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SPECIAL ISSUE

An improved palmprint recognition system using iris features

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Abstract This paper presents a bimodal biometric recognition system based on the extracted features of the human palmprint and iris using a new graph-based approach termed Fisher locality preserving projections (FLPP). This new technique employs two graphs with the first being used to characterize the *within-class* compactness and the second dedicated to the augmentation of the *between-class* separability. By applying the FLPP, only the most discriminant and stable palmprint and iris features are retained. FLPP was implemented on the frequency domain by transforming the extracted region of interest extraction of both biometric modalities using Fourier transform. Subsequently, the palmprint and iris features vectors obtained are matched with their counterpart in the templates databases and the obtained scores are fused to produce a final decision. The proposed combination of palmprint and iris patterns has shown an excellent performance compared to unimodal palmprint biometric recognition. The system was evaluated on a database of 108 subjects and the experimental results show that our system performs very well and achieves a high accuracy expressed by an equal error rate of 0.00%.

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1 Introduction

Palmprint biometric is relatively a new emerging technology that is used to identify people by their palm features. Intensive research work have been reported in the last 10 years in this field which can be categorized into five main approaches: structural-, statistical-, coding-, subspace- and fusion-based approach. In the structural-based approach, several edge and line detector operators including Hough and Radon transforms have been used to extract the principal lines and wrinkles of the palm [1–4]. However, these approaches have some limitations since extracting palm's line and wrinkles is a difficult task, particularly on noisy palmprint images. In the statistical-based approach, several statistical parameters such as mean, variance, Hu moments, Zernike moments and local binary pattern have been used to measure the palm feature [5–8]. Statistical-based approaches have less complexity, however, yield moderate recognition accuracy in a large databases. The coding-based approaches are inspired from the successful iris phase quantization code (IrisCode) proposed by Daugman [9]. Zhang et al. [10] have used the same algorithm to introduce PalmCode algorithm for individual recognition by encoding the phase information of single circular Gabor filtered palmprint at 45° as bitwise features. Later on, many versions of the PalmCode have been proposed: fusion code [11], competitive code [12], phase only correlation (POC) [13], derivative of gaussian