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REAL TIME SPEED ESTIMATION FROM MONOCULAR VIDEO

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Abstract. In this paper, detailed studies have been performed for developing a real time system to be used for surveillance of the traffic flow by using monocular video cameras to find speeds of the vehicles for secure travelling are presented. We assume that the studied road segment is planar and straight, the camera is tilted downward a bridge and the length of one line segment in the image is known. In order to estimate the speed of a moving vehicle from a video camera, rectification of video images is performed to eliminate the perspective effects and then the interest region namely the ROI is determined for tracking the vehicles. Velocity vectors of a sufficient number of reference points are identified on the image of the vehicle from each video frame. For this purpose sufficient number of points from the vehicle is selected, and these points must be accurately tracked on at least two successive video frames. In the second step, by using the displacement vectors of the tracked points and passed time, the velocity vectors of those points are computed. Computed velocity vectors are defined in the video image coordinate system and displacement vectors are measured by the means of pixel units. Then the magnitudes of the computed vectors in the image space are transformed to the object space to find the absolute values of these magnitudes. The accuracy of the estimated speed is approximately $\pm 1 - 2$ km/h. In order to solve the real time speed estimation problem, the authors have written a software system in C++ programming language. This software system has been used for all of the computations and test applications.

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