Properties of Color Images Pictured on Sunlight and Different Wave Lengths

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ABSTRACT
That the amount of the clarity in the color attribute in the single-image depends on the intensity of illumination, as well as the type of light used and the angle of its fall .This research we adopted in the light of the sun and different intensities on throughout the day and the angle of light on the picture, the purpose of Study changes in the color information received from camera. The proposed methods to address these data to get the clearest picture, It was also we working to shed different wavelengths between 400 to 750 nm and the wavelength of 255 nm and 366 nm for the purpose of studying the characteristics of the image. And we can looking for the disappearance of some band of color (RGB) colorimetric with small Concentration and its appearance at other times due to changes in the angle and intensity of light on the image, so the color shows the characteristic change color in the picture and the emergence of a difference in the captured image with time. The adoption of the mediator and the rate calculated the amount of the standard deviation of the color band in all the captured images. In order to find out which color packets disappear or appear based on light intensity , It was also we deducted three areas of each color of the primary colors in the image (red , Green , blue) and calculate the amount of the standard deviation for it to know the times that appear or disappear some of the color packets .

General Terms
The general terms we used general classification of image analysis by different time taken image for get better depend on the sources light.

Keywords
Exposure of camera, sun light, mean of image, measure of image quality.

1. INTRODUCTION
Digital image processing is a subfield of digital signal processing. Digital image processing has many advantages over analog image processing; it allows a much wider range of algorithms to be applied to the input data and can avoid problems such as the build-up of noise and signal distortion during processing[1]. The captured images typically have low signal-to-noise ratio, and the demosaicing step further corrupts the image, [2]. In most digital images, pixel values aren't proportional to the light levels in the scene. Usually, light levels are encoded nonlinearly so they appear either more correctly or more pleasingly on nonlinear display devices such as cathode ray tubes. Furthermore, standard digital images typically represent only a small fraction of the dynamic range—the ratio between the dimmest and brightest regions accurately represented—present in most real world lighting environments. When part of a scene is too bright, the pixels saturate to their maximum value (usually 255) no matter how bright they really are. [3]. We can optically modulate the colors of a real-world scene so that visible differences are preserved for people suffering from color blindness [4].

Measurements of image filter
Photos comprise rich and well-structured visual information. In human visual perception, edges are effective and expressive stimulation, vital for neural interpretation to make the best sense of the scene. In manipulating and understanding pictures, high-level inference with regard to salient structures it was intensively [5]. There are many filters for Digital Image Smoothing, which could directly apply to enhance the noisy images.

a) Minimum filter

The minimum-filter selects the smallest value within the ordered of smoothing window of pixel values.

b) Mean filter

The mean filter technique operates by reducing the statistical fluctuations in each pixel by averaging the pixel with its closest neighbors. Mean-filter can be implemented directly to replace the image pixel values I(i,j) by their mean values $\hat{I}(i,j)$, over sliding window.

c) Median filter

This filter replaces the gray level of each pixel by the median of the gray levels in a neighborhood of that pixel. Recall that the median M of a set of values is such that half of the values in the set are less than M and half are greater than M. In order to perform median filtering in a neighborhood of a pixel must be sort the values of the pixel and its neighbors, then determine the median, and assign this value to the pixel [6].

d) Mode filters:

Mode-filter is another example of the smoothing filters in which the window's central pixel value is replaced by the point's value of the greatest repeated in the sliding mask. The mode filter is defined in the same way as the median filter, but instead of taking the median of the pixels in a neighborhood, that take the value of highest repetition in the sliding mask.[6]

Statistical of images
To measure the quality of the results images that has been obtained by applying enhancement techniques the following measurements can be adopted.

- Mean and variance

The mean (μ) of a set of values is it's statistical average, such that, if I represents a set of N values the mean can be written as[5]:

$$\mu = \frac{1}{N}\sum_{i=1}^{N} I_i \qquad (1)$$

The mean of a set of values locates only the average value . It is helpful to know how much the data varies from its mean. The variance V^2 of a random variable I with expected value μ is given by[6]:

$$V^2 = \frac{\sum_{i=1}^{N} (I_i - \mu)}{N-1} \qquad (2)$$

The smallest value of V^2 can be assumed is zero, and that would occur if all the I-samples take the same value. The variation between the samples increase, the variance will be increased.

Since the variance is expressed in square units, more useful value is the square root of the variance, which is expressed in units, and can be related back to the original values. The standard deviation (STD) of a random variable I is the square root of the variance as follows[6]:

$$STD = \sqrt{\frac{\sum_{i=1}^{N} (I_i - \mu)}{N-1}} \qquad (3)$$

.

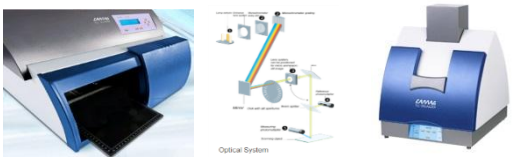
Some of system analyses

1. TLC Scanner 4 works :

The signal of the measuring photomultiplier is continuously offset against the signal of the reference photomultiplier. This compensates for lamp aging and short-time fluctuations. It also reduces the warm-up time required to reach lamp stabilization. All components of the optical system, lamps, monochromator, scanning stage, and photomultiplier are mounted on one sturdy metal support. This ensures high precision of the detector signal. For scanning at wavelengths below 200 nm it is advisable to flush the monochromator with nitrogen. The scanner is equipped to do this.A monochromator bandwidth of 5 nm or 20 nm can be selected. 5 nm bandwidth is used for spectra recording, multi-wavelength scanning, and when spectral selectivity is required. 20 nm bandwidth offers higher light intensity (improves the signalto-noise ratio and thus the reproducibility of the measurement) and enables measurement of several fractions with slightly different absorption maxima in one scan. The lens system with 190 – 900 nm transmission range features automatic positioning for micro and macro slit sizes. This ensures that the light energy available with small slits in the micro position is almost the same as that for the corresponding slit in the macro position, which is four times larger. The light beam strikes the object at right angle. The photomultiplier is aligned at an angle of 30°

2. TLC Visualizer:

TlC visualizer captures images that are, without a doubt, of the best quality in the field. The system provides illumination with direct and/or transmitted white light as well as with direct UV 254 nm and UV 366 nm light. An integrated powerful 12 bit camera with highly linear CCD chip and excellent color reproduction captures the images with the whole process conveniently controlled by the TLC software.[7] See the Fig.1 .



