

Front-view Car Detection using Vocabulary Voting and Mean-Shift Search

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Abstract

Vehicle detection has received much attention over the recent years. In this paper we mainly address on the detection of cars in front-view static images and focus on local features that describe structural characteristics in particular. Our method is based on constructing visual vocabularies for the car and non-car objects (i.e., background). Extended speeded up robust features are used in constructing the vocabularies using *K*-means algorithm. For a test car image, e-SURF keypoints are extracted and possible background keypoints are rejected in order to retain keypoints that of car by using a vocabulary voting strategy. The retained keypoints are then scanned using mean-shift algorithm to find a candidate bounding box of the car. The extraction of keypoints with vocabulary voting and the mean-shift searching technique are repeated to every scale of the down sampled test image. The set of bounding boxes found at every scale are then mapped in to the original test image and a non-maximum suppression technique is used to predict the final bounding box of the car. The system is evaluated on 25 distinctive vehicle classes with 20 images per class. Testing results show that the method has a high detection rate of 96.8% on front-view cars. The method is flexible and can be easily extended to other views such as side or rear view by modifying the visual vocabularies.

Author Keywords

Bounding box, car detection, mean-shift, visual vocabulary