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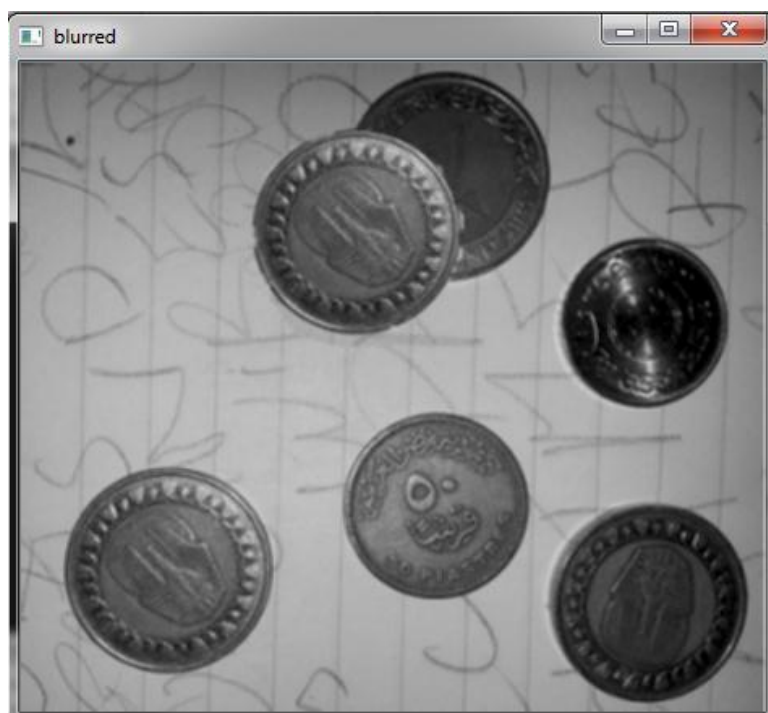
Computer Vision, Assignment #2

Coins Detection using Circular Hough Transform

Original Image used:



1. First, we need to do some blurring to the image before detecting the edges to remove the noise. Using Gaussian Blur OpenCv function with 3*3 filter size, here is the 8 bit Grey Scale Image after blurring:



2. Then i use Canny Edge Detection from OpenCV to get the edge pixels.



3. I implement Circular Hough transform over this binary Image.

Minimum Radius = 53, maximum radius = 65. With threshold = 230.



But I had this problem of detecting the inner circles at each coin; this was solved by looping through all the centers and eliminates the centers that are close to each other (centers with absolute difference < 20).



Each type of coins lies in specific ranges of radii,

The 0.25 pound coin takes range from [minimum radius, 55[

The 0.5 pound coin takes range from [55, 60[

The 1 pound coin takes range from [60, maximum radius]

So final result will be: 4.75 LE

```

C:\Users\toshiba\documents\visual studio 2012\Projects\Coins\Debug\Coins.exe
Min r53max r65
Circle with radius 53 and center 160 , 386
Circle with radius 58 and center 273 , 256
Circle with radius 63 and center 71 , 261
Circle with radius 63 and center 313 , 89
Circle with radius 63 and center 330 , 385
Circle with radius 64 and center 102 , 206
The total sum equals:4.75

```

Assumptions/restrictions:

1. I assumed that we only have these 3 types of coins; however, we don't have to have all the three types at the same time.
2. The program only works with photos taken at the same predetermined space from the camera as the image used. (It doesn't work with variable distance between the table and the camera).

Another output:

I implemented edge detection algorithm on my own instead of using Canny edge detection.

Using Sobel operator, we get these edges.



Using 150 as threshold, we get this binary image.



With a different threshold in the circular Hough transform algorithm (threshold = 253 instead of the previous 230), we get this output.



Coins lie in the same range of Radii,

The 0.25 pound coin takes range from [minimum radius, 55[

The 0.5 pound coin takes range from [55, 60[

The 1 pound coin takes range from [60, maximum radius]

So final result will be: 4.75 LE

```
C:\Users\toshiba\documents\visual studio 2012\Projects\Coins\Debug\Coins.exe
Min r53max r65
Circle with radius 54 and center 162 , 385
Circle with radius 55 and center 272 , 259
Circle with radius 61 and center 106 , 207
Circle with radius 62 and center 69 , 264
Circle with radius 62 and center 310 , 89
Circle with radius 63 and center 329 , 386
The total sum equals:4.75
```