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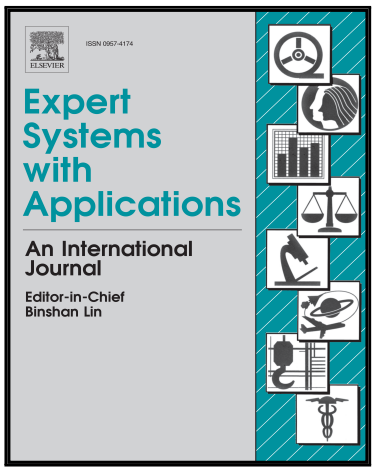

Part-based Vehicle Detection in Side-rectilinear Images for Blind-Spot Detection

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Part-based Vehicle Detection in Side-rectilinear Images for Blind-Spot Detection

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Abstract

The Blind-Spot Detection (BSD) system is designed to prevent accidents during lane changing and overtaking scenarios. Current BSD systems that use side- or rear-view cameras suffer from limited performance because of the severe distortion in the appearance of nearby vehicles depending on their positions relative to the host vehicle. To overcome such limitations, this manuscript introduces a side-rectilinear image to detect and use the side parts of the vehicles. In the side-rectilinear image, the side parts of the vehicles do not contain radial or perspective distortions; consequently, the appearance of the tires remains identical from different positions on the vehicle. By utilizing this rectilinear image, a rear-camera-based BSD system that detects both vehicles and motorcycles is constructed to prevent possible accidents occurring in blind spots. The proposed BSD system detects the vehicles in three stages: tire hypothesis generation/verification, front-rear tire classification, and vehicle hypothesis generation/verification. For motorcycle detection, the proposed system detects the lower parts of the motorcycle, which are not affected by the appearance of the drivers and cargos. Using the property of the side-rectilinear image, the detection procedures of the proposed system are straight-forward and resemble the

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