Vision Based Vehicle Tracking for Traffic Management

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Abstract

Vehicle tracking has become an increasingly in demand for reliable and high efficiency traffic management systems. In this thesis, two different algorithms are implemented for vehicles detection, tracking and counting in a highway, using a computer vision library called OpenCV. The proposed algorithms are motion templates and feature point (Lucas-Kanade algorithm). These algorithms were compared in terms of the accuracy and the ability to run in real-time using off the shelf hardware. Ten tests are used to evaluate these algorithms. Results showed both algorithms performing well in correctly counting cars from video streams. However, the accuracy using the feature point approach was higher. The average speed of vehicles inside a specified region on the streets called the detection zone (DZ) was estimated with the aid of motion templates algorithm. In spite of using uncalibrated camera, the accuracy of the implemented average speed estimating system is 92.2%. Detecting and tracking vehicles in real-time is not simple. A novel method was proposed to achieve real-time processing. It took the advantage of inherent direction of vehicles’ flow and parallel programming using OpenMP to improve its performance.