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Multi-Vehicle Detection Using Histogram of Oriented Gradients Features and Adaptive Sliding Window Technique

Authors : Saumya Srivastava, Rina Maiti

Abstract : In order to achieve a better performance of vehicle detection in a complex environment, we present an efficient approach for a multi-vehicle detection system using an adaptive sliding window technique. For a given frame, image segmentation is carried out to establish the region of interest. Gradient computation followed by thresholding, denoising, and morphological operations is performed to extract the binary search image. Near-region field and far-region field are defined to generate hypotheses using the adaptive sliding window technique on the resultant binary search image. For each vehicle candidate, features are extracted using a histogram of oriented gradients, and a pre-trained support vector machine is applied for hypothesis verification. Later, the Kalman filter is used for tracking the vanishing point. The experimental results show that the method is robust and effective on various roads and driving scenarios. The algorithm was tested on highways and urban roads in India.

Keywords : gradient, vehicle detection, histograms of oriented gradients, support vector machine
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