黃瑞得
0860078
huangjuite@gmail.com

Project1 report

source code

```
import numpy as np
import matplotlib.pyplot as plt
import cv2
import math
import pandas as pd

img = plt.imread('Bird feeding 3 low contrast.tif')
cv2.imshow('bird', img)

min_v = math.atan((0-128)/32)
max_v = math.atan((255-128)/32)

def rescale(v):
    shift = (255-0)/2. - (max_v+min_v)/2
    scale = (255-0)/(max_v-min_v)
    num = v * scale + shift
    return int(round(num,0))

def transform(r) -> int:
    return rescale(math.atan((r-128)/32))

##########  Figure of s = T(r)  ############
x = np.arange(256)
y = np.array([transform(r) for r in x])

f = plt.figure()
plt.plot(x,y)
plt.title(r'T(r)')
plt.xlabel('r')
plt.ylabel('s')
plt.savefig('transform function')
plt.show(0)

##########  Table of transformation function  ############
content = np.vstack((x,y)).T
table = pd.DataFrame(content, columns = ['r', 's'])
table.to_csv('transform tabel.csv', index=False)
```

黃瑞得
0860078
huangjuite@gmail.com

```
##########  transform image  ############
new_img = np.zeros(img.shape, dtype=np.uint8)
for i,k in np.ndindex(new_img.shape):
   new_img[i][k] = transform(img[i][k])

cv2.imshow('transformed', new_img)
cv2.imwrite('transformed.tif', new_img)

##########  histogram  ############
img_his = np.zeros([256], dtype=int)
transformed_his = np.zeros([256], dtype=int)

for i,k in np.ndindex(img.shape):
   img_his[img[i][k]] += 1

for i,k in np.ndindex(new_img.shape):
   transformed_his[new_img[i][k]] += 1

fig, axs = plt.subplots(2, 1, constrained_layout=True)
axs[0].bar(x,img_his)
axs[1].bar(x,transformed_his)
axs[0].set_title('original image histogram')
axs[1].set_title('transformed image histogram')
plt.savefig('histograms')
plt.show(0)

cv2.waitKey(0)
```

黃瑞得
0860078
huangjuite@gmail.com

Figure of s=T(r)

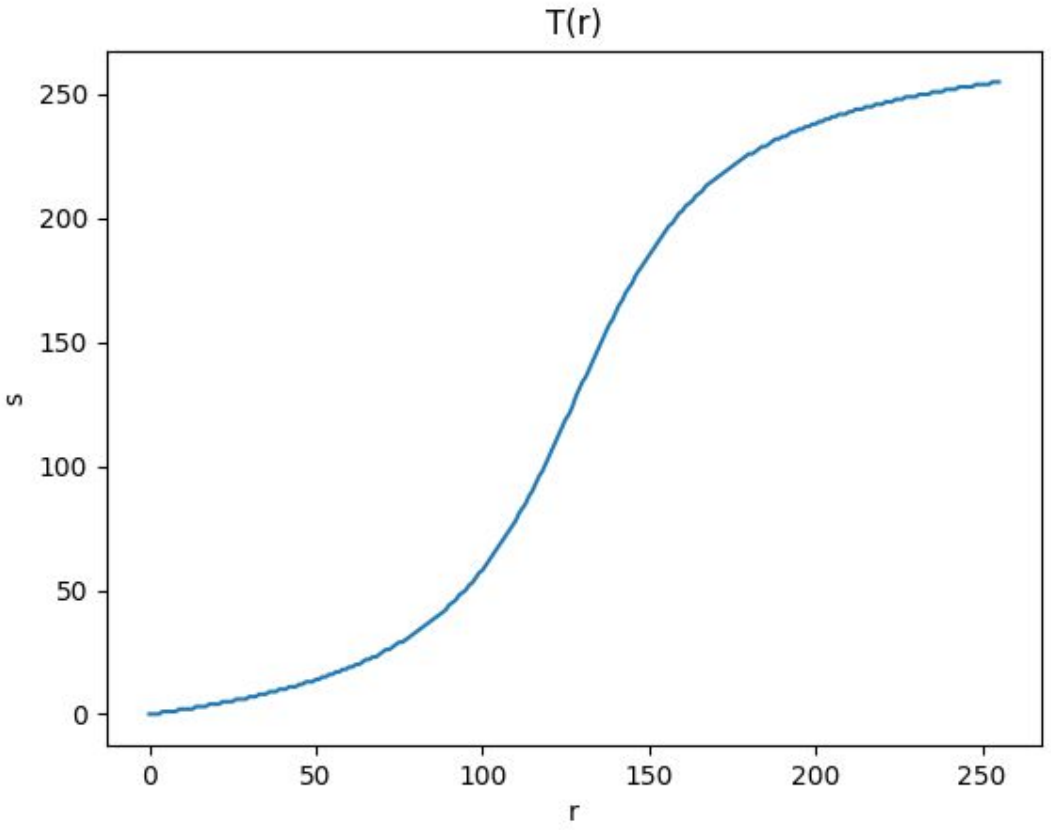
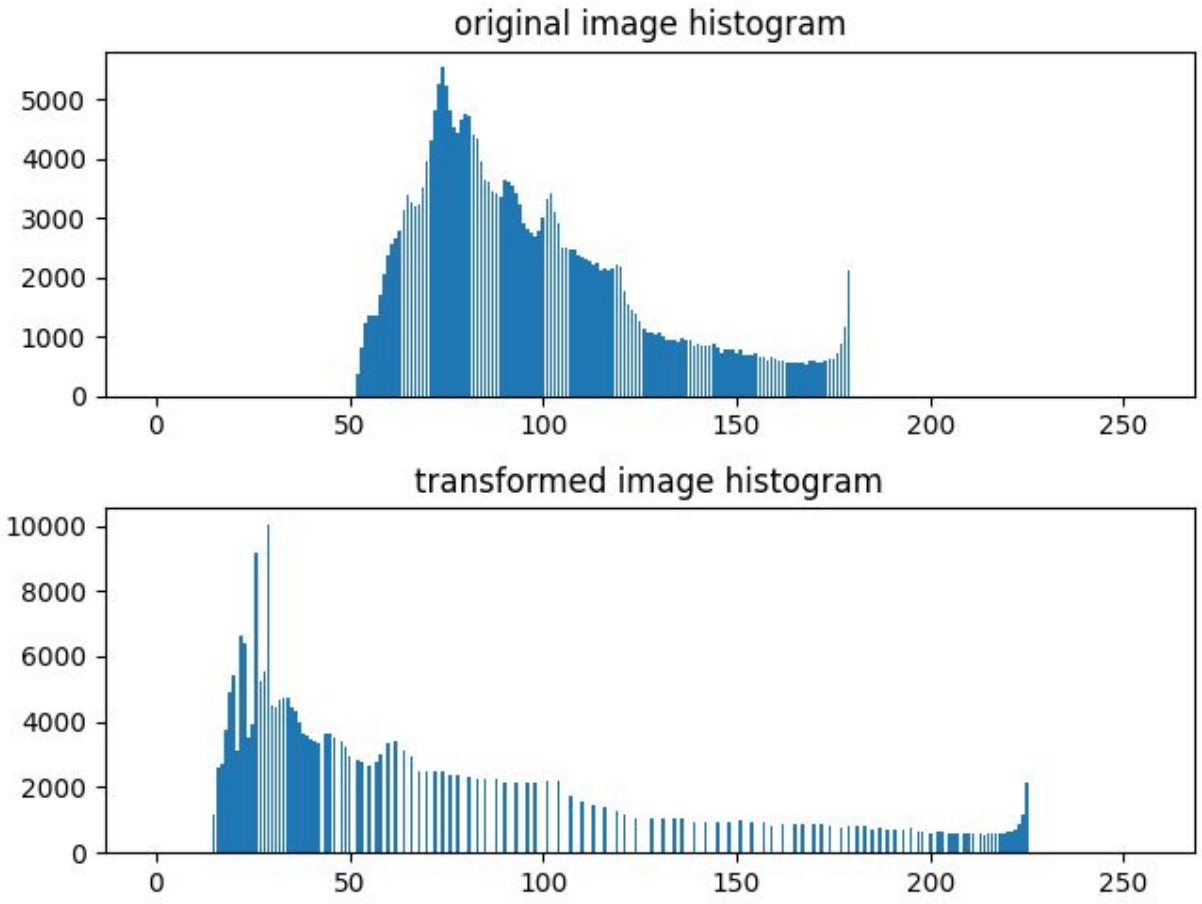


