

Driver alert state and fatigue detection by salient points analysis

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Abstract

Assessing a driver's state of awareness and fatigue is especially important to reduce the number of traffic accidents often involving bus and truck drivers, who must work during several hours under monotonous road conditions. Two main challenges arise in resolving the state of alert: first, the system must be capable of detecting the driver's face location; secondly, the driver's facial cues, such as blinking, yawning, and eyebrow rising must be recognized. Our approach combines the well-known Viola-Jones face detector with motion analysis of Shi-Tomasi salient features within the face to determine the driver's state of alert. The location of the eyes and blinking are cues whose detection is also important. To this end, the proposed method takes advantage of the high reflectivity of the retina to near infrared illumination employing a camera with an 850 nm wavelength filter. Motion analysis of the salient points, in particular cluster mass centers and spatial distribution, has proved successful in determining the driver's state of alert.

Keywords

Fatigue, Face detection, Motion analysis, Road accidents, Eyebrows, Face recognition, Motion detection, Detectors, Eyes, Reflectivity.