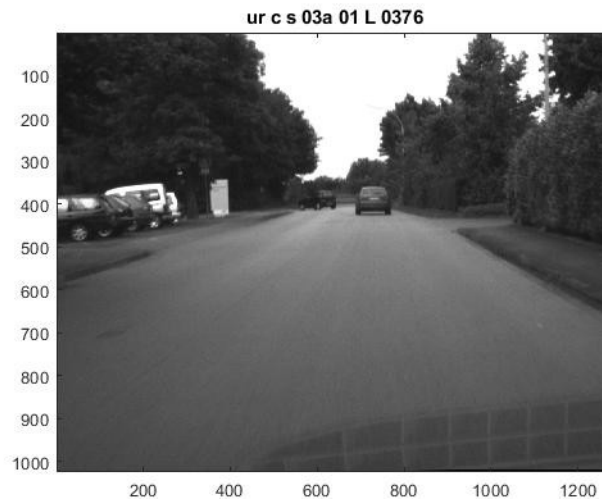


NCC-Based Segmentation

The aim of this lab session is to detect an object through the “mean method” and NCC segmentation. Then, compare these methods with the one of the previous lab (color segmentation).



Car Template (carTemplate.m)

First, we select the template wanted: the car in the gray image.

This is done passing to this function the template size wanted (the center is already fixed taking into account all the six frames) and the gray image.

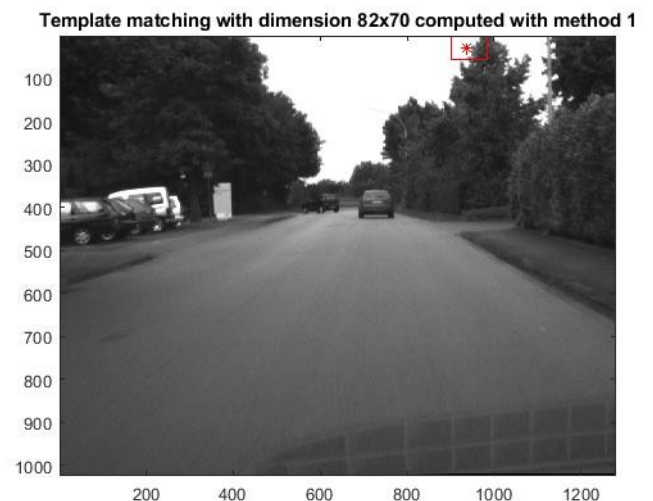
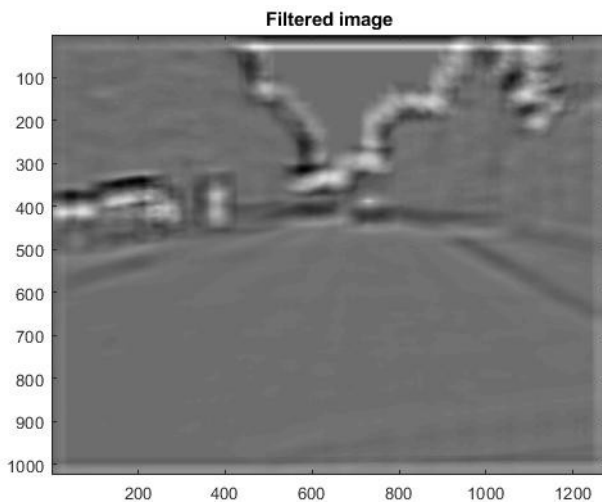
Template Matching (templateMatching.m)

Then, we detect the same car in all frames “matching” the template chosen previously.

