Robust Sclera Recognition System With Novel Sclera Segmentation and Validation Techniques

Sclera blood veins have been investigated recently as a biometric trait which can be used in a recognition system. The sclera is the white and opaque outer protective part of the eye. This part of the eye has visible blood veins which are randomly distributed. This feature makes these blood veins a promising factor for eye recognition. The sclera has an advantage in that it can be captured using a visible-wavelength camera. Therefore, applications which may involve the sclera are wide ranging. The contribution of this paper is the design of a robust sclera recognition system with high accuracy. The system comprises of new sclera segmentation and occluded eye detection methods. We also propose an efficient method for vessel enhancement, extraction, and binarization. In the feature extraction and matching process stages, we additionally develop an efficient method, that is, orientation, scale, illumination, and deformation invariant. The obtained results using UBIRIS.v1 and UTIRIS databases show an advantage in terms of segmentation accuracy and computational complexity compared with state-of-the-art methods due to Thomas, Oh, Zhou, and Das.