TLCScanner4 TLC Visualizer

Fig.1 for TLC scanner4 and TLC Visualizer capture image

The method and work and results

In the system of work, the Image was developed towards the north and Camera has been developed to the south, we take a picture every half hour. See the Fig.2 shows the system work location.

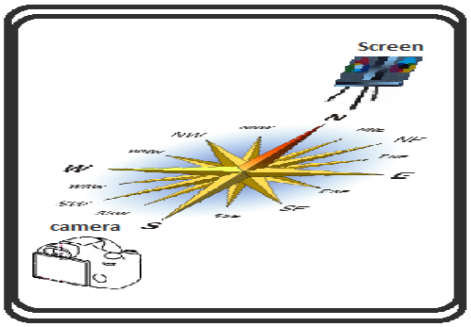


Fig. 2 system work location

Image test results

To study the difference between images taken at different times in the day with in a different light intensity depend on sunlight , so that we calculated statistical characteristics of the mean and standard deviation of RGB of intensity of each image .And shows the relationship between the average (μ) and standard deviation (σ). When the distance between photo and camera the fixed.

A. The first part in this project we numerate the image from 1 to 23, which represents the capture image from six o'clock in the morning to six pm and calculate the standard deviation for it. And use the median rate filter to improve the image and calculate the standard deviation after improve mean filter, We can see the original image in Fig.3 , and the histogram of the original image ,see the Fig.4 ,also gave the properties of the all image in (RGB) by calculated (STD& σ) see the table. 1

Image 1 Image 2 Image 3 Image 4

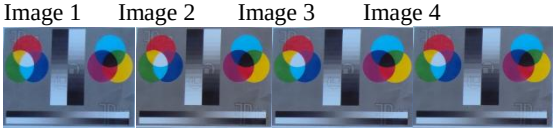


Image 5 Image 6 Image 7 Image 8

Image 9 Image 10 Image 11 Image12

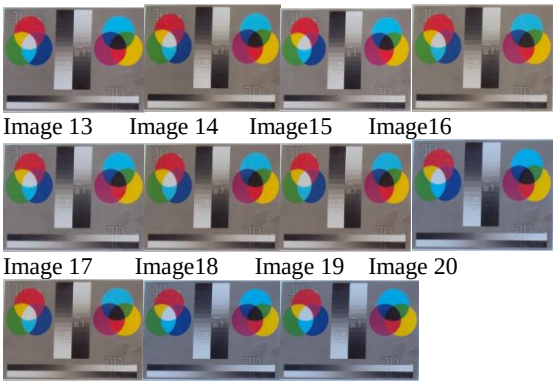
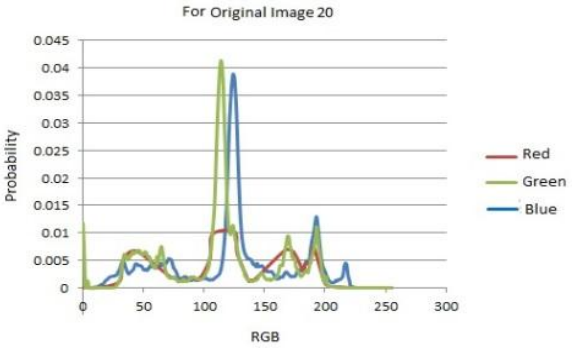


