

# Biometrics Methods Applications And Analyses

Biometrics Methods, Applications and Analyses Nova Science Pub Incorporated

Systematic treatment of the commonly employed crossed and nested classification models used in analysis of variance designs with a detailed and thorough discussion of certain random effects models not commonly found in texts at the introductory or intermediate level. It also includes numerical examples to analyze data from a wide variety of disciplines as well as any worked examples containing computer outputs from standard software packages such as SAS, SPSS, and BMDP for each numerical example.

Edited by a panel of experts, this book fills a gap in the existing literature by comprehensively covering system, processing, and application aspects of biometrics, based on a wide variety of biometric traits. The book provides an extensive survey of biometrics theory, methods, and applications, making it an indispensable source of information for researchers, security experts, policy makers, engineers, practitioners, and graduate students. The book's wide and in-depth coverage of biometrics enables readers to build a strong, fundamental understanding of theory and methods, and provides a foundation for solutions to many of today's most interesting and challenging biometric problems. Biometric traits covered: Face, Fingerprint, Iris, Gait, Hand Geometry, Signature, Electrocardiogram (ECG), Electroencephalogram (EEG), physiological biometrics. Theory, Methods and Applications covered: Multilinear Discriminant Analysis, Neural Networks for biometrics, classifier design, biometric fusion, Event-Related Potentials, person-specific characteristic feature selection, image and video-based face, recognition/verification, near-infrared face recognition, elastic graph matching, super-resolution

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of facial images, multimodal solutions, 3D approaches to biometrics, facial aging models for recognition, information theory approaches to biometrics, biologically-inspired methods, biometric encryption, decision-making support in biometric systems, privacy in biometrics. This book emphasizes recent advances in the creation of biometric identification systems for various applications in the field of human activity. The book displays the problems that arise in modern systems of biometric identification, as well as the level of development and prospects for the introduction of biometric technologies. The authors classify biometric technologies into two groups, distinguished according to the type of biometric characteristics used. The first group uses static biometric parameters: fingerprints, hand geometry, retina pattern, vein pattern on the finger, etc. The second group uses dynamic parameters for identification: the dynamics of the reproduction of a signature or a handwritten keyword, voice, gait, dynamics of work on the keyboard, etc. The directions of building information systems that use automatic personality identification based on the analysis of unique biometric characteristics of a person are discussed. The book is intended for professionals working and conducting research in the field of intelligent information processing, information security, and robotics and in the field of real-time identification systems. The book contains examples and problems/solutions throughout.

"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

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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.

Blindness and vision impairment affect at least 2.2 billion people worldwide with most individuals having a preventable vision impairment. The majority of people with vision impairment are older than 50 years, however, vision loss can affect people of all ages. Reduced eyesight can have major and long-lasting effects on all aspects of life, including daily personal activities, interacting with the community, school and work opportunities, and the ability to access public services. This book provides an overview of the effects of blindness and visual impairment in the context of the most common causes of blindness in older adults as

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well as children, including retinal disorders, cataracts, glaucoma, and macular or corneal degeneration.

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.

A comprehensive introduction to a wide variety of statistical methods for the analysis of repeated measurements. It is designed to be both a useful reference for practitioners and a textbook for a graduate-level course focused on methods for the analysis of repeated measurements. The important features of this book include a comprehensive coverage of classical and recent methods for continuous and categorical outcome variables; numerous homework problems at the end of each chapter; and the extensive use of real data sets in examples and homework problems.

