Abstract

Accurate pupil tracking plays an important role in many sophisticated applications such as HCI, behavioral research, driver’s fatigue detection and marketing. In this study particle filter helps us to track pupil in video frames under active IR illumination. The proposed method can be categorized as follow; The eye video is captured by a HMD camera, then precise location of the pupil is determined by thresholding and applying Snake algorithm, next the contour of the detected pupil is modeled with an ellipse, finally the parameters of the ellipse such as center coordinates and major & minor axis are tracked by particle filter. Experimental results of the proposed method which applied to 20 different subjects, demonstrate the accuracy of the proposed method.

References

Particle Filtering in the Design of an Accurate Pupil Tracking System

On Signal Processing, Vol. 50, No. 2, February
- CASIA V3.0 Iris Image Database http://www.cbser.ia.ac.cn/IrisDatabase.htm
- H. Hua, P. Krishnaswamy, 2006 &quot;Video-based Eyetracking Methods and Algorithms in Head-mounted Displays&quot; OPTIC EXPRESS 4328, Vol. 14, No. 10
- Q. Ji, X. Yang, 2002 &quot;Real-Time Eye, Gaze, and Face Pose Tracking for Monitoring Driver Vigilance&quot; Real-Time Imaging 8, 357–377
- S. Panev, O. Bombarov, S. Sokolov, 2008 &quot;IR Based Pupil Tracking Using Particle Filtering&quot; International Scientific Conference Computer Science&apos;2008
- Y. Yu, Q. Cheng, 2006 &quot;Particle Filters for Maneuvering Target Tracking Problem&quot; Signal Processing, Vol. 86, Issue1, pp:195-203
- Z. Zhu, Q. Ji, K. Fujimura, 2002 &quot;Combining Kalman Filtering and Mean Shift for Real Time Eye Tracking Under Active IR Illumination&quot; IEEE , 1051-4651/02

Index Terms

Computer Science
Image Processing
Keywords
Pupil tracking  Snake algorithm  HMD camera  Particle filter