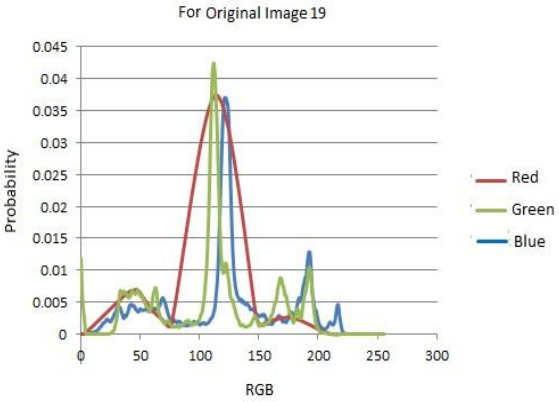
Image 13 Image 14 Image15 Image16

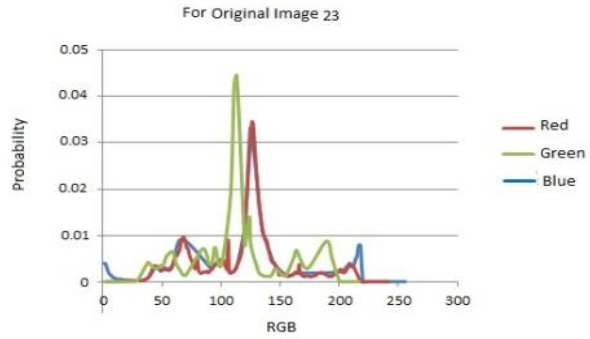
Image 17 Image18 Image 19 Image 20

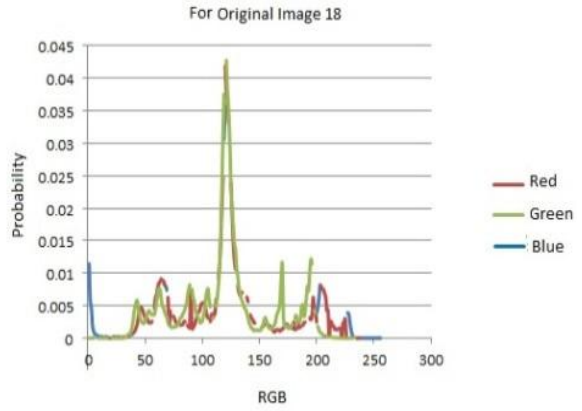
Image 21 Image 22 Image 23

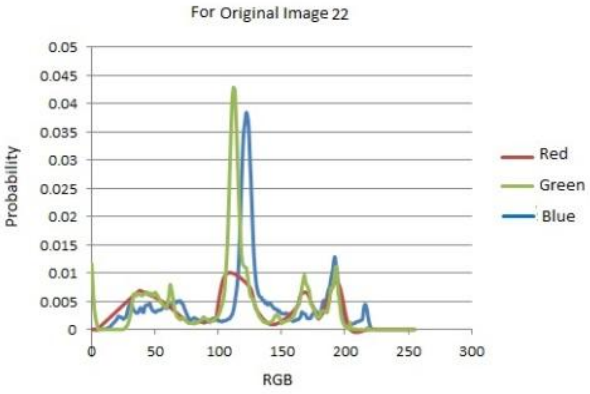
Fig.3 The original image

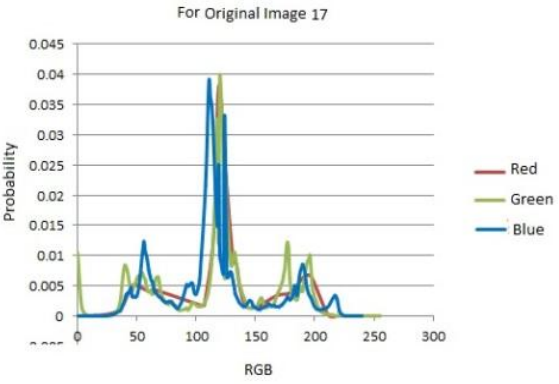


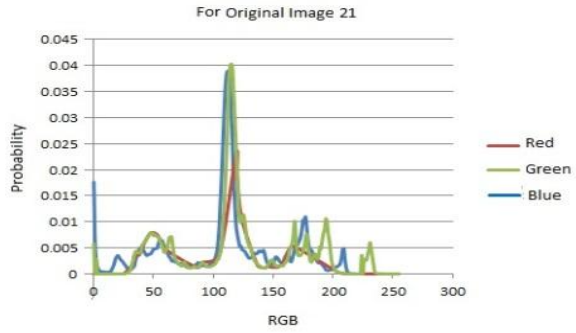


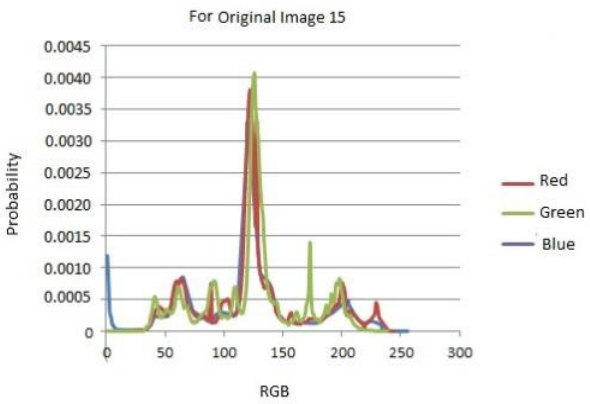








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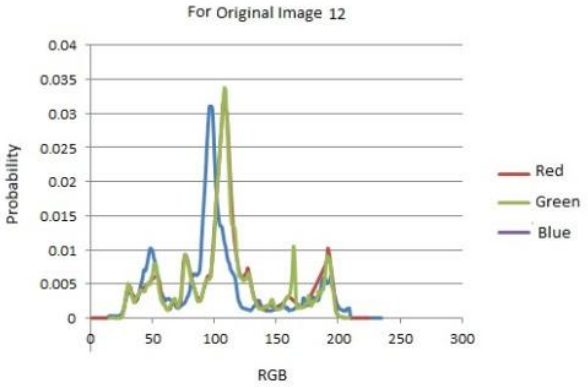
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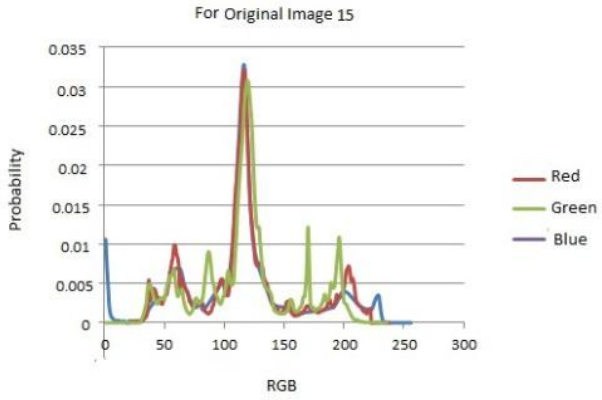
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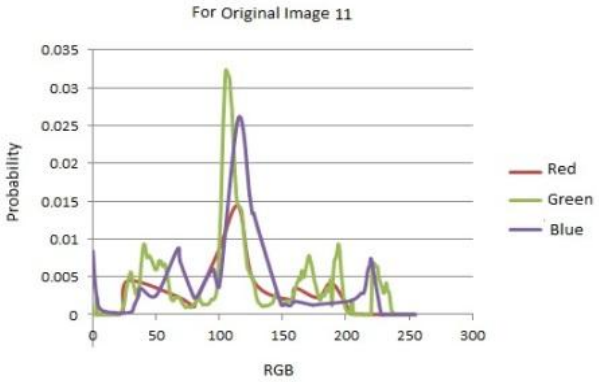
