COMPUTER VISION - ADAPTIVE BLUR

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1 Introduction

The main objective of this assignment was to firstly implement a canny edge detector and then see the difference between my edges and the edges produced by the inbuilt matlab function. The second part of the assignment focuses on the harris corner detection method. The corner/interest point was detected in the edge file obtained from canny and the corners are pointed out on the original image.

1.1 My canny edge detector

The canny edge detector is considered the optimal edge detection method. The method can be broken down to 5 steps-
1.Apply Gaussian blur to decrease noises
2.Find the x and y direction intensity gradients
3.Apply non-maximum suppression to get rid of spurious response to edge detection
4.Apply double threshold to determine potential edges
5.Track edges by hysteresis

Separate sub-functions are created for step 3 named nonMaximalSuppression.m and one function for steps 3 and 4 named myhysteresis.m which are called from within the canny edge detector function. The results for an image with shapes is:

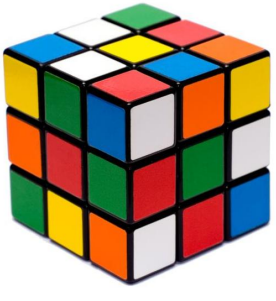

Figure 1: original image

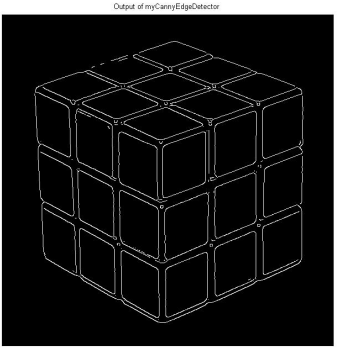

Figure 2: Edge detected cube

1.2 Compare output from built in function

Tt calls the inbuilt and my functions for calculating edges and these edges are compared to my predicted edge. It returns the eucledian distance and PSNR value of the two images and also gives the colored difference map and the blockwise summary matrix.
Now the observation I made was-
The images eucledian distance is: 4.815702e-04
Their PSNR value is: 1.905766e+01
for my image vs the in built edges.

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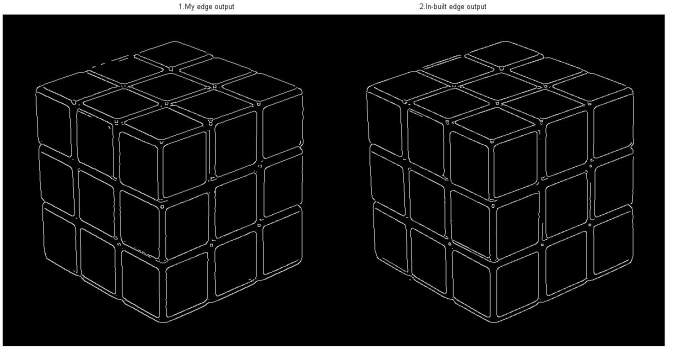

Figure 3: diff between my and built in edges

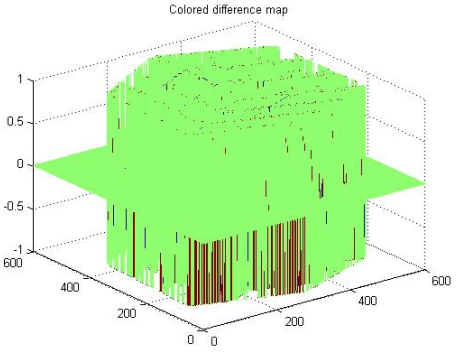

Figure 4: colored difference map

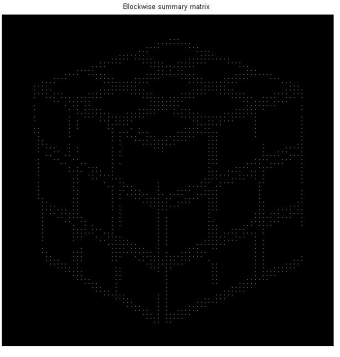

Figure 5: blockwise summary matrix

1.3 Compute the corners of the image

The function myDetectInterest detects the interest points from the edges detected from an image using canny. This edge is now processed upon by the genral algorithm used for Harris edge detction. But now since we have aready calculated the edges in Harris and hence we have the gradients that can be used and hence our work is reduced.
Now, the matrix R is calculated and a threshold is decided from within for this threshold.Now non-maximum suppression is done to get the final corners. These corners are marked on the original image using stars.

Now to see these corners clearly, they are implemented on shapes so that corners are eaily visible to the naked eye and we can verify it.

Figure 6: Corners of the cube

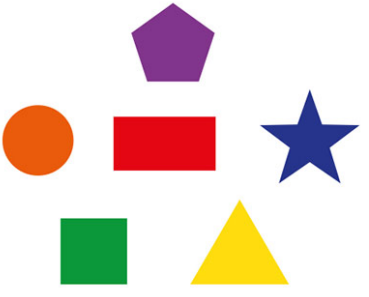

Figure 7: Original image

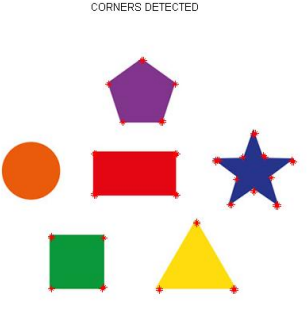

Figure 8: Corners of a shape