We apply two methods for this:

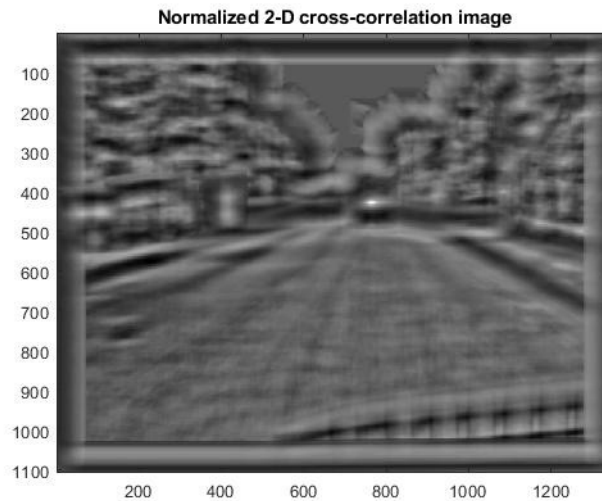
In the first one at the beginning we calculate T1 which is the template minus the mean of the template (find with mean2).

Then we filter (using filter2) the frames with T1



As we can see, this method isn't good because it finds pixels with values that are greater than the one that should be the maximum, so the box is in completely different position.

The second consist in using the normxcorr matlab function, that does the normalized cross-correlation between the original image and the template.

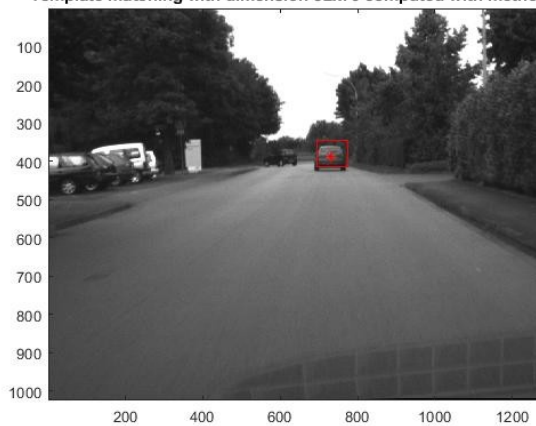


Differently from the method 1, now we clearly see that the maximum is in the right place and no other pixel have values so big.

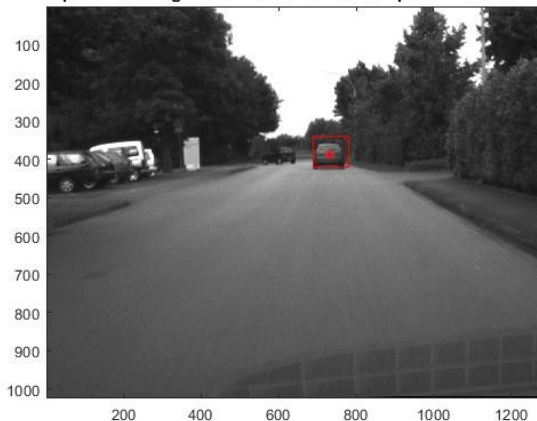
When we have found the maximum point, we construct a rectangle around it (knowing the dimension of the used template).

This method works well with different template size:

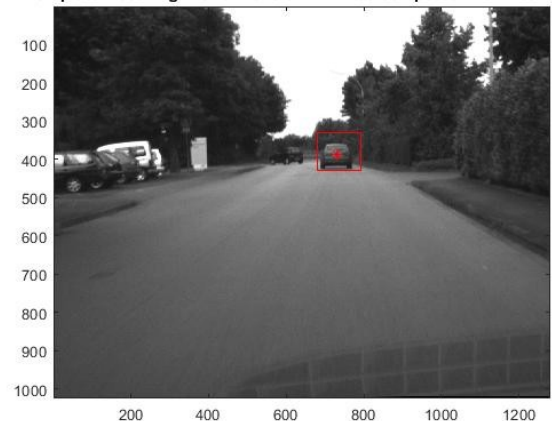
Template matching with dimension 82x70 computed with method 2