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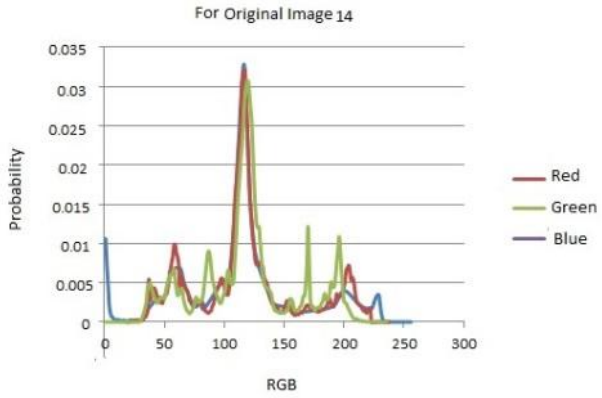
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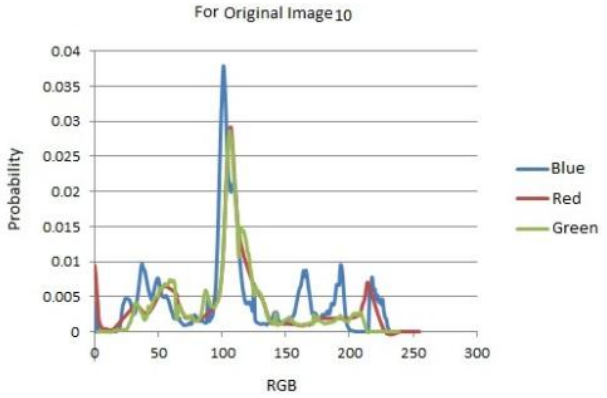
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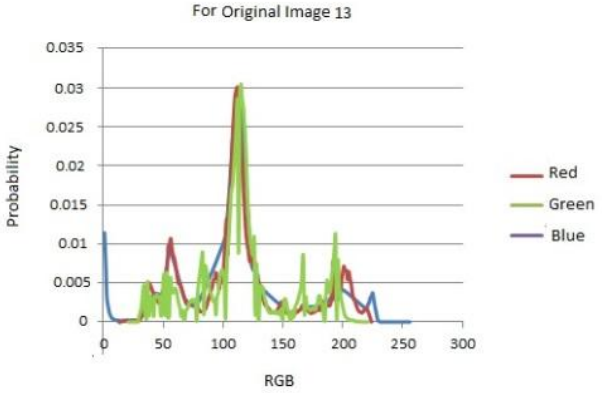
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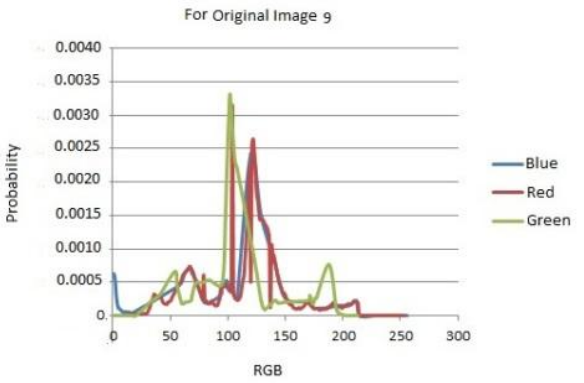
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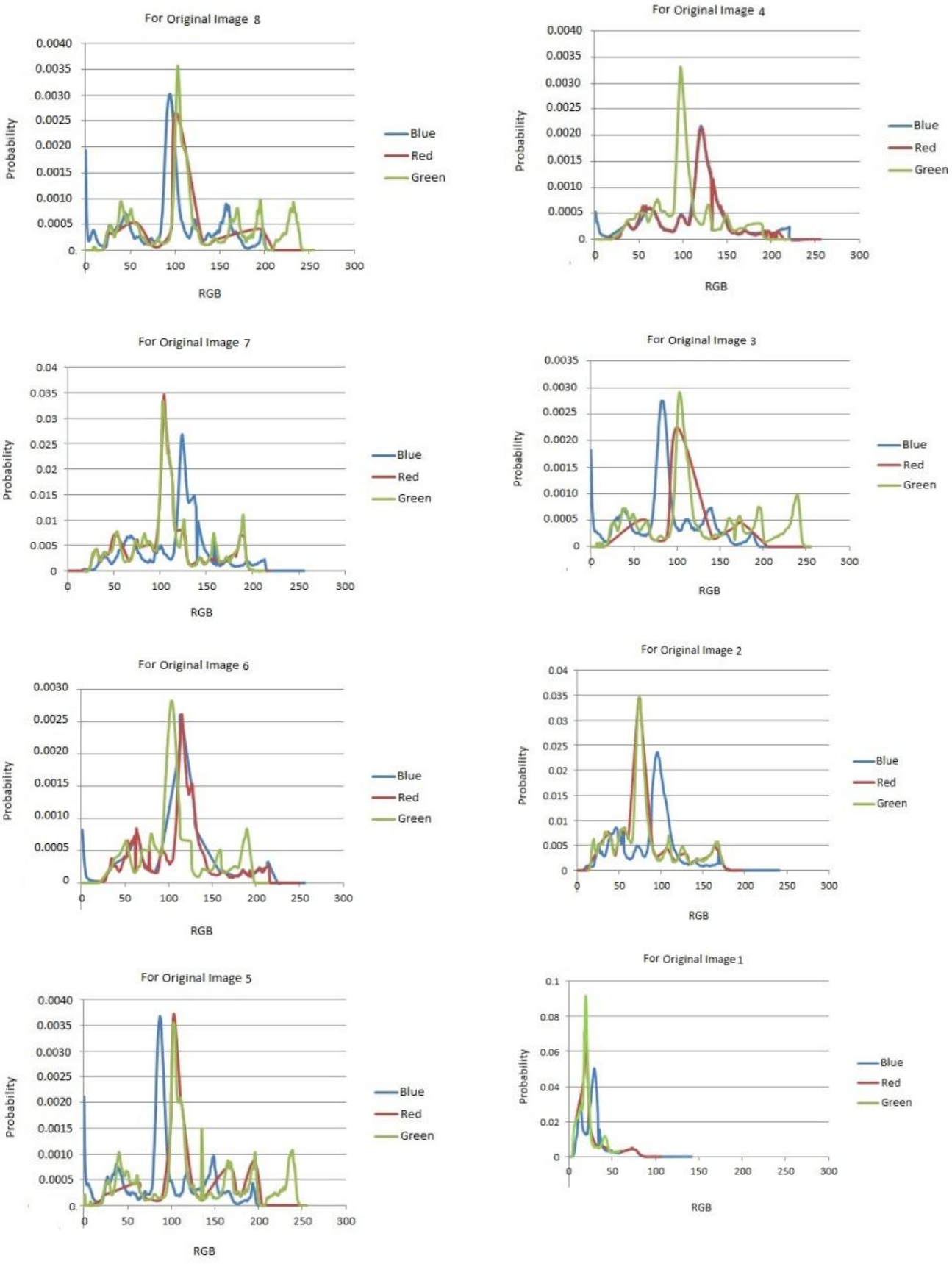


Fig.4 The histogram of original image

After apply mean filter for all image and calculated mean & histogram for read ,green, blue band .see the Fig.5 , for image after mean filter, and Fig 6 , for histogram.

