CSE3018 : Content Based Image and Video Retrieval

Lab - 3

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Q1. Read an image in RGB Color Space. Transform this image into other color spaces like CMY, HSV and Grayscale. Show all of them in a 2X2 subplot.

CODE :

```
img = imread('Harshith.jpg');

subplot(2,2,1);

imshow(img);

title('Original Image');


subplot(2,2,2);

imshow(255 - img);

title('CMY Image');


subplot(2,2,3);

imshow(rgb2hsv(img));

title('HSV Image');


subplot(2,2,4);

imshow(rgb2gray(img));

title('Grayscale Image');
```

OUTPUT

Q2. Read an image in RGB Color Space. Execute color plane slicing in RGB color space. In each of the plane of R, G, B, extract statistical features like mean, standard deviation, variance, skewness, kurtosis. A single image will have 5 features in each color plane. So totally 15 color based features for every image; Also extract no. of rows, no. of columns and no. of color channels in an images. So 3 features.

Altogether, every image will contain 18 features. Write in an Excel File, in a format like the one given below

CODE :

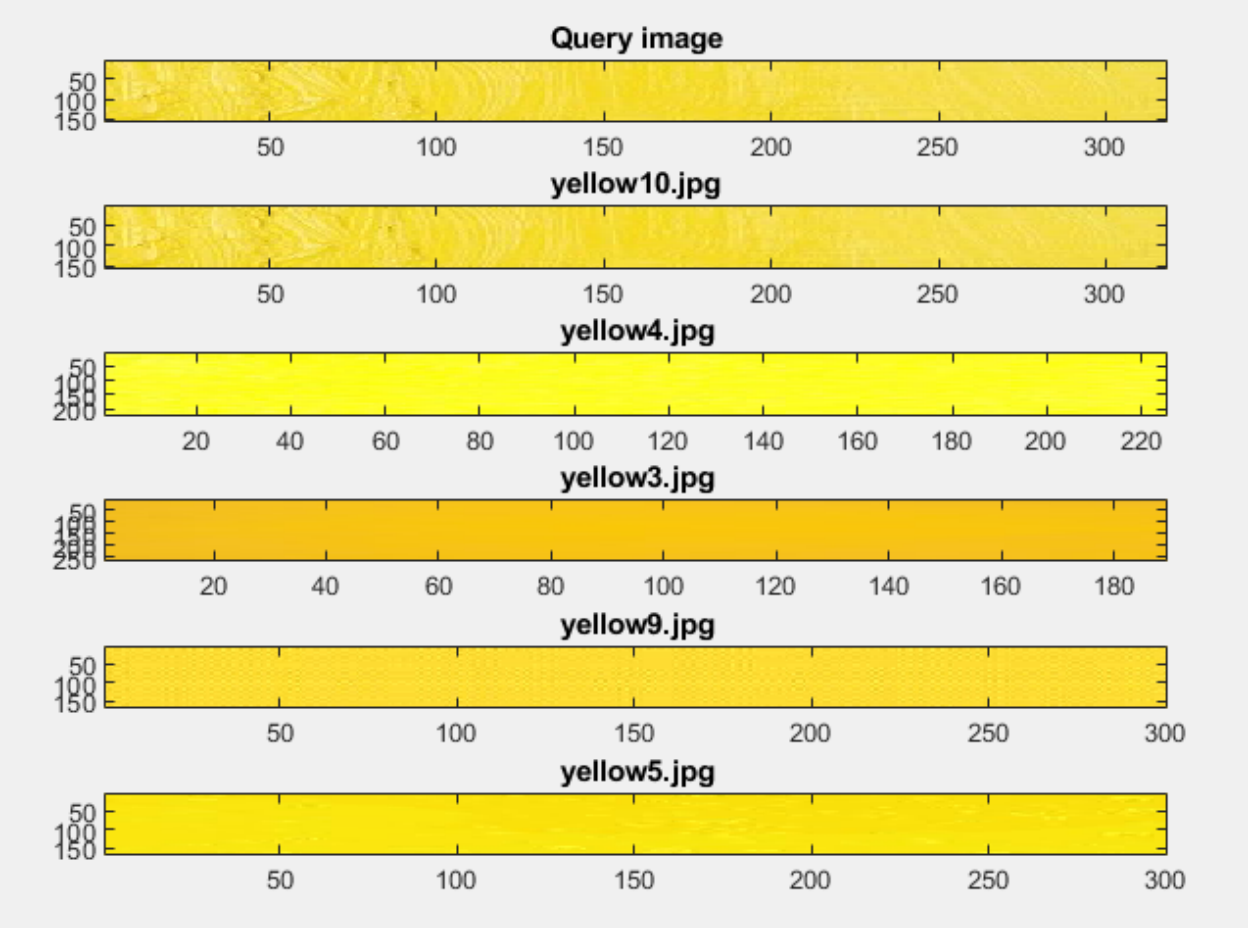
```
D = './images';
```

```
S = dir(fullfile(D,'*.jpg')); % pattern to match filenames.

query_image = imread('images/yellow10.jpg');

q_red = single(query_image(:,:,1));

q_green = single(query_image(:,:,2));

q_blue = single(query_image(:,:,3));

info_table = cell2table(cell(0, 20), 'VariableNames', {'file_name',
'red_mean', 'red_std', 'red_var', 'red_skewness',
'red_kurtosis','green_mean', 'green_std', 'green_var',
'green_skewness', 'green_kurtosis', 'blue_mean', 'blue_std',
'blue_var', 'blue_skewness',
'blue_kurtosis','no_of_rows','no_of_columns','no_of_color_channels',
'euclidean_distance'});

for k = 1:numel(S)

F = fullfile(D,S(k).name);

I = imread(F);

[rows, cols] = size(I);

noof_chanl = size(I,3);

S(k).data = I; % optional, save data.

red = single(I(:, : , 1));

green = single(I(:, :, 2));

blue = single(I(:, :, 3));

euclidean_distance = sqrt((mean(q_red(:)) - mean(red(:)))^2 +
(std(q_red(:)) - std(red(:)))^2 + (var(q_red(:)) - var(red(:)))^2
+(skewness(q_red(:)) - skewness(red(:)))^2 + (kurtosis(q_red(:)) -
```

