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A Novel Local Wavelet Energy Mesh Pattern (LWEMeP) for Heterogeneous Face Recognition

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Abstract

This paper proposes a novel and accurate methodology for matching of heterogeneous faces, such as sketch-photo and near infrared (NIR)-visible (VIS) images. Inspired from mesh topology in computer networking, a new local binary pattern has been developed. We call it derived local mesh pattern (*DLMeP*). *DLMeP* is computed based on the relationship among each and every pixel present in a local window. For heterogeneous face recognition, more emphasis is given to the edge and texture features, because these features could be extracted invariant to different modalities. The wavelet transform is employed to capture the edge and texture features simultaneously. Then a local wavelet energy feature is calculated to enhance the local texture information and edges. Finally, *DLMeP* is used to measure the local variation or pattern of wavelet energy, and we call it local wavelet energy mesh pattern (*LWEMeP*). For refinement of *LWEMeP*, a model based weight value learning is suggested. We have tested the proposed methodology on different sketch-photo and NIR-VIS benchmark databases. In the case of viewed sketches, the rank-1 recognition accuracy of 99.37% is achieved on CUFSF database. *LWEMeP* gives the rank-1 accuracy of 65.31% on challenging e-PRIP composite sketch database. In the case of NIR-VIS matching, the rank-1 accuracy of 89.78% is achieved and which is superior to other state-of-the-art methods. Finally, proposed *LWEMeP* is also compared with state-of-the-art deep learning based methods in the case of composite sketch vs

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