3D Face Modeling, Analysis and Recognition presents methodologies for analyzing shapes of facial surfaces, develops computational tools for analyzing 3D face data, and illustrates them using state-of-the-art applications. The methodologies chosen are based on efficient representations, metrics, comparisons, and classifications of features that

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are especially relevant in the context of 3D measurements of human faces. These frameworks have long-term utility in face analysis, taking into account the anticipated improvements in data collection, data storage, processing speeds, and application scenarios expected as the discipline develops further. The book covers face acquisition through 3D scanners and 3D face pre-processing, before examining the three main approaches for 3D facial surface analysis and recognition: facial curves; facial surface features; and 3D morphable models. Whilst the focus of these chapters is fundamentals and methodologies, the algorithms provided are tested on facial biometric data, thereby continually showing how the methods can be applied. Key features:

- Explores the underlying mathematics and will apply these mathematical techniques to 3D face analysis and recognition
- Provides coverage of a wide range of applications including biometrics, forensic applications, facial expression analysis, and model fitting to 2D images
- Contains numerous exercises and algorithms throughout the book

Biometrics, the science of using physical traits to identify individuals, is playing an increasing role in our security-conscious society and across the globe. Biometric authentication, or bioauthentication, systems are being used to secure everything from amusement parks to bank accounts to military installations. Yet developments in this field have not been matched by an equivalent improvement in the statistical methods for evaluating these systems. Compensating for this need, this unique text/reference provides a basic statistical methodology for practitioners and testers of

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bioauthentication devices, supplying a set of rigorous statistical methods for evaluating biometric authentication systems. This framework of methods can be extended and generalized for a wide range of applications and tests. This is the first single resource on statistical methods for estimation and comparison of the performance of biometric authentication systems. The book focuses on six common performance metrics: for each metric, statistical methods are derived for a single system that incorporates confidence intervals, hypothesis tests, sample size calculations, power calculations and prediction intervals. These methods are also extended to allow for the statistical comparison and evaluation of multiple systems for both independent and paired data.

Topics and features:

- \* Provides a statistical methodology for the most common biometric performance metrics: failure to enroll (FTE), failure to acquire (FTA), false non-match rate (FNMR), false match rate (FMR), and receiver operating characteristic (ROC) curves
- \* Presents methods for the comparison of two or more biometric performance metrics
- \* Introduces a new bootstrap methodology for FMR and ROC curve estimation
- \* Supplies more than 120 examples, using publicly available biometric data where possible
- \* Discusses the addition of prediction intervals to the bioauthentication statistical toolset
- \* Describes sample-size and power calculations for FTE, FTA, FNMR and FMR

Researchers, managers and decisions makers needing to compare biometric systems across a variety of metrics will find within this reference an invaluable set of statistical tools. Written for an upper-level undergraduate or master's

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level audience with a quantitative background, readers are also expected to have an understanding of the topics in a typical undergraduate statistics course. Dr. Michael E. Schuckers is Associate Professor of Statistics at St. Lawrence University, Canton, NY, and a member of the Center for Identification Technology Research.

Confidence Intervals for Proportions and Related Measures of Effect Size illustrates the use of effect size measures and corresponding confidence intervals as more informative alternatives to the most basic and widely used significance tests. The book provides you with a deep understanding of what happens when these statistical methods are applied in situations far removed from the familiar Gaussian case. Drawing on his extensive work as a statistician and professor at Cardiff University School of Medicine, the author brings together methods for calculating confidence intervals for proportions and several other important measures, including differences, ratios, and nonparametric effect size measures generalizing Mann-Whitney and Wilcoxon tests. He also explains three important approaches to obtaining intervals for related measures. Many examples illustrate the application of the methods in the health and social sciences. Requiring little computational skills, the book offers user-friendly Excel spreadsheets for download at [www.crcpress.com](http://www.crcpress.com), enabling you to easily apply the methods to your own empirical data.

The refereed proceedings of the 12th International Conference on Computer Analysis of Images and Patterns are presented in this volume. The papers cover motion

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detection and tracking, medical imaging, biometrics, color, curves and surfaces beyond two dimensions, reading characters, words and lines, image segmentation, shape, image registration and matching, signal decomposition and invariants, and features and classification.