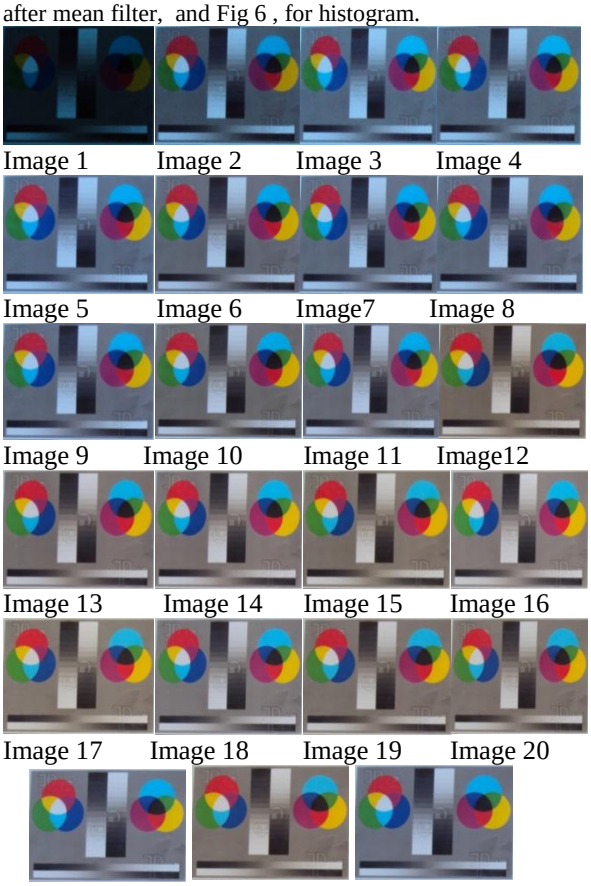
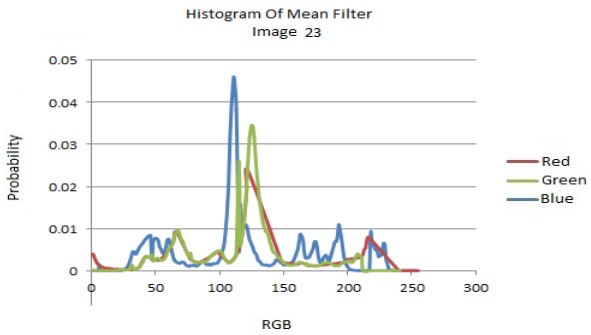
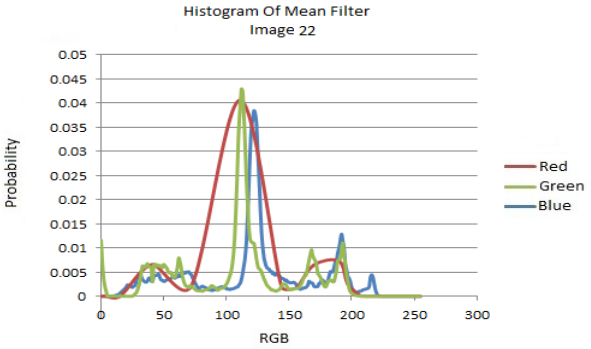
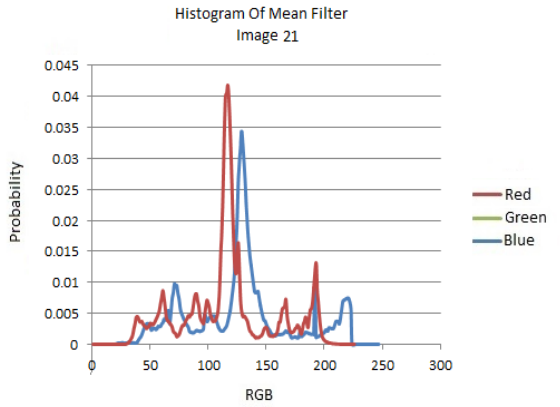
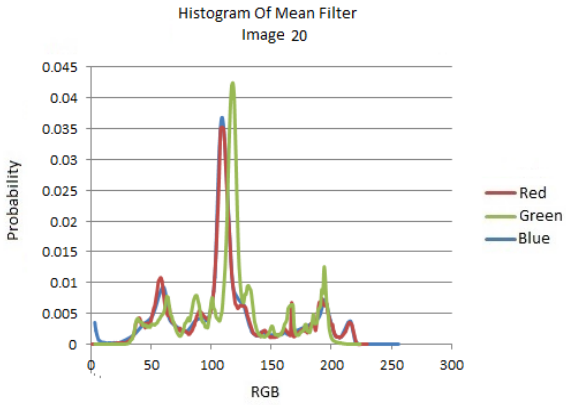