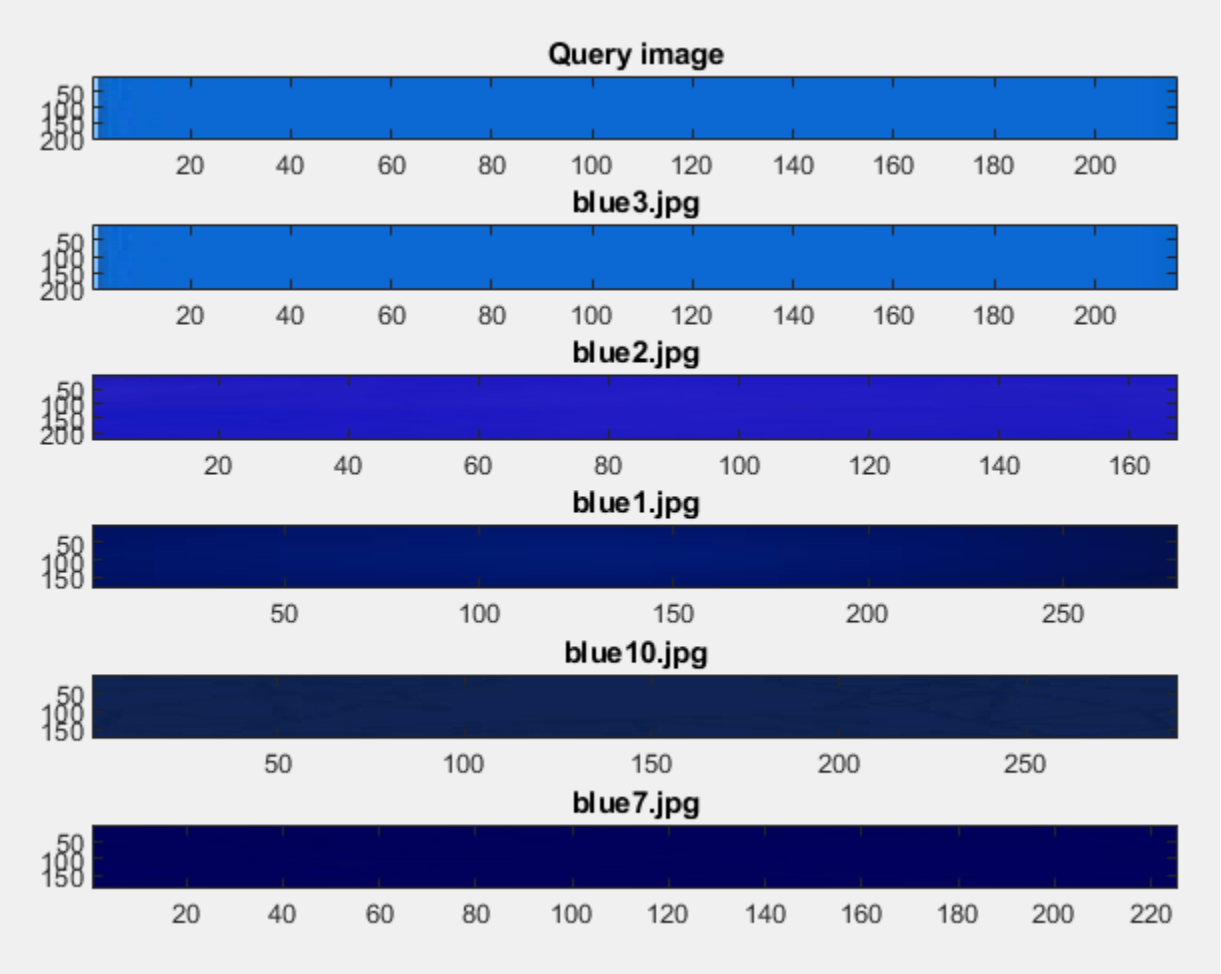
```
kurtosis(red(:)))^2 + (mean(q_green(:)) - mean(green(:)))^2 +
(std(q_green(:)) - std(green(:)))^2 + (var(q_green(:)) -
var(green(:)))^2 + (skewness(q_green(:)) - skewness(green(:)))^2
+(kurtosis(q_green(:)) - kurtosis(green(:)))^2 + (mean(q_blue(:)) -
mean(blue(:)))^2 + (std(q_blue(:)) - std(blue(:)))^2 +
(var(q_blue(:)) - var(blue(:)))^2 + (skewness(q_blue(:)) -
skewness(blue(:)))^2 + (kurtosis(q_blue(:)) - kurtosis(blue(:)))^2);


new_row = {S(k).name, mean(red(:)), std(red(:)), var(red(:)),
skewness(red(:)), kurtosis(red(:)), mean(green(:)),std(green(:)),
var(green(:)), skewness(green(:)), kurtosis(green(:)), mean(blue(:)),
std(blue(:)), var(blue(:)),skewness(blue(:)),
kurtosis(blue(:)),rows,cols,noof_chanl euclidean_distance};


info_table = [info_table;new_row];

end

info_table = sortrows(fillmissing(info_table, 'previous'),
'euclidean_distance');

writetable(info_table, 'lab3.xls')

% Displaying the top 5 images

subplot(6, 1, 1);

imagesc(query_image);

title('Query image');

file_names = info_table(:, 'file_name').file_name; % Extracting the
filenames of the images

for i = 1:5
```

```
F = fullfile(D,char(file_names(i)));

I = imread(F);

subplot(6, 1, i+1);

imagesc(I);

title(char(file_names(i)));

end
```

