A Wheel-based Side-view Car Detection using Snake Algorithm

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Abstract

Car detection is a challenging research area where the appearance has various changes due to different models, poses, scales, lighting conditions, background, occlusion and various image sizes. Amidst these external challenging factors, car side-views have obvious and consistent characteristics in their structure such as wheels, oblique windows and bumpers, which provide crucial cues for detection. In this paper, we describe a novel side-view car detection technique which constructs an initial contour for the Snake using the detection of wheels. Our approach is subdivided in to three stages: wheel detection, bounding box detection, and segmenting the car from its background. In the first step, we use Hough transformation to detect circles in an image and validate the wheels with a learnt visual vocabulary. In the second step, we construct an initial contour with the aid of the detected wheels and the width-to-height statistics of different types of cars. This initial contour forms the bounding box of the car. In the third step, the Snake algorithm proceeds with the initial contour to fit the boundary closer to the car. Hence, the foreground, car, is separated from the background. We empirically evaluated our method on 100 side-view cars and the testing results shows that this approach has good performance.

Author Keywords

Car detection, Circular Hough Transform, Snake algorithm, SURF, Visual Vocabulary