Template matching with dimension 92x80 computed with method 2



Template matching with dimension 112x100 computed with method 2

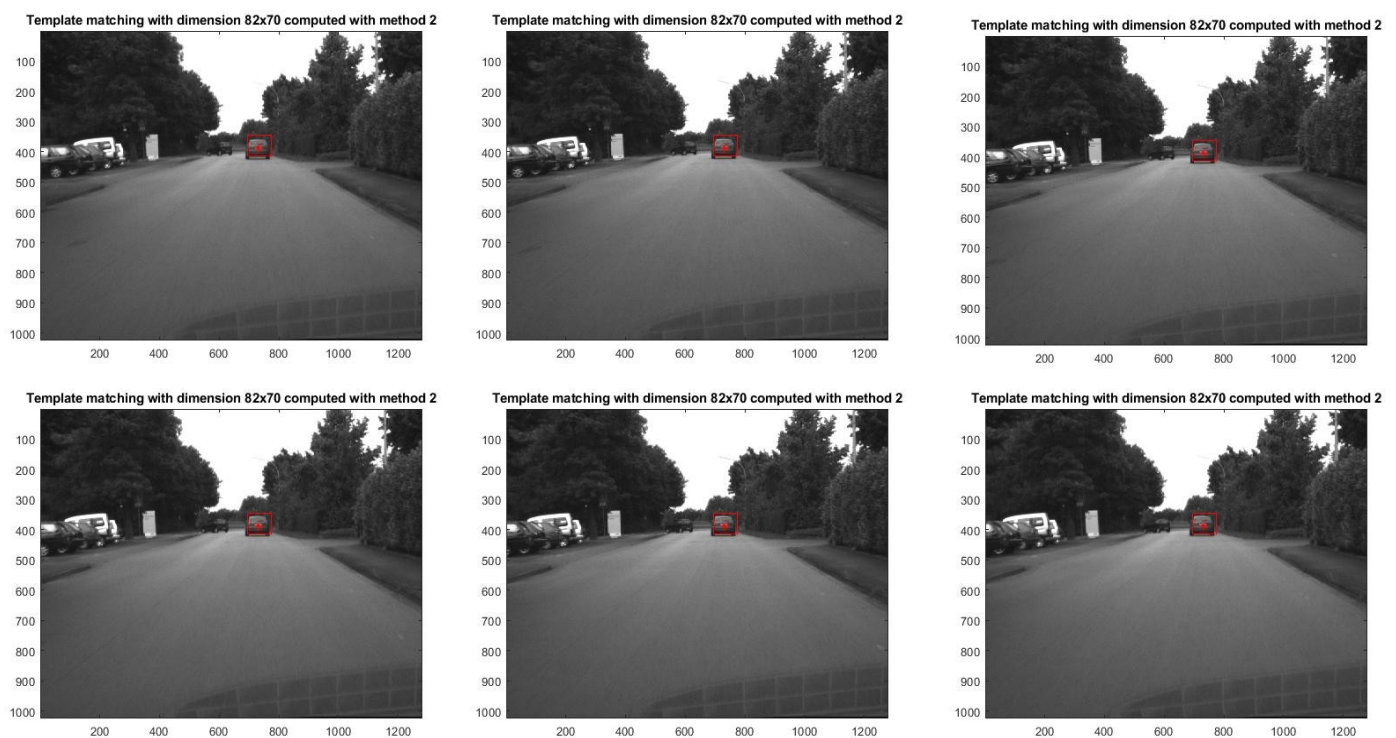


Bigger templates require more computation times because the cross-correlation is done with bigger matrix, but in theory, taking more pixel is more accurate (here the differences is not noticed).

82x70 : ~1.06 seconds

92x80 : ~1.23 seconds

112x100 : ~1.4 seconds



Here we can see that the car is detected in all 6 frames, using one unique template from the first frame.

Comparison with color segmentation method

This method works a lot better than the one used in lab 4: now we are not dependent on the color (we can detect car of any color). Also, we can detect only the car on the road, and not another thing of the same color (for example the car parked on the left)