

Multiframe super-resolution algorithm for improved performance of human palm vein recognition system

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(COICT)2018.

Palm vein recognition (PVR) is an upcoming biometric technology of recognizing individuals based on the geometrical arrangement of the palm veins. The PVR system consists of four fundamental stages: image acquisition, image pre-processing, feature extraction, and matching. The perfection of image acquisition and pre-processing stages determine the overall accuracy of the system. Focusing on the pre-processing stage, classical methods fail to generate more informative vein patterns by suppressing noises and blur, and by restoring useful image features (edges, lines, and contours) from the acquired image. This weakness calls for expensive commercial PVR systems that attempt to neutralize the impacts of the pre-processing stage. This research introduces Multiframe Super-Resolution (MRS) algorithm that can improve the pre-processing stage of the classical PVR systems. This approach suppresses noise and enhances spatial resolution of an image, and ensures protection of the critical features of the image. The proposed PVR system was tested using CASIA Multi-Spectral Palm-print Image Database, which contains 600 palm vein images captured at 850nm from 100 different people. Results show that the PVR system integrated with the MSR algorithm outperforms, giving false acceptance rate (FAR) and false rejection rate (FRR) of 0.67% and 1.00%, respectively, whereas the classical PVR system generated FAR of 2.00% and 4.33%, respectively. The results provides insights on the possibility of augmenting the available PVR systems with an inexpensive image acquisition scanner by embedding MSR algorithm that allows low quality images to be captured without degrading system's performance.

THS EAF TK 8315 V46