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Automated Detection and Counting of Pedestrians on an Urban Roadside

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Abstract
This thesis implements an automated system that counts pedestrians with 85% accuracy. Two approaches have been considered and evaluated in terms of count accuracy, cost and ease of deployment. The first approach employs the Autoscope Solo Terra, a traffic camera which is widely used to monitor vehicular traffic. The Solo Terra supports an image processing-based detector that counts the number of objects crossing user-defined areas in the captured image. The count is updated based on the amount of movement across the selected regions. Therefore, a second approach has been considered that uses a histogram of oriented gradients (HoG), an advanced vision based algorithm proposed by Dalal et al. which distinguishes a pedestrian from a non-pedestrian based on an omega shape formed by the head and shoulders of a human being. The implemented detection software processes video frames that are streamed from a low-cost digital camera. The frames are divided into sub-

regions which are scanned for an omega shape whenever movement is detected in those regions. It has been found that the HoG-based approach degrades in performance due to occlusion under dense pedestrian traffic conditions whereas the Solo Terra approach appears to be more robust. Undercounts and overcounts were encountered using the Solo Terra approach. To combat the disadvantages of both the approaches, they were integrated to form a single system where count is incremented predominantly using the Solo Terra. The HoG-based approach corrects the obtained count under certain conditions. A preliminary prototype of the integrated system has been verified.

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