UNIVERSITATEA Transilvania BRAŞOV

INTERNATIONAL CONGRESS
AUTOMOTIVE, ENVIRONMENT AND FARM MACHINERY
AMMA 2007 – 11 - 13 October, 2007 – Cluj-Napoca, Romania

TECHNICAL UNIVERSITY OF CLUJ-NAPOCA

Vehicle Motion Tracking by Means of Cross-Correlation

Mihai Ivanovici, Ariadna-Laura Iliuț, Daniela Florea
contact: ivanovici@vega.unitbv.ro

ABSTRACT: We designed and implemented a traffic monitoring system, which can be used to compute the micro- and macro-parameters that characterize a car traffic flow. We used a surveillance video camera for the image acquisition and we implemented our own application that detects and tracks the vehicles. For a specific video sequence we compute offline the average velocity of the vehicles.

For the vehicle detection we used a robust algorithm based on feature extraction and learning. Once detected, a vehicle is tracked in the following video frames by computing the cross-correlation between the vehicle image and the image regions in a pre-defined search area. The maximum cross-correlation value indicates the new position of the vehicle. We present our results, conclusions and future plans.

The Traffic Monitoring System

Hardware

D12Di-Sec Mobotix Video Camera

Personal Computer

Software

Matlab

Dev C++

Intel OpenCV Computer Vision Library

1. Image acquisition

The recorded video sequence was downloaded from the video camera and stored as a sequence of 640x480 JPEG images that were processed afterwards.

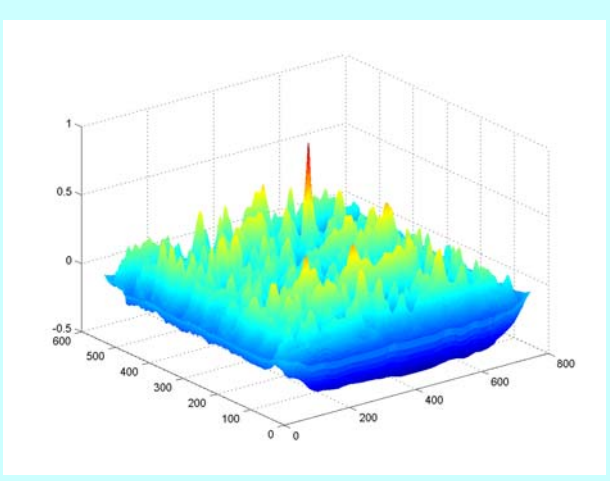
2. Vehicle Detection

We used the **Viola-Jones object detection algorithm**, based on Haar feature extraction and artificial learning (an AdaBoost classifier).

The detected vehicle

3. Vehicle Motion Tracking

The highest value (red peak) of the normalized cross-correlation function between the detected object image and the current video frame indicates the new position of the tracked vehicle.



Normalized cross-correlation function

Position of the vehicle in the current frame

EXPERIMENTAL RESULTS