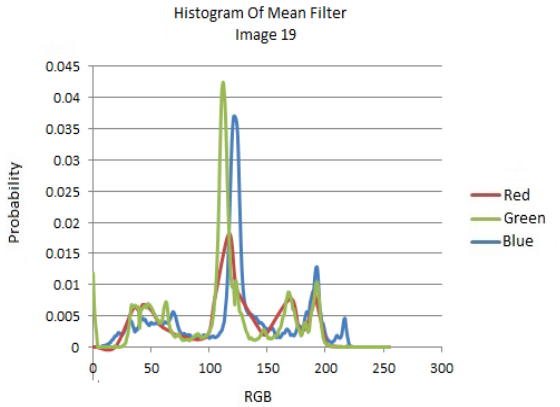
Fig.5 The image after mean filter

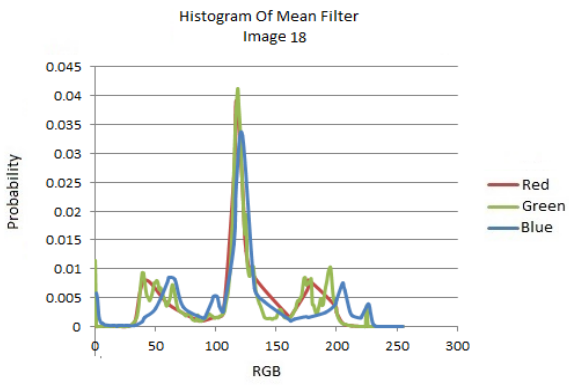


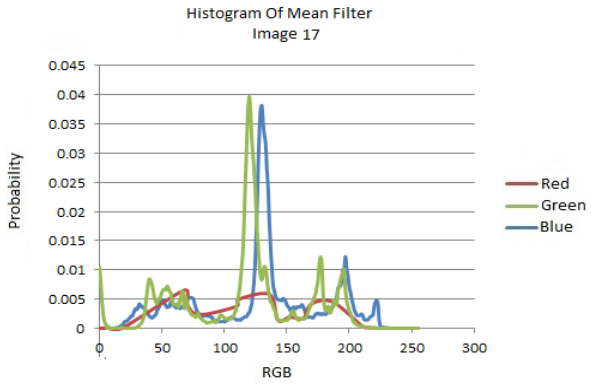








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Probability
RGB
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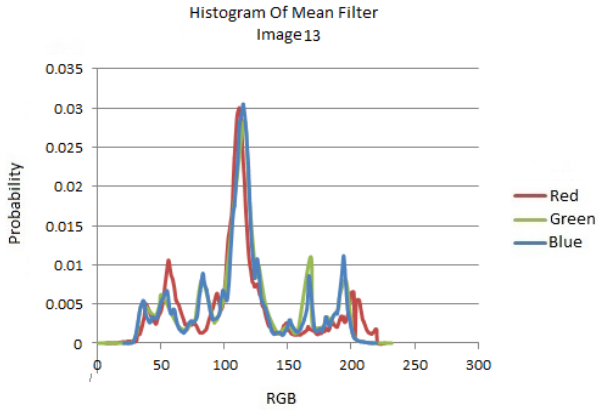
Green
Blue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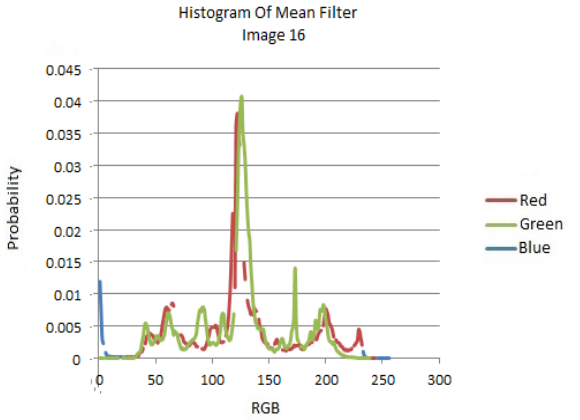
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Probability
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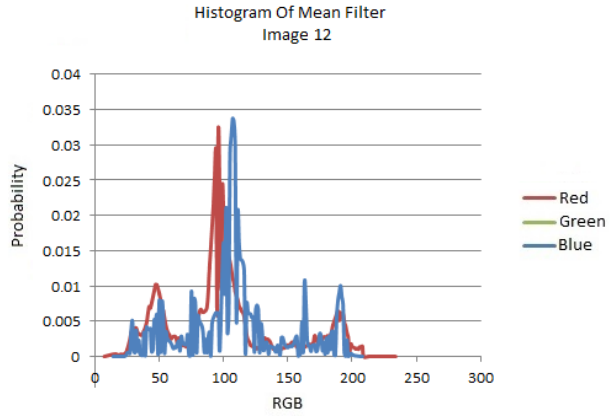
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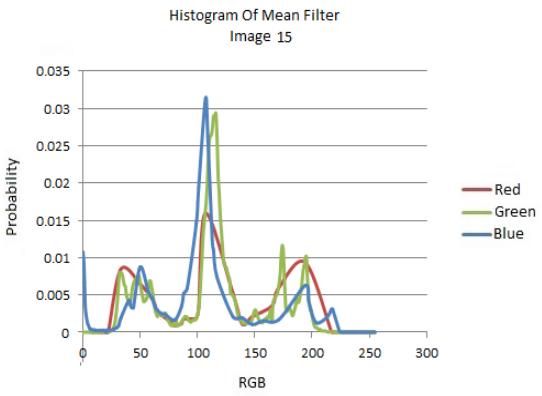
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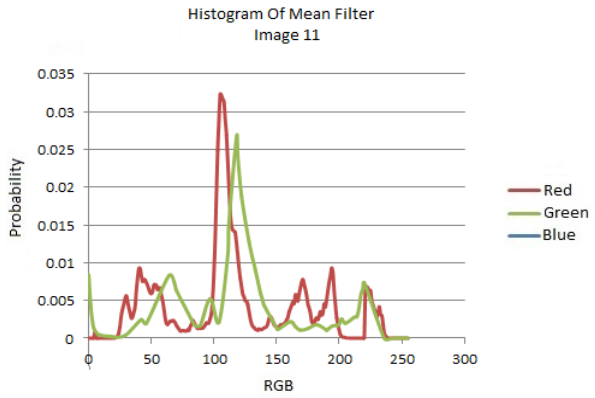
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Red
Green
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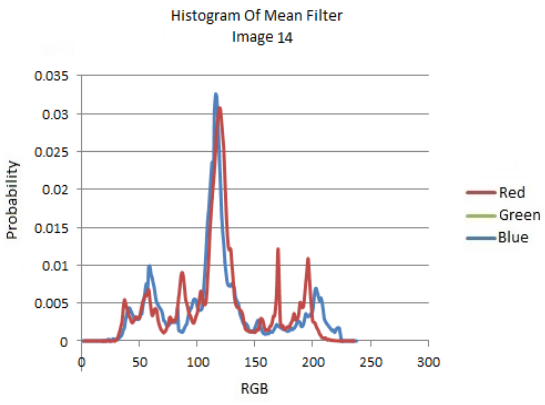
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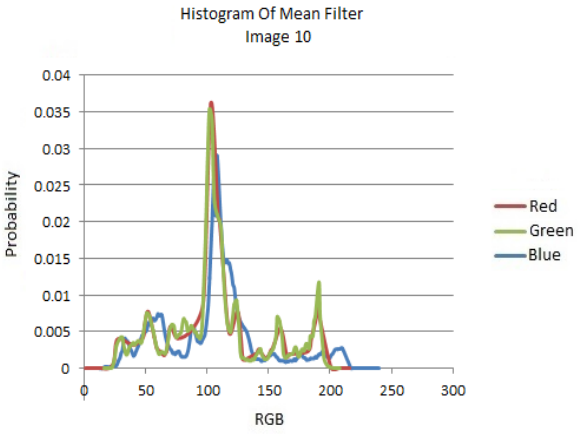
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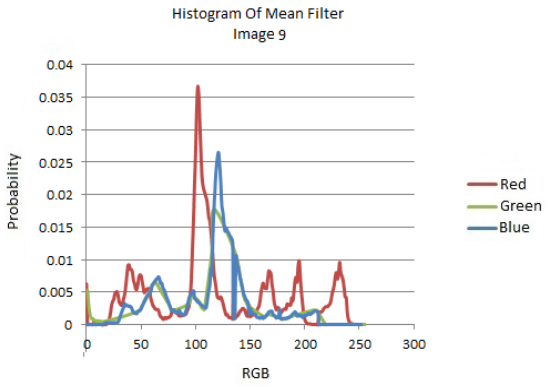
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Probability
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Green
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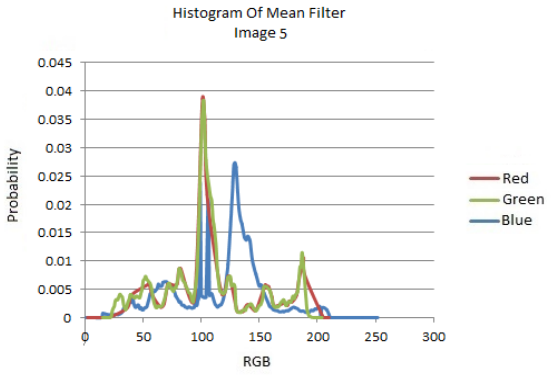
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Image 5
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Green
Blue