Everyday we vicariously experience a range of states that we observe in other people: we may “feel” embarrassed when witnessing another making a social faux pas, or we may feel sadness when we see a loved one upset. In some cases this process appears to be implicit. For instance, observing pain in others may activate pain-related neural processes but without generating an overt feeling of pain. In other cases, people report a more literal, conscious sharing of affective or somatic states and this has sometimes been described as representing an extreme form of empathy. By contrast, there appear to be some people who are limited in their ability to vicariously experience the states of others. This may be the case in several psychiatric, neurodevelopmental, and personality disorders where deficits in interpersonal understanding are observed, such as schizophrenia, autism, and psychopathy. In recent decades, neuroscientists have paid significant attention to the understanding of the “social brain,” and the way in which neural processes govern our understanding of other people. In this Research Topic, we wish to contribute towards this understanding and ask for the submission of manuscripts focusing broadly on the neural underpinnings of vicarious experience. This may include theoretical discussion, case studies, and empirical investigation using

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behavioural techniques, electrophysiology, brain stimulation, and neuroimaging in both healthy and clinical populations. Of specific interest will be the neural correlates of individual differences in traits such as empathy, how we distinguish between ourselves and other people, and the sensorimotor resonant mechanisms that may allow us to put ourselves in another's shoes.

This book brings together aspects of statistics and machine learning to provide a comprehensive guide to evaluating, interpreting and understanding biometric data. It naturally leads to topics including data mining and prediction to be examined in detail. The book places an emphasis on the various performance measures available for biometric systems, what they mean, and when they should and should not be applied. The evaluation techniques are presented rigorously, however they are always accompanied by intuitive explanations. This is important for the increased acceptance of biometrics among non-technical decision makers, and ultimately the general public. A complete guide to the key statistical concepts essential for the design and construction of clinical trials As the newest major resource in the field of medical research, *Methods and Applications of Statistics in Clinical Trials, Volume 1: Concepts, Principles, Trials, and Designs* presents a timely and authoritative review of the central statistical concepts used to build clinical trials that obtain the best results. The reference unveils modern approaches vital to understanding, creating, and evaluating data obtained throughout the various stages of clinical trial design and analysis.

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Accessible and comprehensive, the first volume in a two-part set includes newly-written articles as well as established literature from the Wiley Encyclopedia of Clinical Trials. Illustrating a variety of statistical concepts and principles such as longitudinal data, missing data, covariates, biased-coin randomization, repeated measurements, and simple randomization, the book also provides in-depth coverage of the various trial designs found within phase I-IV trials. *Methods and Applications of Statistics in Clinical Trials, Volume 1: Concepts, Principles, Trials, and Designs* also features: Detailed chapters on the type of trial designs, such as adaptive, crossover, group-randomized, multicenter, non-inferiority, non-randomized, open-labeled, preference, prevention, and superiority trials Over 100 contributions from leading academics, researchers, and practitioners An exploration of ongoing, cutting-edge clinical trials on early cancer and heart disease, mother-to-child human immunodeficiency virus transmission trials, and the AIDS Clinical Trials Group *Methods and Applications of Statistics in Clinical Trials, Volume 1: Concepts, Principles, Trials, and Designs* is an excellent reference for researchers, practitioners, and students in the fields of clinical trials, pharmaceuticals, biostatistics, medical research design, biology, biomedicine, epidemiology, and public health.

In today's 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

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associated privileges -- is becoming progressively complex. This has brought the spotlight on the importance of effective and efficient means of ascertaining an individual's 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."

Biometrics: Personal Identification in Networked Society is a comprehensive and accessible source of state-of-the-art information on all existing and emerging biometrics: the science of automatically identifying individuals based on their physiological or behavior characteristics. In particular, the book covers: \*General

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principles and ideas of designing biometric-based systems and their underlying tradeoffs \*Identification of important issues in the evaluation of biometrics-based systems \*Integration of biometric cues, and the integration of biometrics with other existing technologies \*Assessment of the capabilities and limitations of different biometrics \*The comprehensive examination of biometric methods in commercial use and in research development \*Exploration of some of the numerous privacy and security implications of biometrics. Also included are chapters on face and eye identification, speaker recognition, networking, and other timely technology-related issues. All chapters are written by leading internationally recognized experts from academia and industry. Biometrics: Personal Identification in Networked Society is an invaluable work for scientists, engineers, application developers, systems integrators, and others working in biometrics.

