Vision-based road detection

Summary

Road detection is a key requirement for unmanned guided vehicles as well as for driver assistance. A lot of approaches for road following have been proposed in the past [1]. The main objective of this project is to develop a program for the automatic segmentation of structured roads, that is roads having clear edges and artificial lane markings(fig.2), and for the detection of the road limits and the vanishing point (fig.3).

Fig. 1 – Unstructured road

Fig. 2 – Structured road

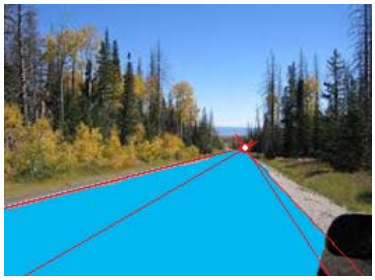

Fig.3 – Structured road segmentation and vanishing point (white point) estimation

General aims

To apply the theoretical knowledge about Image Processing and Analysis, acquired in the Computer Vision course, namely, feature detection and segmentation techniques, using OpenCV library as development tool.

Specific aims

The program must allow:

- the acquisition of a road image, using a computer connected camera, or the selection of a pre-acquired image;
- the segmentation of the road and detection of limits of the road/lanes, signaling their position on the image;
- the estimation of the vanishing point (fig. 3), signaling its position on the image.

Possible improvements (optional):

- to process images containing vehicles;
- to detect the road in unstructured road images.

The work must be done by groups of 3 students.

Project report and delivery

A short report (max. 3 pages) must be delivered, including:

- any additional specifications (if needed);
- the description of the proposed algorithm;
- relevant comments about the efficacy of the used methods, describing the main problems that were encountered and any proposed solutions;
- the status of the proposed solution and the degree of fulfillment of the aims.

The code, with significant comments, must be presented in annex.

The work must be submitted at the Computer Vision page, in Moodle, until the end of 2015/Oct/30th.

Bibliography

- [1] - "Survey: Vision-based Road Detection Techniques", Vipul H. Mistry et al., IJCSIT- International Journal of Computer Science and Information Technologies, Vol. 5 (3), 2014, pp. 4741-4747

NOTE: this paper can be used as a starting point for the search of other bibliography