Table of transform function

r	s	r	s	r	s	r	s	r	s	r	s	r	s	r	s	r	s	r	s	r	s	r	s	r	s
0	0	20	4	40	10	60	19	80	33	100	58	120	104	140	162	160	203	180	226	200	238	220	246	240	252
1	0	21	4	41	10	61	19	81	34	101	60	121	107	141	165	161	205	181	226	201	239	221	247	241	252
2	0	22	5	42	11	62	20	82	35	102	62	122	110	142	167	162	206	182	227	202	239	222	247	242	252
3	0	23	5	43	11	63	20	83	36	103	64	123	113	143	170	163	207	183	228	203	240	223	247	243	253
4	1	24	5	44	11	64	21	84	37	104	66	124	116	144	172	164	209	184	229	204	240	224	248	244	253
5	1	25	5	45	12	65	22	85	38	105	68	125	119	145	174	165	210	185	229	205	241	225	248	245	253
6	1	26	6	46	12	66	22	86	39	106	70	126	121	146	177	166	211	186	230	206	241	226	248	246	253
7	1	27	6	47	13	67	23	87	40	107	72	127	124	147	179	167	213	187	231	207	242	227	249	247	253
8	1	28	6	48	13	68	23	88	41	108	74	128	128	148	181	168	214	188	232	208	242	228	249	248	254
9	2	29	6	49	13	69	24	89	42	109	76	129	131	149	183	169	215	189	232	209	242	229	249	249	254
10	2	30	7	50	14	70	25	90	44	110	78	130	134	150	185	170	216	190	233	210	243	230	249	250	254
11	2	31	7	51	14	71	26	91	45	111	81	131	136	151	187	171	217	191	233	211	243	231	250	251	254
12	2	32	7	52	15	72	26	92	46	112	83	132	139	152	189	172	218	192	234	212	244	232	250	252	254
13	2	33	8	53	15	73	27	93	48	113	85	133	142	153	191	173	219	193	235	213	244	233	250	253	255
14	3	34	8	54	16	74	28	94	49	114	88	134	145	154	193	174	220	194	235	214	244	234	250	254	255
15	3	35	8	55	16	75	29	95	50	115	90	135	148	155	195	175	221	195	236	215	245	235	251	255	255
16	3	36	9	56	17	76	29	96	52	116	93	136	151	156	197	176	222	196	236	216	245	236	251		
17	3	37	9	57	17	77	30	97	53	117	96	137	154	157	198	177	223	197	237	217	245	237	251		
18	4	38	9	58	18	78	31	98	55	118	98	138	157	158	200	178	224	198	237	218	246	238	251		
19	4	39	10	59	18	79	32	99	57	119	101	139	159	159	202	179	225	199	238	219	246	239	252		

黃瑞得
0860078
huangjuite@gmail.com

transformed image

黃瑞得
0860078
huangjuite@gmail.com

histograms