Biometric recognition--the automated recognition of individuals based on their behavioral and biological characteristic--is promoted as a way to help identify terrorists, provide better control of access to physical facilities and financial accounts, and increase the efficiency of access to services and their utilization. Biometric recognition has been applied to identification of criminals, patient tracking in medical informatics, and the personalization of social services, among other things. In spite of substantial effort, however, there remain unresolved questions about the effectiveness and management of systems for biometric recognition, as well as the appropriateness and

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societal impact of their use. Moreover, the general public has been exposed to biometrics largely as high-technology gadgets in spy thrillers or as fear-instilling instruments of state or corporate surveillance in speculative fiction. Now, as biometric technologies appear poised for broader use, increased concerns about national security and the tracking of individuals as they cross borders have caused passports, visas, and border-crossing records to be linked to biometric data. A focus on fighting insurgencies and terrorism has led to the military deployment of biometric tools to enable recognition of individuals as friend or foe. Commercially, finger-imaging sensors, whose cost and physical size have been reduced, now appear on many laptop personal computers, handheld devices, mobile phones, and other consumer devices. Biometric Recognition: Challenges and Opportunities addresses the issues surrounding broader implementation of this technology, making two main points: first, biometric recognition systems are incredibly complex, and need to be addressed as such. Second, biometric recognition is an inherently probabilistic endeavor. Consequently, even when the technology and the system in which it is embedded are behaving as designed, there is inevitable uncertainty and risk of error. This book elaborates on these themes in detail to provide policy makers, developers, and researchers a comprehensive assessment of biometric recognition that examines current capabilities, future possibilities, and the role of government in technology and system development.

Security and authentication issues are surging to the forefront of the research realm in

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global society. As technology continues to evolve, individuals are finding it easier to infiltrate various forums and facilities where they can illegally obtain information and access. By implementing biometric authentications to these forums, users are able to prevent attacks on their privacy and security. *Biometrics: Concepts, Methodologies, Tools, and Applications* is a multi-volume publication highlighting critical topics related to access control, user identification, and surveillance technologies. Featuring emergent research on the issues and challenges in security and privacy, various forms of user authentication, biometric applications to image processing and computer vision, and security applications within the field, this publication is an ideal reference source for researchers, engineers, technology developers, students, and security specialists. Traditional methods of biometric analysis are unable to overcome the limitations of existing approaches, mainly due to the lack of standards for input data, privacy concerns involving use and storage of actual biometric data, and unacceptable accuracy. Exploring solutions to inverse problems in biometrics transcends such limits and allows rich analysis of biometric information and systems for improved performance and testing. Although some particular inverse problems appear in the literature, until now there has been no comprehensive reference for these problems. *Biometric Inverse Problems* provides the first comprehensive treatment of biometric data synthesis and modeling. This groundbreaking reference comprises eight self-contained chapters that cover the principles of biometric inverse problems; basics of data structure design; new

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automatic synthetic signature, fingerprint, and iris design; synthetic faces and DNA; and new tools for biometrics based on Voronoi diagrams. Based on the authors' vast experience in the field, the book authoritatively examines new approaches and methodologies in both direct and inverse biometrics, providing invaluable analytical and benchmarking tools. The authors include case studies, examples, and implementation codes for practical illustration of the methods. Loaded with approximately 200 figures, 60 problems, 50 MATLAB® code fragments, and 200 examples, Biometric Inverse Problems sets the standard for innovation and authority in biometric data synthesis, modeling, and analysis.

