

```

1 from PIL import Image
2 import numpy as np
3 import matplotlib.pyplot as plt
4
5 im = Image.open("Lenna.jpg").resize((255,255))
6 print(im.format)
7 print(im.size)
8 print(im.mode)
9
10
11 arr = np.array(im.copy())
12 print(type(arr))
13 print(arr.shape)
14
15 arr80persen = arr.copy()
16 arr90persen = arr.copy()
17 arr110persen = arr.copy()
18 arr120persen = arr.copy()
19 keys = np.arange(256)
20 histOri = np.zeros((256), dtype= np.uint32)
21 hist80persen = np.zeros((256), dtype= np.uint32)
22 hist90persen = np.zeros((256), dtype= np.uint32)
23 hist110persen = np.zeros((256), dtype= np.uint32)
24 hist120persen = np.zeros((256), dtype= np.uint32)
25
26
27 for y in range(arr.shape[0]):
28     for x in range(arr.shape[1]):
29         akum = (int(arr[y,x,0])+int(arr[y,x,1])+int(arr[y,x,2]))
30         tmp = max(min(int(akum/3),255),0)
31         arr[y,x] = [tmp,tmp,tmp]
32         tmp90persen = max(int(tmp*0.9),0)
33         tmp80persen = max(int(tmp*0.8),0)
34         arr90persen[y,x]=[tmp90persen,tmp90persen,tmp90persen]
35         arr80persen[y,x]=[tmp80persen,tmp80persen,tmp80persen]
36         tmp110persen = min(int(tmp*1.1),255)
37         tmp120persen = min(int(tmp*1.2),255)
38         arr110persen[y,x]=[tmp110persen,tmp110persen,tmp110persen]
39         arr120persen[y,x]=[tmp120persen,tmp120persen,tmp120persen]
40         histOri[tmp] = histOri[tmp]+1
41         hist90persen[tmp90persen] = hist90persen[tmp90persen]+1
42         hist80persen[tmp80persen] = hist80persen[tmp80persen]+1
43         hist110persen[tmp110persen] = hist110persen[tmp110persen]+1
44         hist120persen[tmp120persen] = hist120persen[tmp120persen]+1
45
46 fig = plt.figure(1)
47 plt.bar(keys,histOri)
48 fig.canvas.draw()
49 dataOri = np.frombuffer(fig.canvas.tostring_rgb(), dtype=np.uint8)
50 dataOri = dataOri.reshape(fig.canvas.get_width_height()[::-1] + (3,))
51 histImageOri = Image.fromarray(dataOri).resize((255,255))
52 histNpOri = np.array(histImageOri)
53
54 fig90persen = plt.figure(2)
55 plt.bar(keys,hist90persen)
56 fig90persen.canvas.draw()
57 data90persen = np.frombuffer(fig90persen.canvas.tostring_rgb(), dtype=np.uint8)
58 data90persen = data90persen.reshape(fig90persen.canvas.get_width_height()[::-1] + (3,))
59 histImage90persen = Image.fromarray(data90persen).resize((255,255))
60 histNp90persen = np.array(histImage90persen)
61
62 fig80persen = plt.figure(3)
63 plt.bar(keys,hist80persen)
64 fig80persen.canvas.draw()
65 data80persen = np.frombuffer(fig80persen.canvas.tostring_rgb(), dtype=np.uint8)
66 data80persen = data80persen.reshape(fig80persen.canvas.get_width_height()[::-1] + (3,))
67 histImage80persen = Image.fromarray(data80persen).resize((255,255))
68 histNp80persen = np.array(histImage80persen)
69
70
71 fig110persen = plt.figure(4)
72 plt.bar(keys,hist110persen)
73 fig110persen.canvas.draw()

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74 data110persen = np.frombuffer(fig110persen.canvas.tostring_rgb(), dtype=np.uint8)
75 data110persen = data110persen.reshape(fig110persen.canvas.get_width_height()[::-1] + (3,))
76 histImage110persen = Image.fromarray(data110persen).resize((255,255))
77 histNp110persen = np.array(histImage110persen)
78
79 fig120persen = plt.figure(5)
80 plt.bar(keys,hist120persen)
81 fig120persen.canvas.draw()
82 data120persen = np.frombuffer(fig120persen.canvas.tostring_rgb(), dtype=np.uint8)
83 data120persen = data120persen.reshape(fig120persen.canvas.get_width_height()[::-1] + (3,))
84 histImage120persen = Image.fromarray(data120persen).resize((255,255))
85 histNp120persen = np.array(histImage120persen)
86
87 histStack = np.hstack((histNp80persen,histNp90persen,histNp0ri,histNp120persen,histNp120persen))
88 imageStack = np.hstack((arr80persen,arr90persen,arr,arr120persen,arr120persen))
89
90 Image.fromarray(np.vstack((histStack,imageStack))).show()
```