

電腦視覺 作業三

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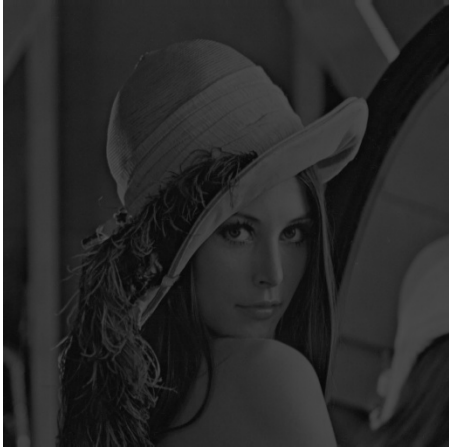
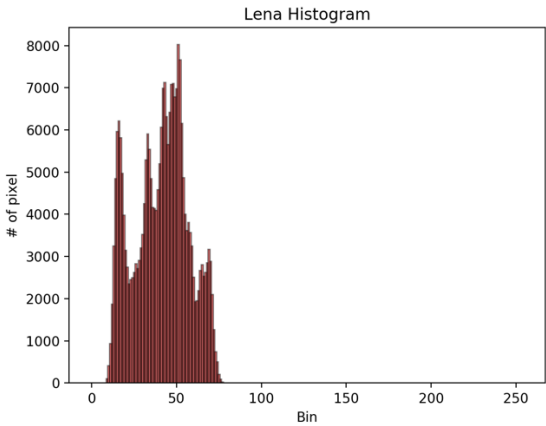
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Problem1.

原圖	
直方圖	
程式碼	<pre>11 def histogram(): 12 img = cv2.imread("./lena.bmp", cv2.IMREAD_GRAYSCALE) 13 14 w,h = img.shape 15 dict1 = {} 16 for i in range(255): 17 dict1[i] = 0 18 for row in range(w): 19 for col in range(h): 20 dict1[img[row,col]] += 1 21 X = [i for i in range(255)] 22 x = [pixel for pixel in dict1.values()] 23 plt.title('Lena Histogram') 24 plt.xlabel("Bin") 25 plt.ylabel("# of pixel") 26 plt.bar(X, x, alpha=0.5, width=1, facecolor='red', edgecolor='black', label='two', lw=1) 27 plt.show()</pre>
<p>想法：程式方面和先前作業一樣，遍歷原圖所有點後，得到各個像素值的數量，即可畫出直方圖。</p>	

Problem2.

原圖	
直方圖	
程式碼	<pre>29 def histogram_3(): 30 img = cv2.imread("./lena.bmp", cv2.IMREAD_GRAYSCALE) 31 write(img,"01.jpg") 32 img = img//3 33 write(img,"02.jpg") 34 show(img) 35 w,h = img.shape 36 dict1 = {} 37 for i in range(255): 38 dict1[i] = 0 39 for row in range(w): 40 for col in range(h): 41 dict1[img [row,col]] += 1 42 X = [i for i in range(255)] 43 x = [pixel for pixel in dict1.values()] 44 plt.title('Lena Histogram') 45 plt.xlabel("Bin") 46 plt.ylabel("# of pixel") 47 plt.bar(X, x, alpha=0.5, width=1, facecolor='red', edgecolor='black', label='two', lw=1) 48 plt.show()</pre>
<p>想法：原圖除以 3 後，直方圖分佈明顯向亮度低的地方集中，因此圖像亮度呈現偏暗。而過度集中於某區間的值方圖，會造成視覺上的辨識難度增加。</p>	

Problem3.

<p>原圖(亮度除以 3，再經過 CDF 轉換)</p>	
<p>直方圖</p>	
<p>程式碼</p>	<pre>50 def trans_his_to_cdf(): 51 img = cv2.imread("./lena.bmp", cv2.IMREAD_GRAYSCALE) 52 img = img // 3 53 w, h = img.shape 54 show(img) 55 original_list = [0 for i in range(256)] 56 for i in range(h): 57 for j in range(w): 58 original_list[img[i,j]] +=1 59 cum_list = np.cumsum(original_list) 60 min_cum = min(cum_list) 61 traslated_cum_list = [] 62 for cdf_val in cum_list: 63 cdf = round(((cdf_val-min_cum)/(512*512-min_cum))*(255)) 64 traslated_cum_list.append(cdf) 65 look_up_table = {}</pre>

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66         for i in range(256):
67             look_up_table[i] = traslated_cum_list[i]
68
69     for i in range(h):
70         for j in range(w):
71             img[i,j] = look_up_table[img[i,j]]
72
73     dict1 = {}
74     for i in range(256):
75         dict1[i] = 0
76     for row in range(h):
77         for col in range(w):
78             dict1[img [row,col]] += 1
79
80     X = [i for i in range(255)]
81     x = [pixel for pixel in dict1.values()]
82     plt.title('Lena Histogram_CDF')
83     plt.xlabel("Bin")
84     plt.ylabel("# of pixel")
85     plt.bar(X, x, alpha=0.5, width=1, facecolor='red', edgecolor='black', label='two', lw=1)
86     plt.show()
87     show(img)

```

想法：經過第 63 行的 CDF 轉換後，把原本過度集中的像素值，較均勻地分散在 0-255 的區間內。因圖像的直方圖分佈較均勻，因此在視覺上接受到的對比度也會變好。

CDF 轉換的概念，就是對原本亮度集中的圖像，進行正規化後，映射至 0~255 的區間。較均勻分散的直方圖，能表達的亮度較豐富，因此辨識上也較清楚。