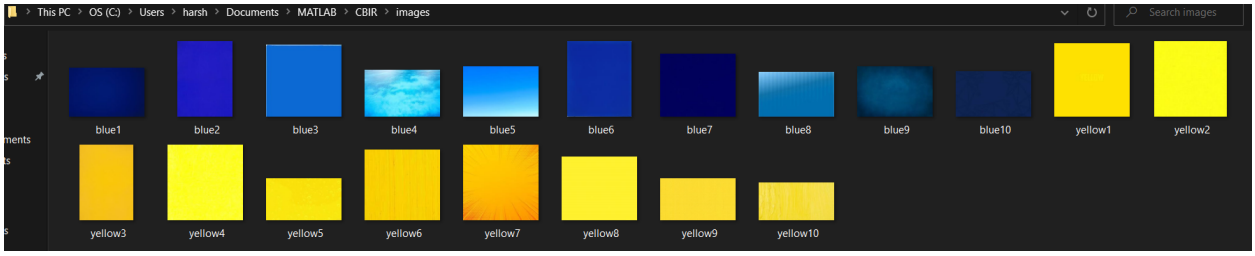
OUTPUT (Query Image is yellow10.jpg)



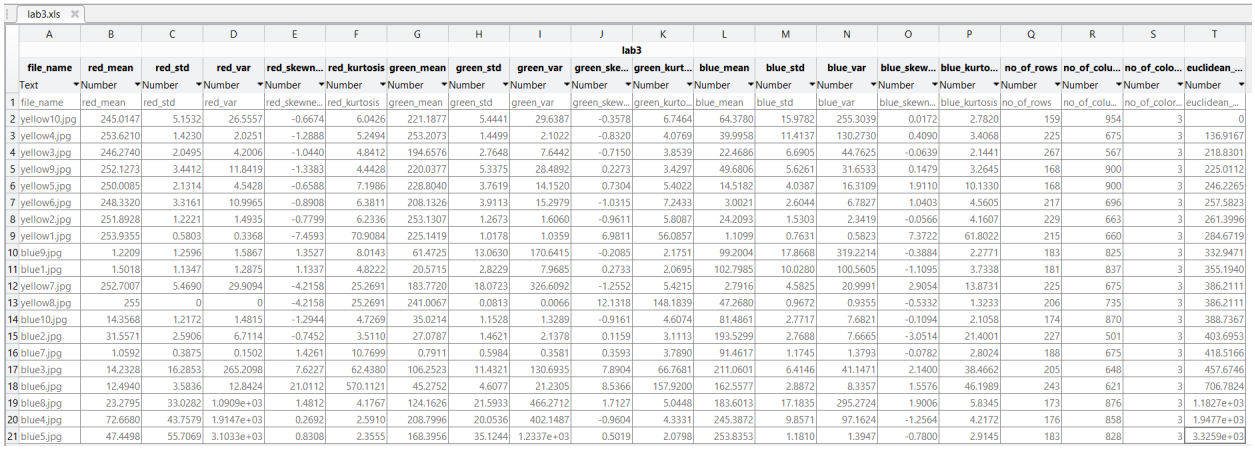
OUTPUT (Query Image is blue3.jpg)



