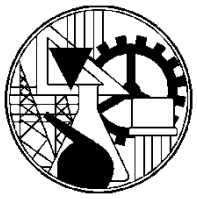

INSTITUTO SUPERIOR DE ENGENHARIA DE LISBOA

ÁREA DEPARTAMENTAL DE ENGENHARIA DE ELECTRÓNICA E TELECOMUNICAÇÕES E DE COMPUTADORES

Image Processing

1st Laboratory Project – Coin Detection and Counting

1. **Goal**
    a. Develop a computer vision algorithm able to automatically count the amount of money (coins), placed upon a table;
    b. Familiarization with the OpenCV (Open Source Computer Vision) library to develop real-time computer vision applications (for the Python programming language).
2. **Description**
    a. The aim is to develop an algorithm to count the sum of money (euro coins), placed in a table of clear and homogeneous surface and observed by a camera mounted on a tripod, adjusted so that the sensor plane is parallel to the table plane;
    b. The algorithm should be able to overcome the following perturbations: (i) the presence of objects other than coins, (ii) presence of minor shadows and (iii) possible contact of objects;
    c. A training set of images is provided to the development the algorithm;
    d. The algorithm will be evaluated with a test set of images, different from the training set, but acquired under the same conditions.

A typical sequence of tasks and related operations

	OpenCV
1. Image read	*imread*
2. Gray-scale conversion	*cvtColor*
3. Thresholding	*threshold*
4. Binary image improving	*getStructuringElement,* *morphologyEx* *dilate* *erode*
5. Connected component labeling	*findContours, drawContours,* *connectedComponents*
6. Feature extraction	*contourArea, arcLength,* *moments,* *connectedComponentsWithStats*
7. Object classification	

Other useful functions/methods:

	OpenCV
Image displaying	*imshow*
Saving images to the disk	*imwrite*
Computing the histogram	*calcHist*
Placing text on the image/figure	*putText*
Graphics displaying	*matplotlib library: plot, bar*
Separate color components	*split*
Compute the area inside a contour	*contourArea*
Compute the contour length	*arcLength*