Multibiometrics for Human Identification

In today's security-conscious society, real-world applications for authentication or identification require a highly accurate system for recognizing individual humans. The required level of performance cannot be achieved through the use of a single biometric such as face, fingerprint, ear, iris, palm, gait, or speech. Fusing multiple biometrics enables the indexing of large databases, more robust performance, and enhanced coverage of populations. Multiple biometrics are also naturally more robust against attacks than single biometrics.

This book addresses a broad spectrum of research issues on multibiometrics for human identification, ranging from sensing modes and modalities to fusion of biometric samples and combination of algorithms. It covers publicly available multibiometrics databases, theoretical and empirical studies on sensor fusion techniques in the context of biometrics authentication, identification, and performance evaluation and prediction.

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Preface

In today's security-conscious society, biometrics-based authentication and identification have become the focus of many important applications because it is believed that biometrics can provide accurate and reliable identification. Biometrics research and technology continue to mature rapidly, given pressing industrial and government needs and the strong support of industrial and government funding.

However, many of the applications warrant higher accuracy performance, which is not feasible with a single biometric today. It is widely believed that fusing multiple biometrics can also enable indexing of large databases and enhance coverage of the part of the population that is not able to provide any single biometric. Multiple biometrics is naturally more robust against spoof attacks as well, because hackers have to contend with more than one biometric.

This book addresses a broad spectrum of research issues ranging from different sensing modes and modalities to fusion of biometrics samples and combination of algorithms. It also covers theoretical and large-scale empirical studies on sensor fusion techniques in the context of biometrics authentication, identification, and performance evaluation/prediction.

As the number of biometrics architectures and sensors increases, the need to disseminate research results increases as well. Since 2006 we have organized a series of high-quality Annual Biometrics Workshops under the auspices of the IEEE Computer Society Conference on Computer Vision and Pattern Recognition. This series has emerged as the premier forum for showcasing cutting-edge research from academia, industry, and government laboratories.

The topics of interest at the workshop have largely centered around the theme of multibiometrics. They include sensing intensity, depth, thermal, pressure, time-series, and exotic; face, finger, ear, eye, iris, retina, vein pattern, palm, gait, foot, and speech; biometric templates, feature extraction, and selection; matching techniques and performance baselines; evolution of standards,

competitions, and organized challenge problems; score-level, decision-level, and feature-level integration; architectures for evidence integration; fusion-based identification techniques; normalization techniques involved in fusion techniques; machine learning techniques in biometrics fusion; public databases and score files in multibiometrics; application-dependent personalization of multibiometrics systems; theoretical studies in showing models for integration; performance modeling, prediction, and evaluation of multibiometrics systems; and security improvement assessment for multibiometrics systems.

This book is based on a selection of topics and authors from the proceedings of the workshop series and runs the entire gamut of multibiometrics topics, including multimodal, multisensory levels of fusion, multiple algorithms, and multiple data acquisition instances. It addresses novel sensing devices for novel multibiometric modalities, security assessment of multibiometrics systems and their dynamic management, theoretically sound and novel approaches for fusion, publicly available multibiometrics databases, and issues related to performance modeling, prediction, and validation of multibiometrics systems.

The primary intended audience for this book is the research community in academia and industrial research labs. The secondary audience is graduate students working on master's theses and doctoral dissertations. This book will also serve as a useful reference for an advanced biometrics course that considers pattern recognition, computer vision, and machine learning as prerequisites.

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