking denoising etc that will give the new directions of the research in the relevant field for the readers

the development of technologies for the identi cation of individuals has driven the interest and curiosity of many people spearheaded and inspired by the bertillon coding system for the classi cation of humans based on physical measurements scientists and engineers have been trying to invent new devices and classi cation 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 agship activity of the iapr technical committee on biometrics iapr tc4 the last four chapters of the book are derived from some of the best p

sentations 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

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