Capture-recapture methods have been used in biology and ecology for more than 100 years. However, it is only recently that these methods have become popular in the social and medical sciences to estimate the size of elusive populations such as illegal immigrants, illicit drug users, or people with a drinking problem. Capture-Recapture Methods for the Social and Medical Sciences brings together important developments which allow the application of these methods. It has contributions from more than 40 researchers, and is divided into eight parts, including topics such as ratio regression models, capture-recapture meta-analysis, extensions of single and multiple source models, latent variable models and Bayesian approaches. The book is suitable for everyone who is interested in applying capture-recapture methods in the social and medical sciences. Furthermore, it is also of interest to those working with capture-

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recapture methods in biology and ecology, as there are some important developments covered in the book that also apply to these classical application areas.

"The book gives an introduction to basic biometric image discrimination technologies including theories that are the foundations of those technologies and new algorithms for biometrics authentication"--Provided by publisher.

Biometric recognition, or simply biometrics, is the science of establishing the identity of a person based on physical or behavioral attributes. It is a rapidly evolving field with applications ranging from securely accessing one's computer to gaining entry into a country. While the deployment of large-scale biometric systems in both commercial and government applications has increased the public awareness of this technology, "Introduction to Biometrics" is the first textbook to introduce the fundamentals of Biometrics to undergraduate/graduate students. The three commonly used modalities in the biometrics field, namely, fingerprint, face, and iris are covered in detail in this book. Few other modalities like hand geometry, ear, and gait are also discussed briefly along with advanced topics such as multibiometric systems and security of biometric systems. Exercises for each chapter will be available on the book website to help students gain a better understanding of the topics and obtain practical experience in designing computer programs for biometric applications. These can be found at: <http://www.csee.wvu.edu/~ross/BiometricsTextBook/>. Designed for undergraduate and graduate students in computer science and electrical engineering, "Introduction to

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Biometrics" is also suitable for researchers and biometric and computer security professionals.

Biometrics refers to methods for uniquely recognising humans based upon one or more intrinsic physical or behavioural traits. In information technology in particular, biometrics is used as a form of identity access management and access control. It is also used to identify individuals in groups that are under surveillance. Biometric characteristics can be divided in two main classes: physiological and behavioural. Physiological examples include fingerprints, face recognition, DNA, hand and palm geometry, iris recognition, which has largely replaced retina, and odour/scent. Behavioural examples include typing rhythm, gait, and voice. This book gathers the latest research in the field of biometrics and focuses on topics such as on-line signature verification, improving the performance of colour spaces in face recognition, block coding schemes designed for biometrical authentication, large scale palm print identification and distributional properties of count outcomes and limitations of relying on more traditional analytic methods to analyse low base rate occurrences.

Biometrics is a component of Encyclopedia of Mathematical Sciences in the global Encyclopedia of Life Support Systems (EOLSS), which is an integrated compendium of twenty one Encyclopedias. Biometry is a broad discipline covering all applications of statistics and mathematics to biology. The Theme Biometrics is divided into areas of expertise essential for a proper application of statistical and mathematical methods to contemporary biological problems. These volumes cover four main topics: Data Collection and Analysis, Statistical

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Methodology, Computation, Biostatistical Methods and Research Design and Selected Topics. These volumes are aimed at the following five major target audiences: University and College students Educators, Professional practitioners, Research personnel and Policy analysts, managers, and decision makers and NGOs.

This book discusses all critical privacy and data protection aspects of biometric systems from a legal perspective. It contains a systematic and complete analysis of the many issues raised by these systems based on examples worldwide and provides several recommendations for a transnational regulatory framework. An appropriate legal framework is in most countries not yet in place. Biometric systems use facial images, fingerprints, iris and/or voice in an automated way to identify or to verify (identity) claims of persons. The treatise which has an interdisciplinary approach starts with explaining the functioning of biometric systems in general terms for non-specialists. It continues with a description of the legal nature of biometric data and makes a comparison with DNA and biological material and the regulation thereof. After describing the risks, the work further reviews the opinions of data protection authorities in relation to biometric systems and current and future (EU) law. A detailed legal comparative analysis is made of the situation in Belgium, France and the Netherlands. The author concludes with an evaluation of the proportionality principle and the application of data protection law to biometric data processing operations, mainly in the private sector. Pleading for more safeguards in legislation, the author makes several suggestions for a regulatory framework aiming at reducing the risks of biometric systems. They include limitations to the collection and storage of biometric data as well as technical measures, which could influence the proportionality of the processing. The text is supported by several figures and tables

