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1 import cv2 as cv
2 import matplotlib.pyplot as plt
3 import numpy as np
4 import math
5
6 # path to the input img
7 path = 'C:/Users/Raiyan/Desktop/building.jpg'
8
9 # reading img + converting from BGR to GRAY
10 img = cv.imread(path)
11 img = cv.cvtColor(img, cv.COLOR_BGR2GRAY)
12
13 k_h = int(input("Enter kernel height: "))
14 k_w = k_h
15 k_size = (k_h, k_w)
16
17 # avg kernel
18 kernel1 = np.zeros( k_size, np.float32)
19 kernel2 = np.zeros( k_size, np.float32)
20 kernel3 = np.zeros( k_size, np.float32)
21
22 # img height
23 img_h = img.shape[0]
24 # img width
25 img_w = img.shape[1]
26 # kernel height // 2
27 a = kernel1.shape[0] // 2
28 # kernel width // 2
29 b = kernel1.shape[1] // 2
30
31 pi=3.1416
32 sigma1 = 1.0
33 normalizing_c = 1.0 / ( 2.0 * sigma1 * sigma1 * pi )
34
35 # building kernel1
36 for x in range(-a,a+1):
37     for y in range(-b,b+1):
38         r = math.exp( -(x*x + y*y) / (2.0 * sigma1 * sigma1) )
39         r = r* normalizing_c
40         kernel1[a+x][b+y] = r
41
42 sigma2 = 2.5
43 normalizing_c = (1.0 / ( 2.0 * sigma2 * sigma2 * pi ))
44
45 # building kernel2
46 for x in range(-a,a+1):
47     for y in range(-b,b+1):
48         r = math.exp( -(x*x + y*y) / (2.0 * sigma2 * sigma2) )
49         r = r* normalizing_c
50         kernel2[a+x][b+y] = r
51
52 # subtracting kernel1 from kernel2
53 kernel2 = kernel2 - kernel1
54
55 # empty op img
56 output = np.zeros((img_h,img_w), np.float32)
57
58 # conv
59 # visiting each pixel in the img
60 # m ta row img e ... for each row ...
61 for i in range(img_h):
62     # n ta coln img e ... for each coln ...
63     for j in range(img_w):
64         # visiting each pixel in the kernel
65         # a ta row img e ... for each row ...
66         for x in range(-a,a+1):
67             # b ta coln img e ... for each coln ...
68             for y in range(-b,b+1):
69                 if 0 <= i-x < img_h and 0 <= j-y < img_w:
70                     output[i][j] += kernel2[a+x][b+y] * img[i-x][j-y]
71                 else:
72                     output[i][j] += 0
73
74
75
76 def show_images(images, image_title):
77     # displaying multiple images side by side

```

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78 # https://stackoverflow.com/questions/41793931/plotting-images-side-by-side-
using-matplotlib
79
80 # err : was giving weird colormap due to diff in the mechanism of reading img of
cv2 & matplotlib
81 # https://stackoverflow.com/questions/3823752/display-image-as-grayscale-using-
matplotlib
82 # running this once in the code will ALWAYS give gray op
83 plt.gray()
84
85 no_of_imgs = len(images)
86 f = plt.figure()
87 for i in range(no_of_imgs):
88
89     # Debug, plot figure
90     axes = f.add_subplot(1, no_of_imgs, i + 1)
91     # the last img will show y axis on the RHS instead of LHS(which is by
default)
92
93     if i==no_of_imgs-1:
94         axes.yaxis.tick_right()
95
96     plt.title(image_title[i])
97     plt.imshow(images[i], 'gray')
98     # plt.rc('font', size=8)
99     plt.show(block=True)
100
101 show_images([img,output], ['input', 'output'])
102

```

