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Research Article

Efficient Unconstrained Iris Recognition System Based on CCT-Like Mask Filter Bank

Abstract:

In this paper, a new personal identification method based on unconstrained iris recognition is presented. We apply a nontraditional step for feature extraction where a new circular contourlet filter bank is used to capture the iris characteristics. This idea is based on a new geometrical image transform called the circular contourlet transform (CCT). An efficient multilevel and multidirectional contourlet decomposition method is needed to form a reduced-length quantized feature vector with improved performance. The CCT transform provides both multiscale and multioriented analysis of iris features. Circular contourlet-like mask filters can be used with shapes just like the 2D circular-support regions in different scales and directions. A reduced recognition system is realized using a single branch of the whole decomposition bank, highlighting a system realization with lower complexity and fewer computations. In the proposed recognition system, only five out of seven elements of the gray level cooccurrence matrix are required in the creation of the feature vector, which leads to a further reduction in computations. In addition, the highly discriminative frequency regions due to the use of circular-support decompositions can result in highly accurate feature vectors, reflecting good recognition rates for the proposed system. It is shown that the proposed system has encouraging performance in terms of high recognition rates and a reduced number of elements of the feature vector. This reflects reliable and rapid recognition properties. In addition, some promising characteristics of the system are apparent since it can efficiently be realized with lower computation complexity.