Abstract

A stereo vision based vehicle/obstacle detection system has been proposed that generates alarms when vehicles/obstacles are detected in vicinity of near/mid region. Numerous techniques have been applied to detect vehicles/obstacles using a forward facing monocular camera mounted inside a vehicle. This paper presents a methodology for vehicle/obstacle detection using high resolution stereo camera. Stereo cameras are calibrated; stereo images are undistorted and rectified using stereo calibration parameters. Stereo disparity image is then generated using stereo matching algorithm. To localize vehicles/obstacles, search space reduction forms a preliminary step by eliminating sky region retaining only road regions on which vehicles/obstacles are embedded. Periodic peaks in the histogram of stereo disparity image are used as a cue in vehicle/obstacle detection process. Line profiles corresponding to each periodic peak are extracted using vertical strokes. Statistical features are extracted and analyzed for each line profiles to determine the presence/absence of vehicles/obstacles. If vehicles/obstacles are detected in a line profile, then bounding box of blobs are detected using vertical projection technique. Blobs detected from all the gray level profiles are merged together and connected component analysis is applied to count the number of vehicles/obstacles. Color mapping of vehicles/obstacles detected are done to indicate the presence of vehicles/obstacles in near region or mid region thereby generating appropriate alarms.
An Application for Stereo Vision based Vehicle/Obstacle Detection for Driver Assistance

References

- Nicolas Soquet and Didier Aubert, &quot;Road Segmentation Supervised by an Extended V-Disparity Algorithm for Autonomous Navigation,&quot; in 2007 IEEE Intelligent Vehicles Symposium, pp. 160-165, June 2007.
- R. Labayrade, D. Aubert, and J. P. Tarel. Real time obstacle detection in stereo vision on non flat road geometry through v-disparity representation. In Proc. IEEE Intelligent Vehicle Symposium, Versailles, France, June 2002.
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- http://www.cvlibs.net/datasets/karlsruhe_sequences.html

Index Terms

Computer Science
Image Processing

Keywords
Camera calibration Stereo rectification stereo matching Inverse perspective mapping (IPM) Vertical projection Vertical stroke Feature extraction