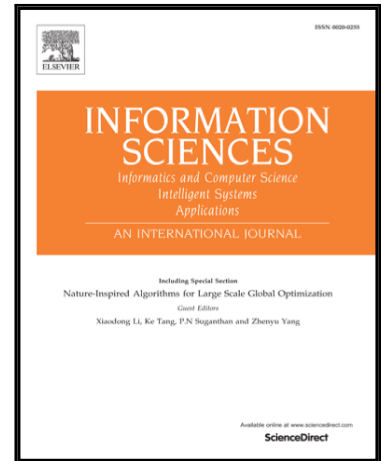


## Accepted Manuscript

Fingerprint enhancement rooted in the spectra diffusion by the aid of the 2D adaptive Chebyshev band-pass filter with orientation-selective



Shifei Ding , Weixin Bian , Tongfeng Sun , Yu Xue

PII: S0020-0255(16)31228-2  
DOI: [10.1016/j.ins.2017.06.028](https://doi.org/10.1016/j.ins.2017.06.028)  
Reference: INS 12950

To appear in: *Information Sciences*

Received date: 9 October 2016  
Revised date: 19 June 2017  
Accepted date: 22 June 2017

Please cite this article as: Shifei Ding , Weixin Bian , Tongfeng Sun , Yu Xue , Fingerprint enhancement rooted in the spectra diffusion by the aid of the 2D adaptive Chebyshev band-pass filter with orientation-selective, *Information Sciences* (2017), doi: [10.1016/j.ins.2017.06.028](https://doi.org/10.1016/j.ins.2017.06.028)

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

# Fingerprint enhancement rooted in the spectra diffusion by the aid of the 2D adaptive Chebyshev band-pass filter with orientation-selective

Shifei Ding<sup>a</sup>, Weixin Bian<sup>a,b,\*</sup>, Tongfeng Sun<sup>a</sup>, Yu Xue<sup>c</sup>

<sup>a</sup>School of Computer Science and Technology, China University of Mining and Technology, Xuzhou 221116, China

<sup>b</sup>School of Mathematics and Computer Science, Anhui Normal University, Wuhu 241003, China

<sup>c</sup>School of Computer and Software, Nanjing University of Information Science & Technology, Nanjing 210044, China

**Abstract:** 2D adaptive Chebyshev band-pass filter (ACBF) with orientation-selective, a novel fingerprint enhancement filter, is designed in this paper. The fingerprint enhancement is deeply rooted in the spectra diffusion by performing the 2D ACBF with orientation-selective in the frequency domain. The process of the enhancement is to have two phases: fingerprint is first enhanced by using Gabor filter and histogram equalization (HE), and then the pre-enhanced fingerprint is enhanced based on spectra diffusion by using the 2D ACBF with orientation-selective in frequency domain. In the first stage, the fingerprint quality can be improved in some extent. In the second stage, first, the qualities of patches are evaluated by the coherence of point orientations. Second, the adaptive parameters of the 2D ACBF are estimated, further, the 2D ACBF with orientation-selective is designed. Finally, the fingerprint image is enhanced based on spectra diffusion by using the 2D ACBF with orientation-selective. Experimental results on the database of FVC2000 and FVC2004 show that the proposed method achieves better results in comparison with other methods, and can significantly improve the performance of automatic fingerprint identification system (AFIS).

**Keywords:** Fingerprint enhancement; Gabor filter; Histogram equalization; 2D adaptive Chebyshev band-pass filter with orientation-selective; Spectra diffusion

## 1. Introduction

Image processing technology is developing by leaps and bounds in the late years [22-24, 38-40], and it is applied in many aspects of social life successfully. Li et al. [22] designed a subspace learning framework which can learn an appropriate representation for data by incorporating image understanding and feature learning into a unified framework. Tang et al. [38] proposed a novel hashing method by preserving the local discriminative information for image indexing, and it can effectively improve the performance for large-scale image retrieval. A number of biometric technologies have been developed and several of them have been successfully deployed. Among these, the fingerprint is one of the most popular personal identification due to the consistency during life time and uniqueness [28]. The human fingerprints are believed to be unique [33]. Most

Download English Version:

<https://daneshyari.com/en/article/4944358>

Download Persian Version:

<https://daneshyari.com/article/4944358>

[Daneshyari.com](https://daneshyari.com)