

A Fatigue Detection System with Eyeglasses Removal

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Abstract—A fatigue detection system is designed to alert the driver and thus prevent the possible accidents. The detection is mainly based on the result of the face/eye detection or the pupil of the eyeball to determine whether the driver is in the fatigue condition or not. Most of the previous studies assume that the driver does not wear the eyeglasses. However, the eye detection is easily influenced by the eyeglasses and thus decreases the correct detection ratio. In order to overcome the influence of the eyeglasses, a fatigue detection method with eyeglass removal is proposed in this paper. Firstly, the face area is detected by using the functions in the OpenCV library. Then, the eyeglasses are removed by using the morphological operations. After eyeglasses removal, the eye areas are detected by using the functions in the OpenCV library and tracking by using a template matching method. The binarization result of the eye area is performed the horizontal projection and Kalman filter. Then, the open/close state of eyes is determined, and then fatigue is determined based on the series state of eyes. Four testing videos are used to evaluate the performance of the proposed method. The average correct detection ratio of the eye state is 88.5% and the fatigue detection can reach 100%. The preliminary results show that the proposed method is feasible.

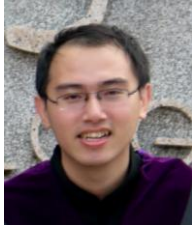
Keywords—Face detection, Eye detection, Eye tracking, Kalman filter, Template matching



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