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providing a summary of particular points of the discussion. The book also uses the 2012 biometric vocabulary adopted by ISO and contains an extensive bibliography and literature sources.

This comprehensive handbook addresses the sophisticated forensic threats and challenges that have arisen in the modern digital age, and reviews the new computing solutions that have been proposed to tackle them. These include identity-related scenarios which cannot be solved with traditional approaches, such as attacks on security systems and the identification of abnormal/dangerous behaviors from remote cameras. Features: provides an in-depth analysis of the state of the art, together with a broad review of the available technologies and their potential applications; discusses potential future developments in the adoption of advanced technologies for the automated or semi-automated analysis of forensic traces; presents a particular focus on the acquisition and processing of data from real-world forensic cases; offers an holistic perspective, integrating work from different research institutions and combining viewpoints from both biometric technologies and forensic science.

Biometrics is concerned with measurement and analysis of a universal, unique and measurable physiological or behavioural characteristic. Biometric data is taken from individuals, extracting feature sets from the data and comparing it with the enrolment set in a database. Existing analyses techniques using wearable sensors are applied to gait analyses in children for biometric gait recognition. The performance degradation for children walking compared to adult walking is approximately 100%. A 6.21% Equal Error Rate (EER) for adult gait recognition was reached compared to 12.69% for children. Carrying an object showed that the performance actually improved compared to normal walking. However, faster walking was

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unstable resulting in a higher Equal Error Rate (EER). Age and gender differences showed significant variations in EER values. A coupled approach of statistical time-domain and frequency domain methods was employed to match biometric gait signals. Using root mean squared, crest-factor and kurtosis obtained similar matches in gait signals of children for the ages of 5-16 than for the traditional methods.

This book presents a range of qualitative and quantitative analyses in areas such as cybersecurity, sustainability, multivariate analysis, customer satisfaction, parametric programming, software reliability growth modeling, and blockchain technology, to name but a few. It also highlights integrated methods and practices in the areas of machine learning and genetic algorithms. After discussing applications in supply chains and logistics, cloud computing, six sigma, production management, big data analysis, satellite imaging, game theory, biometric systems, quality, and system performance, the book examines the latest developments and breakthroughs in the field of science and technology, and provides novel problem-solving methods. The themes discussed in the book link contributions by researchers and practitioners from different branches of engineering and management, and hailing from around the globe. These contributions provide scholars with a platform to derive maximum utility in the area of analytics by subscribing to the idea of managing business through system sciences, operations, and management. Managers and decision-makers can learn a great deal from the respective chapters, which will help them devise their own business strategies and find real-world solutions to complex industrial problems.

This is one of the very few books focused on analysis of multimedia data and newly emerging multimedia applications with an emphasis on security. The main objective of this project was to

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assemble as much research coverage as possible related to the field by defining the latest innovative technologies and providing the most comprehensive list of research references. The book includes sixteen chapters highlighting current concepts, issues and emerging technologies. Distinguished scholars from many prominent research institutions around the world contribute to the book. The book covers various aspects, including not only some fundamental knowledge and the latest key techniques, but also typical applications and open issues. Topics covered include dangerous or abnormal event detection, interaction recognition, person identification based on multiple traits, audiovisual biometric person authentication and liveness verification, emerging biometric technologies, sensitive information filtering for teleradiology, detection of nakedness in images, audio forensics, steganalysis, media content tracking authentication and illegal distributor identification through watermarking and content-based copy detection. We believe that the comprehensive coverage of diverse disciplines in the field of intelligent multimedia analysis for security applications will contribute to a better understanding of all topics, research, and discoveries in this emerging and evolving field and that the included contributions will be instrumental in the expansion of the corresponding body of knowledge, making this book a reference source of information. It is our sincere hope that this publication and its great amount of information and research will assist our research colleagues, faculty members and students, and organization decision makers in enhancing their understanding for the concepts, issues, problems, trends, challenges and opportunities related to this research field. Perhaps this book will even inspire its readers to contribute to the current discoveries in this immense field.

