

Preface

Recently, biometrics technology has been one of the hot research topics in the IT field, because of the demands for accurate personal identification or verification to solve security problems in various applications, such as e-commerce, Internet banking, access control, immigration, and law enforcement. In particular, after the 911 terrorist attacks, the interest in biometrics-based security solutions and applications has increased dramatically.

Although a lot of traditional biometrics technologies and systems such as fingerprint, face, palmprint, voice, and signature have been greatly development in the past decades, they are application dependent and still have some limitations. Multispectral biometrics technologies are emerging for high security requirement for their advantages: multispectral biometrics could offer a richer information source for feature extraction; multispectral biometrics is more robust to spoof attack since it is more difficult to be duplicated or counterfeited.

With the development of multispectral imaging techniques, it is possible to capture multispectral biometrics characteristics in real time. Recently, multispectral techniques have been used in biometrics authentication, such as multispectral face, multispectral iris, multispectral palmprint, and multispectral fingerprint recognition, and some commercial multispectral biometrics systems have been pushed into the market already.

Our team certainly regards multispectral biometrics as a very potential research field and has worked on it since 2008. We are the first group that developed the multispectral hand dorsal technology and system. We built a large multispectral palmprint database (PolyU multispectral Palmprint Database), which contains 6,000 samples collected from 500 different palms, and then published it online since 2010. Until now, this database has been downloaded by many researchers. This work was followed with more extensive investigations into multispectral palmprint technology, and this research has now evolved to other multispectral biometrics field. Then, a number of algorithms have been proposed for these multispectral biometrics technologies, including segmentation approaches, feature extraction methodologies, matching strategies, and classification ideas. Both this explosion of

interest and this diversity of approaches have been reflected in the wide range of recently published technical papers.

This book seeks to gather and present current knowledge relevant to the basic concepts, definition, and characteristic features of multispectral biometrics technology in a unified way, and demonstrates some multispectral biometric identification system prototypes. We hope thereby to provide readers with a concrete survey of the field in one volume. Selected chapters provide in-depth guides to specific multispectral imaging methods, algorithm designs, and implementations.

This book provides a comprehensive introduction to multispectral biometrics technologies. It is suitable for different levels of readers: Those who want to learn more about multispectral biometrics technology, and those who wish to understand, participate in, and/or develop a multispectral biometrics authentication system. We have tried to keep explanations elementary without sacrificing depth of coverage or mathematical rigor. The first part of this book explains the background of multispectral biometrics. Multispectral iris recognition is introduced in Part II. Part III presents multispectral palmprint technologies. Multispectral hand dorsal recognition is developed in Part IV.

This book is a comprehensive introduction to both theoretical and practical issues in multispectral biometrics authentication. It would serve as a textbook or as a useful reference for graduate students and researchers in the fields of computer science, electrical engineering, systems science, and information technology. Researchers and practitioners in industry and R&D laboratories' working security system design, biometrics, immigration, law enforcement, control, and pattern recognition would also find much of interest in this book.

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David Zhang
Zhenhua Guo
Yazhuo Gong

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Systems and Applications

Zhang, D.; Guo, Z.; Gong, Y.

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