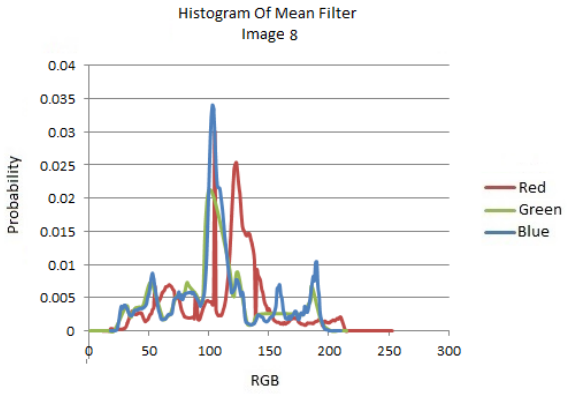
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Image 8
Probability
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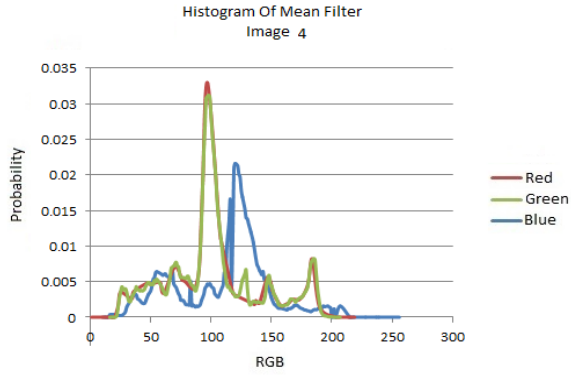
Red
Green
Blue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Probability
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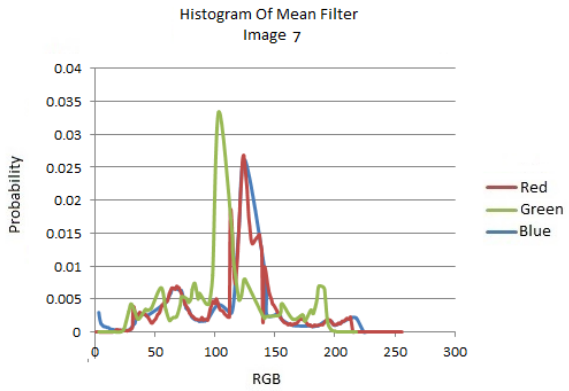
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Image 7
Probability
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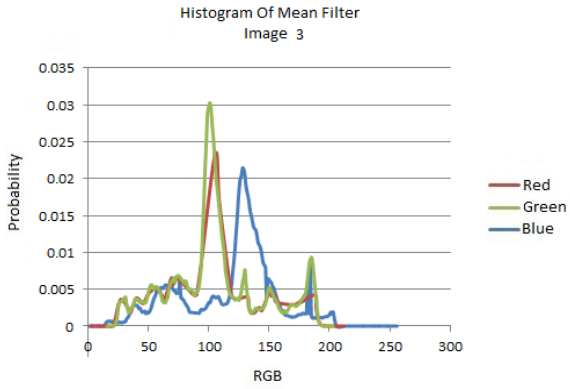
Green
Blue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Green
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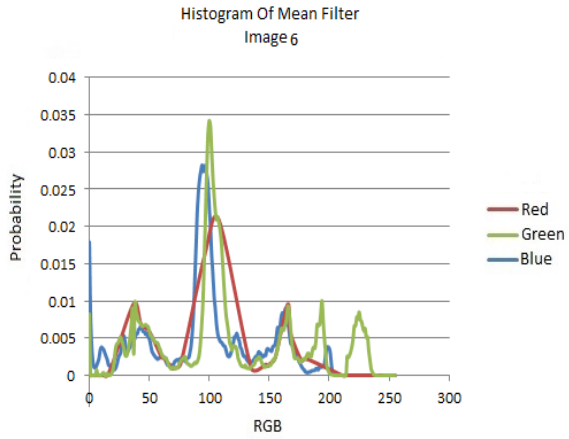
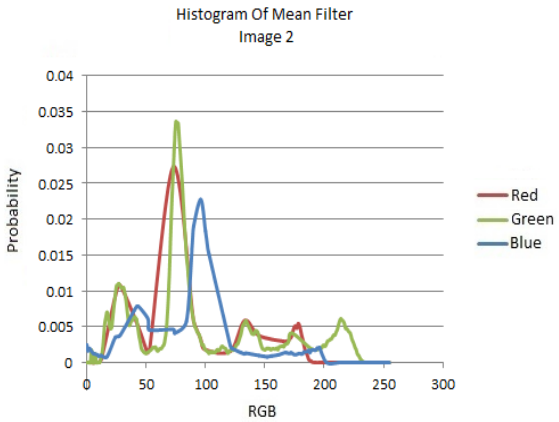

