Report for lab assignment-1

Que1:

How did you decide the Low and high thresholds for hysteresis? What were your observations:

A)-For the process of extracting the edges which we want to observe/for specified mode of edge detection,we use thresholds
We can find wide edge detection where we extract all the type of edges
We can also find tight edge detection where we claim the edges which are very sure of
We vary the thresholds according to different purpose of use

I have observed a technique which gives results between these two boundaries which is auto edge detection:
1)it initially finds the median of the image
2)then it applies the median with sigma to find the thresholds.Sigma=0.33 has been found to give good results to detection

```
 k=np.median(inputImg4)
# lower = int(max(0, (1.0 - 0.33) * k))
# upper = int(min(255, (1.0 + 0.33) * k))
```

But for most cases I have got null values in the median which made the detection less capable of finding exact accurate edges.

Hence,I used
-I have compared the score/ssim values for different set of thresholds and observed the values and selected the thresholds accordingly which gave better results at 0.07,0.11

I have checked each of my functions accuracy to the inbuilt functions,for the convolve/sobel/..which came near to 80% on an avg.

Que2:

Approach:

I have used the approach mentioned in the paper:*Blur image detection using Laplacian operator and Open-CV*
I have used the laplacian operator over the image and calculated its variance as a parameter
High variance in a normal representative in-focus image means that there are a lot of responses both non edge like and edge like. Similarly, if the detected variance is low that means there is very less response spread which means that image contains very little edges. Thus, we can conclude that if an image has very few edges, then the image is blurred.

But we need to apply thresholds to divide the images accordingly

Selecting a proper threshold value totally depends on the domain. If the selected threshold is too high or too low then images would be marked falsely, for example, if an image is not blurry and the threshold is too high then the image will be marked blurry.

Hence I took a dataset from kaggle which consists of 70 images approx and I have runned my code for the images and listed the values for each blur and unblur images then,I have segregated the images accordingly.
Image attached:

Enter Data Set

0.00028474792597527586,
0.0002848861763557914,
0.00029031278075619145,
0.00031168506844421104,

Clear | Calculate

Answer:

| | |
|---|---|
| **Mean $\overline{x}$** | **0.0085654738086132** |
| **Median $\tilde{x}$** | **0.0019697226792295868** |
| **Mode** | **0.0005015980384279408** |
| Range | 0.11010394201311 |
| Minimum | 0.00028474792597527586 |
| Maximum | 0.11038868993908181 |
| Count *n* | 65 |
| Sum | 0.55675579755986 |
| Quartiles | Quartiles:<br>$Q_1$ --> 0.00088820734092112<br>$Q_2$ --> 0.0019697226792295868<br>$Q_3$ --> 0.0074750289958944 |
| Interquartile | 0.0065868216549733 |

For the thresholds,I have studied the paper:
*https://www.researchgate.net/publication/330956611_Pre-processing_Techniques_for_Detection_of_Blurred_Images*

In this paper,they have checked over 2450 images and classified that,
The mean of the both blur and unblur images gave better results than many parameters

–"*CERTH dataset is functioned to perform image quality assessment, which contains 2480 digital images containing 1249 undistorted images and 1231 natural and artificial blurred images. The threshold is fixed over the training dataset and evaluated over the testing set of CERTH dataset. Along with the CERTH dataset, PET-DEBI is tested over the collection of random 2200 sample images taken from Google. Table 1 and Fig. 6 list out the comparison of blur detection of PET-DEBI with other such works and have given promising results with accuracy of 87.57%, precision of 88.88%, recall of 86.96% and F-measure of 87.91%. It was able to detect blurred images in five to seven microseconds.*"

Hence i took the value of mean for threshold

For probability:how variance of laplacian is comparable to range, decides the probability of image being blur/unblur;
If we take k_max to be 1,we can get more accurate say about unblur but the margin is too large that nothing crosses 10% of unblurred hence i took k_max
I used how much it is close to mean,max to find near measure of probability