DATASET



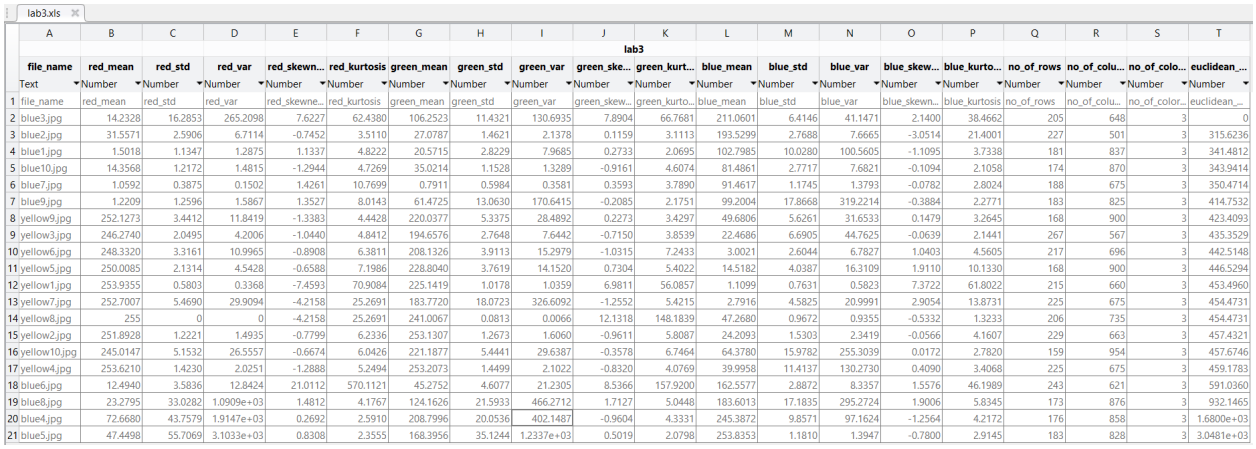
Excel Sheet - for yellow10.jpg



lab3.xls

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T
											lab3									
	file_name	red_mean	red_std	red_var	red_skewn...	red_kurtosis	green_mean	green_std	green_var	green_ske...	green_kurt...	blue_mean	blue_std	blue_var	blue_skew...	blue_kurto...	no_of_rows	no_of_colu...	no_of_colo...	euclidean_...
	Text	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number
1	file_name	red_mean	red_std	red_var	red_skewne...	red_kurtosis	green_mean	green_std	green_var	green_skew...	green_kurto...	blue_mean	blue_std	blue_var	blue_skewn...	blue_kurtosis	no_of_rows	no_of_colu...	no_of_color...	euclidean_...
2	yellow10.jpg	245.0147	5.1532	26.5557	-0.6674	6.0426	221.1877	5.4441	29.6387	-0.3578	6.7464	64.3780	15.9782	255.3039	0.0172	2.7820	159	954	3	0
3	yellow4.jpg	253.6210	1.4230	2.0251	-1.2888	5.2494	253.2073	1.4499	2.1022	-0.8320	4.0769	39.9958	11.4137	130.2730	0.4090	3.4068	225	675	3	136.9167
4	yellow3.jpg	246.2740	2.0495	4.2006	-1.0440	4.8412	194.6576	2.7648	7.6442	-0.7150	3.8539	22.4686	6.6905	44.7625	-0.0639	2.1441	267	567	3	218.8301
5	yellow9.jpg	252.1273	3.4412	11.8419	-1.3383	4.4428	220.0377	5.3375	28.4892	0.2273	3.4297	49.6806	5.6261	31.6533	0.1479	3.2645	168	900	3	225.0112
6	yellow5.jpg	250.0085	2.1314	4.5428	-0.6588	7.1986	228.8040	3.7619	14.1520	0.7304	5.4022	14.5182	4.0387	16.3109	1.9110	10.1330	168	900	3	246.2265
7	yellow6.jpg	248.3320	3.3161	10.9965	-0.8908	6.3811	208.1326	3.9113	15.2979	-1.0315	7.2433	3.0021	2.6044	6.7827	1.0403	4.5605	217	696	3	257.5823
8	yellow2.jpg	251.8928	1.2221	1.4935	-0.7799	6.2336	253.1307	1.2673	1.6060	-0.9611	5.8087	24.2093	1.5303	2.3419	-0.0566	4.1607	229	663	3	261.3996
9	yellow1.jpg	253.9355	0.5803	0.3368	-7.4593	70.9084	225.1419	1.0178	1.0359	6.9811	56.0857	1.1099	0.7631	0.5823	7.3722	61.8022	215	660	3	284.6719
