22437 - Industrial Vision
Lab 10: Image processing and feature extraction

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Useful functions: *regionprops*, *imfilter*, *bwlabel*, *imfill*, *strel*, *label2idx*, *bwselect*, *bwulterode*

This practice consists of using the processing tools seen in class to obtain, from the images provided, binary images in which the main object is segmented. Subsequently, a series of descriptors that characterize existing objects are also obtained.

Descriptors

Perform the following tasks for each given image (*apple.jpg*, *bell.jpg*, *shoe.jpg*, *fork.jpg*):

- Load the image and show it.
- Convert the image to grayscale and calculate its histogram. Show at the same figure the calculated image and its histogram.
- Obtain a binary image and show it in a new figure.
- Use segmentation techniques learned in class (mainly morphological operations and edge detection operators) considered appropriate to isolate the significant object as best as possible of the image, without losing the main information from its original form.
- From the segmented binary image, obtain the following set of descriptors:
  – Area
  – Centroid
  – Orientation
  – Eccentricity
  – Solidity

Once all the images have been processed and the descriptors from each object are obtained, two descriptors must be chosen from among all those calculated, to visualize the objects on the plane; so that if these descriptors are well chosen, the objects will be easily distinguishable.

Exercise

In a previous lab, the Hough transform was used to draw lines on a picture. Now, starting from the lines obtained, insert them as 1's into a matrix of 0's of the same dimensions as the original image. Do it with images *road* and *chessboard*.

The function signature should be:

```
function out = houghlines2mat(matdims, lines)
```

where *matdims* is a 1×2 matrix that indicates the dimensions of the matrix, and *lines* is the struct that is obtained from function *houghlines*.

To do this, explore the output structure of the houghlines function. You will see that each element consists of the fields *point1*, *point2*, *theta* and *rho*. With *point1* and *point2* you have enough data to do this.

Hint: Use *strel* to create the matrix with the line. It returns a struct with the field *.Neighborhood* that is the matrix you'll have to insert in the original matrix of zeros.

The final result should look like this: