Abstract

Iris localization is a critical step for an iris recognition system because it directly affects the recognition rates. Consequently, in order to have reasonably accurate measures, we should estimate as many iris boundaries as possible which are defined by papillary and ciliary regions. Due to the contraction which is an intrinsic propriety of the pupil and the variations in the shooting angle, the pupil will not be a regular circle. So an active contour is suitable to accurately locate the iris boundaries. In this paper we focused on iris/pupil boundary and we proposed a new algorithm based on an active contour without edges applied in gray level image. First, we develop a new method to locate and fill the corneal reflection which is used not only to remove the highlight points that appear inside the pupil but also as an initial contour generator for the snake. Second, we propose to use the active contour without edges for precise pupil segmentation. This kind of snake can detect objects whose boundaries are not necessarily defined by gradient. Our algorithm seems to be robust to occlusion, specular reflection, variation in illumination and improves its efficiency in precision and time computation compared with AIPF and Gvf active contour. Another advantage is that the initial curve can be anywhere in the image and the contour will be automatically detected. The proposed
algorithm is 2.36 faster than GVF snake-based method for accurate pupil contour detection and integro-differential method with accuracy up to 99.62% using CASIA iris database V3.0 and up to 100% with CASIA iris database V1.0.

References

- L. Masek, "Recognition of human iris patterns for biometric identification", The University of Western Australia, 2003.
Active Contour without Edges vs GVF Active Contour for Accurate Pupil Segmentation

- Image understanding for iris biometrics: A survey Kevin W. Bowyer, Karen Hollingsworth, Patrick J. Flynn

Index Terms
Computer Science Pattern Recognition

Keywords
Iris pupil snake specular reflection active contour without edges