## A Comparative Study of Palmprint Recognition Algorithms

DAVID ZHANG, The Hong Kong Polytechnic University / Harbin Institute of Technology WANGMENG ZUO and FENG YUE, Harbin Institute of Technology

Palmprint images contain rich unique features for reliable human identification, which makes it a very competitive topic in biometric research. A great many different low resolution palmprint recognition algorithms have been developed, which can be roughly grouped into three categories: holistic-based, feature-based, and hybrid methods. The purpose of this article is to provide an updated survey of palmprint recognition methods, and present a comparative study to evaluate the performance of the state-of-the-art palmprint recognition methods. Using the Hong Kong Polytechnic University (HKPU) palmprint database (version 2), we compare the recognition performance of a number of holistic-based (Fisherpalms and DCT+LDA) and local feature-based (competitive code, ordinal code, robust line orientation code, derivative of Gaussian code, and wide line detector) methods, and then investigate the error correlation and score-level fusion performance of different algorithms. After discussing the achievements and limitations of current palmprint recognition algorithms, we conclude with providing several potential research directions for the future.

Categories and Subject Descriptors: A.1 [Introductory and Survey]; I.4 [Image Processing and Computer Vision]; I.5.4 [Pattern Recognition]: Applications

General Terms: Algorithms, Performance

Additional Key Words and Phrases: Biometrics, feature extraction, palmprint recognition, performance evaluation, person identification

## **ACM Reference Format:**

Zhang, D., Zuo, W., and Yue, F. 2012. A comparative study of palmprint recognition algorithms. ACM Comput. Surv. 44, 1, Article 2 (January 2012), 37 pages.

## 1. INTRODUCTION

With the increasing demand of biometric solutions for security systems, palmprint recognition, a relatively novel but promising biometric technology, has recently received considerable interest [Duta et al. 2002; Jain et al. 2004; Shu and Zhang 1998; Zhang 2004; Zhang and Shu 1999]. Palmprints (the inner surface of the palm) carry several kinds of distinctive identification features for accurate and reliable personal recognition. Like fingerprints, palmprints have permanent discriminative features, including patterns of ridges and valleys, minutiae, and even pores in high resolution (>1000dpi) images [Cummins and Midlo 1961; SWGFAST 2006]. Aside from these

© 2012 ACM 0360-0300/2012/01-ART2 \$10.00

DOI 10.1145/2071389.2071391 http://doi.acm.org/10.1145/2071389.2071391

ACM Computing Surveys, Vol. 44, No. 1, Article 2, Publication date: January 2012.

The work is partially supported by the GRF fund from the HKSAR Government, the central fund from the Hong Kong Polytechnic University, and the NSFC/SZHK funds under Contract Nos. 60902099 and SG200810100003A.

Authors' addresses: D. Zhang, Biometrics Research Centre, Department of Computing, Hong Kong Polytechnic University, Kowloon, Hong Kong/Shenzhen University, Harbin Institute of Technology, Shenzhen, China; email: csdzhang@comp.polyu.edu.hk; W. Zuo and F. Yue, School of Computer Science and Technology, Harbin Institute of Technology, Harbin, China; email: wmzuo@hit.edu.cn.

Permission to make digital or hard copies of part or all of this work for personal or classroom use is granted without fee provided that copies are not made or distributed for profit or commercial advantage and that copies show this notice on the first page or initial screen of a display along with the full citation. Copyrights for components of this work owned by others than ACM must be honored. Abstracting with credit is permitted. To copy otherwise, to republish, to post on servers, to redistribute to lists, or to use any component of this work in other works requires prior specific permission and/or a fee. Permissions may be requested from the Publications Dept., ACM, Inc., 2 Penn Plaza, Suite 701, New York, NY 10121-0701, USA, fax +1 (212) 869-0481, or permissions@acm.org.