Biometrics - the physiological and/or behavioural characteristics that can be used to verify the

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identity of an individual - are no longer just being used in high security locations; they are now in use in major, mainstream government and commercial applications. Since September 11, the heightened awareness of security issues is driving forward the adoption of biometrics within numerous application environments. Coupled with a dramatic decrease in the price of such systems and the formulation of comprehensive industry standards, the market looks set for rapid growth over the next 5 years. The second edition of *The Biometric Industry Report - Forecasts and Analysis to 2006* examines the current use and future growth of biometrics. It analyses the trends in markets, technologies and industry structure and profiles the major players. The report provides key market statistics and forecasts essential for companies to plot their future growth strategies. For a PDF version of the report please call Sarah Proom on +44 (0) 1865 843181 for price details.

Biometrics is becoming increasingly common in establishments that require high security such as state security and financial sectors. The increased threat to national security by terrorists has led to the explosive popularity of biometrics. Biometric devices are now available to capture biometric measurements such as fingerprints, palm, retinal scans, keystroke, voice recognition and facial scanning. However, the accuracy of these measurements varies, which has a direct relevance on the levels of security they offer. With the need to combat the problems related to identify theft and other security issues, society will have to compromise between security and personal freedoms. *Securing Biometrics Applications* investigates and identifies key impacts of biometric security applications, while discovering opportunities and challenges presented by the biometric technologies available.

"This edited book provides researchers and practitioners a comprehensive understanding of

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the start-of-the-art of behavioral biometrics techniques, potential applications, successful practice, and available resources"--Provided by publisher.

This book highlights recent research advances on biometrics using new methods such as deep learning, nonlinear graph embedding, fuzzy approaches, and ensemble learning. Included are special biometric technologies related to privacy and security issues, such as cancellable biometrics and soft biometrics. The book also focuses on several emerging topics such as big data issues, internet of things, medical biometrics, healthcare, and robot-human interactions. The authors show how these new applications have triggered a number of new biometric approaches. They show, as an example, how fuzzy extractor has become a useful tool for key generation in biometric banking, and vein/heart rates from medical records can also be used to identify patients. The contributors cover the topics, their methods, and their applications in depth.

The field of biometrics utilizes computer models of the physical and behavioral characteristics of human beings with a view to reliable personal identification. The human characteristics of interest include visual images, speech, and indeed anything which might help to uniquely identify the individual. The other side of the biometrics coin is biometric synthesis ? rendering biometric phenomena from their corresponding computer models. For example, we could generate a synthetic face from its corresponding computer model. Such a model could include muscular dynamics to model the full gamut of human emotions conveyed by facial expressions. This book is a collection of carefully selected papers presenting the fundamental theory and practice of various aspects of biometric data processing in the context of pattern recognition. The traditional task of biometric technologies ? human identification by analysis of

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biometric data ? is extended to include the new discipline of biometric synthesis.

User-Driven Healthcare: Concepts, Methodologies, Tools, and Applications provides a global discussion on the practice of user-driven learning in healthcare and connected disciplines and its influence on learning through clinical problem solving. This book brings together different perspectives for researchers and practitioners to develop a comprehensive framework of user-driven healthcare.

"This book focuses on two kinds of advanced biometric recognition technologies, biometric data discrimination and multi-biometrics"--Provided by publisher.

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