National University of computer and emerging sciences

LAB MANUAL

AI-4002: COMPUTER VISION

BS-Artificial Intelligence

SCHOOL OF COMPUTING FAST-NATIONAL UNIVERSITY OF COMPUTER AND EMERGING SCIENCES, ISLAMABAD CAMPUS

Creation History

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LAB 1 INTRODUCTION TO OPENCV

What is OpenCV?

OpenCV is a library that can be used with Python and C++ to perform operations on images. You can also use skimage however we would follow the former in these manuals.

Basic Operations

Installing OpenCV:

You can install opencv using the following command in Windows Powershell or CMD

pip install opencv-python

```
PS C:\Users\qc\PycharmProjects\opencv> pip install opencv-python
```

```
PS C:\Users\qc\PycharmProjects\opencv> pip install opencv-python
Requirement already satisfied: opencv-python in c:\users\qc\appdata\local\programs\python\python310\lib\site-packages (4.6.0.66)
Requirement already satisfied: numpy>=1.19.3 in c:\users\qc\appdata\local\programs\python\python310\lib\site-packages (from opencv-python) (1.23.1)
WARNING: You are using pip version 22.0.4; however, version 22.2.2 is available.
You should consider upgrading via the 'C:\Users\qc\AppData\Local\Programs\Python\Python310\python.exe -m pip install --upgrade pip' command.
PS C:\Users\qc\PycharmProjects\opencv>
```

Reading an image:

You can use cv2.imread() to read an image, you can also specify the way in which your image should be read, e.g. in grayscale, color and unchanged (including the alpha channel if it exists)

```
gray=cv2.imread("car.jpg",0)
color=cv2.imread("car.jpg",1)
unchanged=cv2.imread("car.jpg",-1)
```

Gray image will have 1 depth, color will have 3 and unchanged will have 2

Display an image:

You can display an image using imshow, it takes two parameters, the text to display on the image and which image to display.

```
cv2.imshow("Text to display on image",gray)
```

```
cv2.imshow("Gray",gray)
cv2.imshow("Color,",color)
cv2.imshow("Unchanged",unchanged)
cv2.waitKey(5000)
```



Resize an image :

You can resize an image using resize function, it takes image as an input along with output lateral size of the image such as (300,300) instead of (x,y)

```
img1 = cv2.resize(image, (x, y))
```

Transpose the image:

You can transpose an image using transpose function, it takes image as an input

```
img2 = cv2.transpose(gray)
```

Convert an image from color to grayscale:

```
img1_gray = cv2.cvtColor(img1, cv2.COLOR_RGB2GRAY)
```

Invert a color image and a grayscale image:

You can also use bitwisenot to invert an image.

```
negative = 255 - img1_gray
```

Save your results in a directory:

It takes path and image as input

```
cv2.imwrite("abc.jpg",gray)
```

Display your results in a horizontal window:

You can also use hconcate or vconcate functions, however using np.concate must take images with the same depth, you cannot concate a grayscale image of depth 0 with a colour image of depth 3, you'll have to use cv2.cvtColor(img,cv2.COLOR_GRAY2BGR) to convert a grayscale image to depth 3. Do note that this does not colorise the image.

```
np.concatenate((img1, img1_gray_3, negative, rotate), axis=1)
```

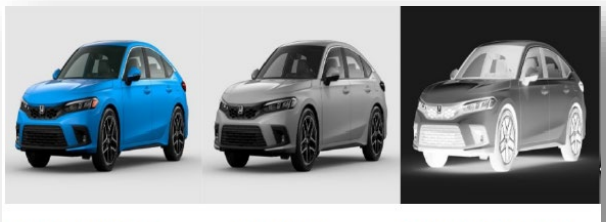

Figure 1 Resizing Grayscaling Negative of Grayscale

Applying a Filter to an image:

ddpeth means that the output size of image should be the same as input image.