Computer Vision

EMARO- *European Master on Advanced Robotics*

Robotics Engineering *Master Degree*

Lab Session n. 5

The following items are the steps that you must do in this lab session:

NCC-based segmentation

- Select a window around the red car on the street (in the gray scale image "ur_c_s_03a_01_L_0376.png") and apply the NCC (normalized cross correlation, *normxcorr2*), in order to find the template in all the 6 images (consider the same images of Lab4). Show the template. Show the position of the maximum of the score map and a box corresponding to the size of the template for all the 6 images (as in Fig.1). Do the same for the dark car that turns on the left.
- Compare the results of this Lab with the ones of Lab4 (color-based segmentation).
- Consider three different sizes of the window (centered around the dark car that turns on the left): discuss the results in terms of computation time and accuracy of detection.

Harris corner detection

- Implement the Harris corner detector. Apply the developed corner detector on the "image i235.png". Show the partial derivatives of the image and the Gaussian filter. Show the R score map and the corner regions. Show the detected corners overlapped to the image (see Fig.2). Tips: to look at the *harris_corner.m* available on AulaWeb; threshold for the corner regions 0.3*M, where M is the maximum value of R map; to use *regionprops()* function to get the centroids of the blobs in the corner regions map.

Notes:

- **This Lab will be evaluated (continuous assessment) and will count for the final score of the exam.**
- You have to write a report that describes your work and the obtained results (please include the most relevant figures, **not code**). In the report you must indicate all the surnames of the participants (not other names, e.g. the teachers).
- About the code (the code must be M-files):
  - You have to use relative paths.
  - You have to write and use functions.
  - You have to provide us a main script to test your code.

- All the files (M-files, images, and report) have to be compressed in a single file named “surnames_labxx.zip/tgz” (all the surnames of the participants have to be indicated), and then the compressed file has to be uploaded on AulaWeb.
- All group members must submit on Aulaweb individually.

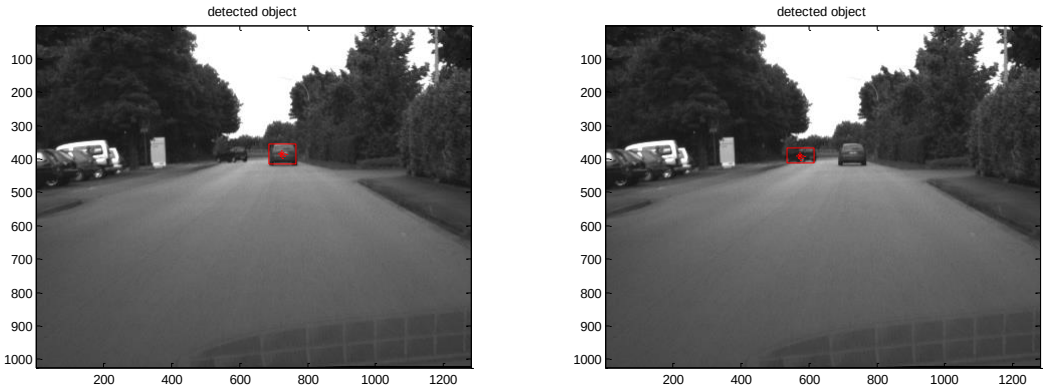

Fig.1: Segmentation examples.

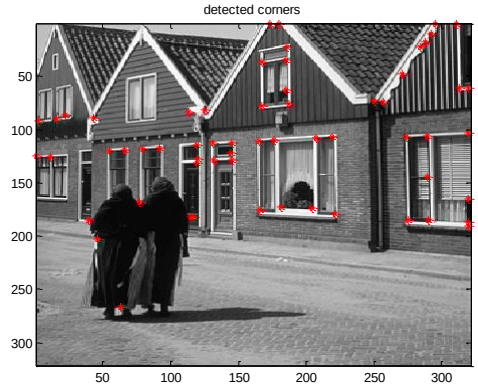

Fig.2: Corner detection example.