10	blue9.jpg	1.2209	1.2596	1.5867	1.3527	8.0143	61.4725	13.0630	170.6415	-0.2085	2.1751	99.2004	17.8668	319.2214	-0.3884	2.2771	183	825	3	332.9471
11	blue1.jpg	1.5018	1.1347	1.2875	1.1337	4.8222	20.5715	2.8229	7.9685	0.2733	2.0695	102.7985	10.0280	100.5605	-1.1095	3.7338	181	837	3	355.1940
12	yellow7.jpg	252.7007	5.4690	29.9094	-4.2158	25.2691	183.7720	18.0723	326.6092	-1.2552	5.4215	2.7916	4.5825	20.9991	2.9054	13.8731	225	675	3	386.2111
13	yellow8.jpg	255	0	0	-4.2158	25.2691	241.0067	0.0813	0.0066	12.1318	148.1839	47.2680	0.9672	0.9355	-0.5332	1.3233	206	735	3	386.2111
14	blue10.jpg	14.3568	1.2172	1.4815	-1.2944	4.7269	35.0214	1.1528	1.3289	-0.9161	4.6074	81.4861	2.7717	7.6821	-0.1094	2.1058	174	870	3	388.7367
15	blue2.jpg	31.5571	2.5906	6.7114	-0.7452	3.5110	27.0787	1.4621	2.1378	0.1159	3.1113	193.5299	2.7688	7.6665	-3.0514	21.4001	227	501	3	403.6953
16	blue7.jpg	1.0592	0.3875	0.1502	1.4261	10.7699	0.7911	0.5984	0.3581	0.3593	3.7890	91.4617	1.1745	1.3793	-0.0782	2.8024	188	675	3	418.5166
17	blue3.jpg	14.2328	16.2853	265.2098	7.6227	62.4380	106.2523	11.4321	130.6935	7.8904	66.7681	211.0601	6.4146	41.1471	2.1400	38.4662	205	648	3	457.6746
18	blue6.jpg	12.4940	3.5836	12.8424	21.0112	570.1121	45.2752	4.6077	21.2305	8.5366	157.9200	162.5577	2.8872	8.3357	1.5576	46.1989	243	621	3	706.7824
19	blue8.jpg	23.2795	33.0282	1.0909e+03	1.4812	4.1767	124.1626	21.5933	466.2712	1.7127	5.0448	183.6013	17.1835	295.2724	1.9006	5.8345	173	876	3	1.1827e+03
20	blue4.jpg	72.6680	43.7579	1.9147e+03	0.2692	2.5910	208.7996	20.0536	402.1487	-0.9604	4.3331	245.3872	9.8571	97.1624	-1.2564	4.2172	176	858	3	1.9477e+03
21	blue5.jpg	47.4498	55.7069	3.1033e+03	0.8308	2.3555	168.3956	35.1244	1.2337e+03	0.5019	2.0798	253.8353	1.1810	1.3947	-0.7800	2.9145	183	828	3	3.3259e+03

