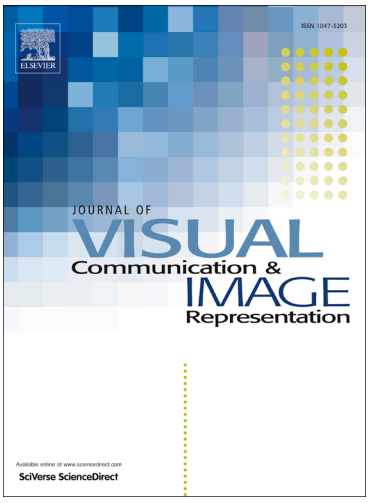

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Vehicle Counting in Crowded Scenes with Multi-channel and Multi-task Convolutional Neural Networks

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Abstract

Vehicle counting in crowded urban setting plays a significant role in public security area. Most existing works on vehicle counting focused on video sequence. Though these techniques has achieved significant progress, it has a significant disadvantage: only moving vehicle could be counted. It is not realistic that vehicles are often stopped in most crowded cases, e.g. carpark and traffic-light intersections. To deal with this issue, in this paper, we propose a novel multi-channel and multi-task convolutional neural networks (CNN) to count vehicles from still images. More specially, we present a novel algorithm to produce illumination invariance image and combine it with original gray image as input channels, which could handle more details. And we deem vehicle counting as a local consistency deep regression problem, using a local label supervised deep CNN model to fit it. Moreover, we utilize surveillance camera view classification as a related task to improve the performance of vehicle counting task and the two tasks are trained end-to-end jointly. To evaluate the proposed model, we collect a real-work dataset for research and extensive experimental results show that the proposed method performs better than existing state-of-the-art methods.

Keywords: Vehicle counting, urban setting, semantic feature, regression, classification
2010 MSC: 00-01, 99-00

1. Introduction

Vehicle counting aims at calculating the number of vehicles presented in images or videos. It is widely used in realistic computer vision applications