«««< Updated upstream   =======   »»»> Stashed changes

<div align="center">

Laboratory Exercise
Digital Visible and Infrared Imaging

Madeleine Boström   Tobias Claesson

dat11mbo@student.lu.se   ada10tcl@student.lu.se

18 november 2014

</div>

1 Introduction

2 Theory

3 Method

3.1 Pixel size, magnification and resolution

To take images of an object we used a CCD camera and the m-file `takeImage.m` which gave us black and white images. In background of the object we had a test chart with horizontal and vertical lines with different distances between their lines.

We used these images and MatLab functions such as `imcrop, size` and `getpts` to calculate how many pixels on the screen that corresponded to a centimetre, determine a distance in the image and also to compare vertical and horizontal resolution.

3.2 Grey scale images, image format and image information

We started by loading the image and normalizing the intensity by dividing it by 255. Then we use the `imcrop` command to select the part of the image we want to use. We then test some different functions to show that we can show the image in different ways, such as the `flipud` command to flip the image upside down.

After we got comfortable with the different commands and understood how we could manipulate the image we moved on to the next part of the assignment and made two new matrices from the image. The first matrix, lets call this I1, we removed the first row and in the second matrix, we will call this I2, we removed the last row. I1 now have shifted one pixel. By using the test chart we determine the MTF-values by summing along the columns on a arbitrary row.

3.3 Image enhancement

We try to enhance two images with histogram equalization and contras stretching by using MatLab function `histeq` and `imhist`.

3.4   Colour images

We took a colour photo using a camera and transferred it to the computer and examined the resolution. We then used the MatLab command `imhist` to compare the spectrum of different parts of the image. We also studied a method that if we selected the tomato it would highlight all red content in the image.

3.5   IR - Imaging

We use an infra-red camera to study heat conduction, friction heat and evaporation heat. We also study the transmission, reflection, absorption and scattering properties of some objects such as water, glass, plastic and whiteboard.

4   Results

4.1   Pixel size, magnification and resolution

Our result from calculating how many pixels in the image (see figure 1a) that corresponds to one centimetre were 41. When we calculated length of the car in image (see figure 1b) we got the result 10 cm.
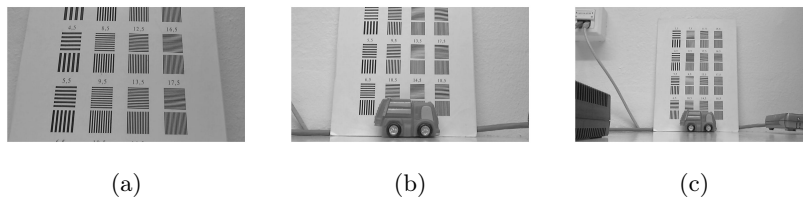

(a)   (b)   (c)

Figur 1: (a) Image of test chart used to calculate how many pixels correspond to 1 cm. (b) Image used to measure distance of object and to compare the vertical and horizontal . (c) Image used to compare the resolution for different distances.

4.2   Grey scale images, image format and image information

5   Discussion