Excel Sheet - for blue3.jpg



lab3.xls

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											lab3									
	file_name	red_mean	red_std	red_var	red_skewn...	red_kurtosis	green_mean	green_std	green_var	green_ske...	green_kurt...	blue_mean	blue_std	blue_var	blue_skew...	blue_kurto...	no_of_rows	no_of_colu...	no_of_colo...	euclidean_...
	Text	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number
1	file_name	red_mean	red_std	red_var	red_skewne...	red_kurtosis	green_mean	green_std	green_var	green_skew...	green_kurto...	blue_mean	blue_std	blue_var	blue_skewn...	blue_kurtosis	no_of_rows	no_of_colu...	no_of_color...	euclidean_...
2	blue3.jpg	14.2328	16.2853	265.2098	7.6227	62.4380	106.2523	11.4321	130.6935	7.8904	66.7681	211.0601	6.4146	41.1471	2.1400	38.4662	205	648	3	0
3	blue2.jpg	31.5571	2.5906	6.7114	-0.7452	3.5110	27.0787	1.4621	2.1378	0.1159	3.1113	193.5299	2.7688	7.6665	-3.0514	21.4001	227	501	3	315.6236
4	blue1.jpg	1.5018	1.1347	1.2875	1.1337	4.8222	20.5715	2.8229	7.9685	0.2733	2.0695	102.7985	10.0280	100.5605	-1.1095	3.7338	181	837	3	341.4812
5	blue10.jpg	14.3568	1.2172	1.4815	-1.2944	4.7269	35.0214	1.1528	1.3289	-0.9161	4.6074	81.4861	2.7717	7.6821	-0.1094	2.1058	174	870	3	343.9414
6	blue7.jpg	1.0592	0.3875	0.1502	1.4261	10.7699	0.7911	0.5984	0.3581	0.3593	3.7890	91.4617	1.1745	1.3793	-0.0782	2.8024	188	675	3	350.4714
7	blue9.jpg	1.2209	1.2596	1.5867	1.3527	8.0143	61.4725	13.0630	170.6415	-0.2085	2.1751	99.2004	17.8668	319.2214	-0.3884	2.2771	183	825	3	414.7532
8	yellow9.jpg	252.1273	3.4412	11.8419	-1.3383	4.4428	220.0377	5.3375	28.4892	0.2273	3.4297	49.6806	5.6261	31.6533	0.1479	3.2645	168	900	3	423.4093
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10	yellow6.jpg	248.3320	3.3161	10.9965	-0.8908	6.3811	208.1326	3.9113	15.2979	-1.0315	7.2433	3.0021	2.6044	6.7827	1.0403	4.5605	217	696	3	442.5148
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12	yellow1.jpg	253.9355	0.5803	0.3368	-7.4593	70.9084	225.1419	1.0178	1.0359	6.9811	56.0857	1.1099	0.7631	0.5823	7.3722	61.8022	215	660	3	453.4960
13	yellow7.jpg	252.7007	5.4690	29.9094	-4.2158	25.2691	183.7720	18.0723	326.6092	-1.2552	5.4215	2.7916	4.5825	20.9991	2.9054	13.8731	225	675	3	454.4731
14	yellow8.jpg	255	0	0	-4.2158	25.2691	241.0067	0.0813	0.0066	12.1318	148.1839	47.2680	0.9672	0.9355	-0.5332	1.3233	206	735	3	454.4731
15	yellow2.jpg	251.8928	1.2221	1.4935	-0.7799	6.2336	253.1307	1.2673	1.6060	-0.9611	5.8087	24.2093	1.5303	2.3419	-0.0566	4.1607	229	663	3	457.4321
16	yellow10.jpg	245.0147	5.1532	26.5557	-0.6674	6.0426	221.1877	5.4441	29.6387	-0.3578	6.7464	64.3780	15.9782	255.3039	0.0172	2.7820	159	954	3	457.6746
17	yellow4.jpg	253.6210	1.4230	2.0251	-1.2888	5.2494	253.2073	1.4499	2.1022	-0.8320	4.0769	39.9958	11.4137	130.2730	0.4090	3.4068	225	675	3	459.1783
18	blue6.jpg	12.4940	3.5836	12.8424	21.0112	570.1121	45.2752	4.6077	21.2305	8.5366	157.9200	162.5577	2.8872	8.3357	1.5576	46.1989	243	621	3	591.0360
19	blue8.jpg	23.2795	33.0282	1.0909e+03	1.4812	4.1767	124.1626	21.5933	466.2712	1.7127	5.0448	183.6013	17.1835	295.2724	1.9006	5.8345	173	876	3	932.1465
20	blue4.jpg	72.6680	43.7579	1.9147e+03	0.2692	2.5910	208.7996	20.0536	402.1487	-0.9604	4.3331	245.3872	9.8571	97.1624	-1.2564	4.2172	176	858	3	1.6800e+03
21	blue5.jpg	47.4498	55.7069	3.1033e+03	0.8308	2.3555	168.3956	35.1244	1.2337e+03	0.5019	2.0798	253.8353	1.1810	1.3947	-0.7800	2.9145	183	828	3	3.0481e+03