

## Traffic Density Measurement by Automatic Detection of the Vehicles Using Gradient Vectors from Aerial Images

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**Abstract :** This paper presents a new automatic vehicle detection method from very high resolution aerial images to measure traffic density. The proposed method starts by extracting road regions from image using road vector data. Then, the road image is divided into equal sections considering resolution of the images. Gradient vectors of the road image are computed from edge map of the corresponding image. Gradient vectors on the each boundary of the sections are divided where the gradient vectors significantly change their directions. Finally, number of vehicles in each section is carried out by calculating the standard deviation of the gradient vectors in each group and accepting the group as vehicle that has standard deviation above predefined threshold value. The proposed method was tested in four very high resolution aerial images acquired from Istanbul, Turkey which illustrate roads and vehicles with diverse characteristics. The results show the reliability of the proposed method in detecting vehicles by producing 86% overall F1 accuracy value.

**Keywords :** aerial images, intelligent transportation systems, traffic density measurement, vehicle detection

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