EN2550

Fundamentals of Image Processing and Machine vision

Assignment 01

Index Number: 190328V

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GitHub Link: <https://github.com/WikumJCK/EN2550_Image_Processessing.git>

**Question 01**

Chart, line chart

Description automatically generatedIn intensity transformation, we enhance selected range of pixel vales, So, brightness of those pixels will increase. New features of the image can be obtained by this method. In the below, image of Emma Watson is enhanced according to the intensity transformation graph showed in figure 01, the result is pixels that are gray have enhanced so dark side of the face is lighted.

A person with a cigarette in her mouth

Description automatically generated with low confidence

Fig 02

Fig 01

Text

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Using Look up tables to map the corresponding pixel values reduce the computational complexity of doing intensity transformation.

**Question 02**

A picture containing graphical user interface

Description automatically generatedIn this Question we have enhance white matter and gray matter using intensity transformation. First, we must identify the range of pixel values we need to enhance to separate gray matter and white matter. For that I manually changed intensity transformation graph and selected suitable range.

Fig 03

Fig 03 represents original image and Gray and White matter enhanced image, Black color section represent white matter section while white color section represent gray matter section. Intensity transformation of the above image is shown in Fig 04.

Code used in this Question is same as Q01,

Chart, line chart

Description automatically generated

Fig 04

**Question 03**

Gamma correction is also a Intensity transformation, in this method intensity transformation is nonlinear. By changing gamma value, we can change the darkness of the image.

**A picture containing graphical user interface

Description automatically generated**

Fig 05

Text

Description automatically generated

**Question 04**

In a picture, number of pixels with same intensity is not equal. Therefore for a normal image this histogram is not flat, the process of making the histogram flat is called histogram equalization. This results image being more vibrant. Here are the results(Fig 06),

A picture containing banana, fruit, different, sliced

Description automatically generated

Fig 06

Chart, histogram

Description automatically generated

This figure (Fig 07)shows histogram of two images before and after equalization.

Fig 07

Graphical user interface, text

Description automatically generated

**Question 05**

There are two methods to zoom an image, Nearest neighbor zooming and Bilinear interpolation. The more accurate one is using bilinear interpolation also it gives smoother image even if it is zoomed. But when we use Nearest neighbor zooming image get pixelated when size increased.

* Nearest neighbor zooming

Graphical user interface, text

Description automatically generated

A black and white photo of a person's face

Description automatically generated with medium confidenceA picture containing text, indoor, person, close

Description automatically generated

Fig 09

Fig 08

Fig 08 shows original image and Fig 09 represent part of zoomed image, we can see that it is pixelated.

* Bilinear Interpolation

Text

Description automatically generated

**Question 06**

In normal intensity transformation value of a pixel depended only on the same pixel. But, in Spatial filtering we consider neighbor pixels to calculate value to a pixel using a kernel. By using suitable kernel we can obtain blurred, Sobel horizontal and Soble vertical images. The data obtained from Soble filtering can be combined with original image to increase sharpness of the image. This figure(Fig 10) shows original image and Sobel filtered images

A picture containing text

Description automatically generated

Fig 10

* Using inbuilt OpenCV function

Text

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* By defining own function

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* By convolution

Text

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**Question 07**

Using inbuilt function grabCut in OpenCV library we can mask out specific object in defined area in our image. Also, we can remove the background of that image. In part (a) in this question we separate flower from the image. Masked foreground in background is showed in following figure.(Fig 11)

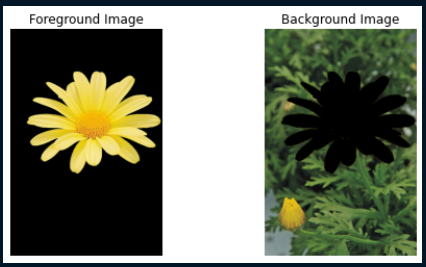


Fig 11

Text

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Masks of those two images are showed in below,

A picture containing graphical user interface

Description automatically generated

Fig 12

In part (b) of this question, first we blur the masked background of the image and combine it with masked foreground, then we can we that flower is focused.

Text

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