Departament d'Enginyeria de Sistemes,
Automàtica i Informàtica Industrial

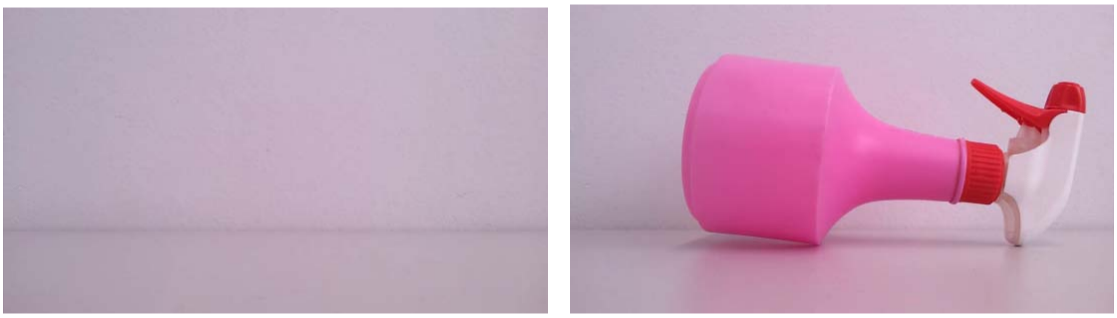
Advanced Topics on Computer Vision

Joan.aranda@upc.edu

Colour description and object identification

The goal is to detect, locate and identify daily objects appearing in front of a camera.

For objects detection and localization of the image we use the difference between two consecutive images, the first containing only the background and the second including the object. We assume that the camera does not move between the two samples. See the figure:

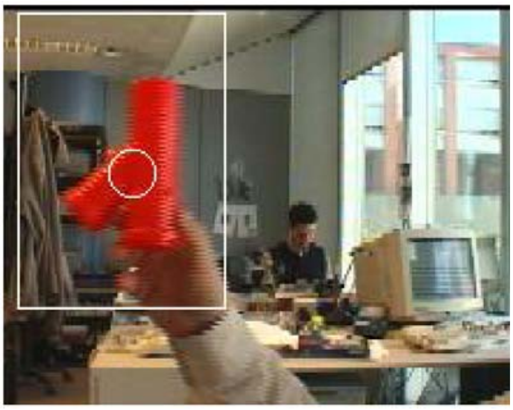


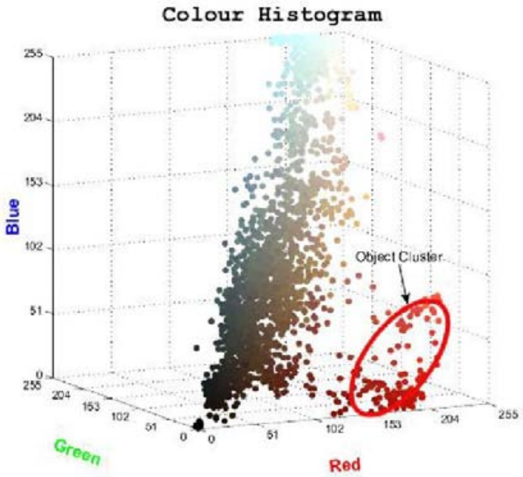
We'll provide you with real images of different objects. However, it's expected you use your own database and also testing on a less homogeneous than those presented in the figure.

For the description and identification of the patterns use techniques based on the color histogram of an image, or other proposed by you. The color histogram is made by counting all pixels in an image or a region of interest (ROI) in which are recorded all occurrences of a particular color (RGB combination).

In the practice, you must calculate the color histogram only in the ROI defined by the image difference (where the object appears) , so that the histogram reflects only the presence of colors in the object. This distribution of colors is what we use to describe the object during learning and to identify it later.

The following figure shows an example histogram made on a whole picture where you can see the red object and its color distribution.





As you can see, a three-dimensional representation is used to represent the histogram where the axes represent the R , G and B values. Each coordinate of this bucket is a cell (bin) with the counter value corresponding color (R , G , B).

To improve the presentation, only the bins with a value above a significant threshold are displayed. In addition, it is usual to paint the bins with a combination of color -coordinate equal to its RGB (to identify them better).

Steps to be followed:

1. Determine the ROI from the difference between images.
2. Calculate the color histogram for each ROI object instance.
3. Build classes from examples (learning)
4. Build the classifier and evaluate it.

you can use the *classify* function (MATLAB) to perform step 3 and 4.

Extra work:

You can test others color spaces such as HSV, Yxy or Lab and compare the results.

If the recognition algorithm is fast enough you can use the color histogram for tracking the object in real time (once located) on a video stream.