Computational Vision & Imaging - Lab 1
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In this lab exercise, you will be applying edge detectors to images and comparing two different methods. You will also write a convolution function in MATLAB and evaluate the difference when using an approximation to a Gaussian parameter.

At this stage, we will assume that you are able to use MATLAB, and understand its basic use.

You are asked to write a short (no more than 2 pages) report of your work, answering specific questions, and showing example images. This work is not assessed (it will not count towards your module mark) but you will get formative feedback.

STEP 1:

- Download the zip file and extract the .m files and the data files (.gif) for Lab 1 from CANVAS and save them in your working directorry

- In MATLAB type

    shakey = read_image('','shakey.150.gif');

   This will load up the gif file from the current directory into the variable shakey. To see a help command for the function type

    help read_image

- You can display the image by typing

    show_image(shakey)

   This only works for grey images.

- Now you can load up different sets of masks. To load up the sobel masks type

    load sobel

   If you now type

    Who

   you will get a list of variable names. You can see the sobel horizontal mask by typing

    sobelX

   and the array will print on screen.

STEP 2:

- You can convolve the image with the mask by typing

```
shakey_sobelX = conv2(shakey,sobelX,'valid');
```

You can then display the new image.

- Apply both the sobelX and sobelY operators to the image. You can try to threshold the resulting images

  ```
  show_image(            >5)
  ```

  or whatever numb   s the threshold.

TASK 1:

- Combine the two resulting arrays using Pythagoras theorem. To do this you will need to write your own m-file. Call it magnitude.m. You need to make it into a MATLAB function, such that:

  ```
  m = magnitude(x,y)
  ```

  Now display the resulting image using

  ```
  show_image(m)
  ```

  You can also display this edge image after thresholding it,

  ```
  show_image(m>40)
  ```

  Create several of these with different thresholds.

  QUESTION 1: What do you notice regarding the effect of changing the threshold?

TASK 2:

- Now load up the Roberts operator. Repeat your previous exercise,

  QUESTION 2: What do you notice regarding the difference between Sobel and Roberts?

TASK 3:

- You now need to write a new function, that rather than taking the magnitude of the gradients, it takes the absolute value of |Gx|+|Gy|. This is an approximation to the magnitude.

  QUESTION 3: What do you notice regarding the difference between magnitude and absolute when calculating the edge?