Histogram Of Mean Filter
Image 6
Probability
RGB
Red
Green
Blue


Histogram Of Mean Filter
Image 2
Probability
RGB
Red
Green
Blue

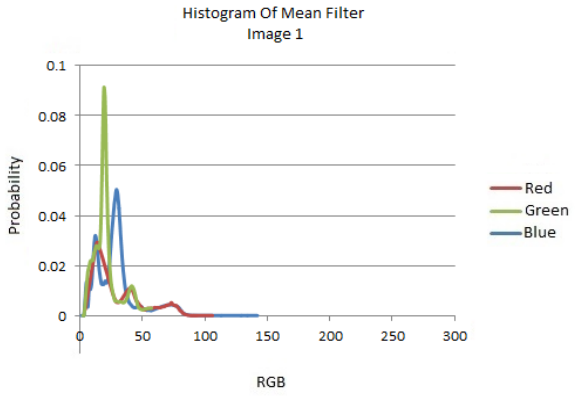
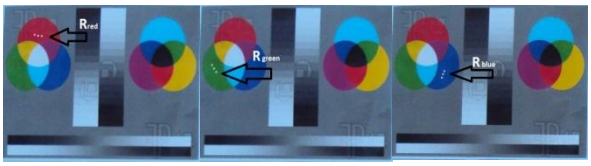


Fig.6 The histogram for image after mean filter.

Table.1 The properties of the all image in (RGB) by calculated (STD& σ). Note (R1, R2, R3) it is meaning (R red, Rgreen ,R blue)

Mean	Mean (μ)of homogenous region			STD		STD (σ)of homogenous region		
	R1	R2	R3			R1	R2	R3
1	24	14	27	37	17	9.9	21	29
2	80	65	83	103	37	35	43	54
3	104	85	108	133	38	41	46	57
4	101	85	104	125	39	41	46	57
5	105	89	108	133	39	44	45	56
6	104	97	105	120	40	46	42	54
7	107	95	108	128	39	47	45	55
8	106	95	108	127	39	45	45	55
9	106	96	107	126	40	45	45	55
10	106	103	106	113	40	47	45	53
11	110	105	110	122	39	48	45	53
12	109	116	106	100	40	50	46	48
13	114	118	112	112	40	51	46	50
14	118	122	116	116	40	52	46	50
15	116	123	114	108	40	50	46	48
16	124	129	112	121	40	52	46	49
17	122	129	120	113	39	49	44	47
18	120	122	119	121	39	50	44	49
19	115	122	113	109	39	48	44	47
20	117	123	115	110	39	48	44	47
21	116	111	116	128	39	48	44	51
22	115	112	113	109	39	48	44	47
23	112	106	112	125	39	47	44	51

A. The scanned part, we select three reign from image bund collar (RGB) , every part of it have fore pixel ,and calculate the (Mean of RGB &STD of RGB & Vr of RGB).see the Table.2 and 3 & 4 and the Fig.7 is the image select reign .



For reign red bund For reign green bund For reign blue bund

Fig.7 The image of reign selected.

Table.2 The (R1, R2, R3) it is meaning (R red, Rgreen ,R blue)

No. of image	Mean R Image for reign red bund (μ)of homogenous region			STD R for Image for reign red bund (σ)of homogenous region			Vr R Image for reign red bund The variance		
	R1	R2	R3	R1	R2	R3	R1	R2	R3
1	27	7	11	1.3	0.95	1.2	1.7	0.9	1.4
2	121	25	46	2.21	2.3	2.3	4.9	5.3	5.5
3	158	35	68	3.4	2.9	2.5	12	8.4	6.3
4	153	34	60	3.2	2.6	2.9	10	7.1	8.8
5	166	39	69	1.03	1.31	1.48	1.0	1.7	2.1
6	171	38	62	2.2	1.6	2.1	5.0	2.8	4.6
7	172	41	67	1.2	2.6	4.4	1.5	2.6	4.4
8	170	39	65	1.6	1.3	1.4	2.6	1.8	2.0
9	170	39	66	1.46	1.5	1.39	2.1	2.2	1.9
10	176	38	58	1.6	2.1	1.7	2.8	4.7	3.1

11	181	41	64	1.33	1.7	1.8	1.7	2.9	3.5
12	191	30	48	3.1	1.7	1.8	10	3.03	3.3
13	195	33	55	3.2	1.5	1.6	10	2.4	2.7
14	201	35	58	2.6	2.1	2.3	7.1	4.7	5.4
15	197	34	52	2.1	1.4	1.7	4.7	1.9	2.9
16	206	36	57	2.7	1.44	1.63	7.4	2.08	2.6
17	205	39	54	1.1	2.4	2.08	1.3	5.9	4.3
18	197	40	61	2.04	2.09	2.31	4.1	4.3	5.3
19	193	37	54	1.5	1.3	1.8	2.2	1.9	3.5
20	196	40	56	1.3	1.1	2.3	1.7	1.3	5.7
21	185	45	68	1.8	2.2	1.9	3.5	4.8	3.6
22	192	36	54	1.37	1.38	1.57	1.8	1.9	2.4
23	179	41	63	1.7	2.05	2.5	3.02	4.2	6.3

11	55	120	66	1.5	1.3	1.6	2	1.7	2.6
12	64	119	48	2.6	1.5	3.3	6	2.3	11
13	62	125	58	2.1	1.5	1.6	4	2.5	2.8
14	63	130	61	2.0	1.9	2.6	4	3.7	6.7
15	67	126	51	2.1	1.5	2.3	4	2.5	5.5
16	71	138	64	3.1	1.3	2.0	9	1.7	4.4
17	74	133	57	2.29	1.4	2.4	5	2.1	6.1
18	66	130	64	3.2	1.7	1.8	10	3.1	3.5
19	68	123	53	1.3	0.9	1.9	1	0.8	3.7
20	70	125	56	1.4	1.8	2.2	2	3.4	5.2
21	58	126	72	1.41	1.5	1.6	1.	2.5	2.6
22	68	122	53	2.0	1.8	1.5	4.	3.5	2.4
23	53	121	69	1.2	1.1	1.8	1	1.2	3

Table.3 The (R1, R2, R3)it is meaning(Rred, Rgreen,Rblue)

No. of image	Mean G Image for reign green bund (μ)of homogenous region			STD G for Image for reign Green bund (σ)of homogenous region			Vr G Image for reign green bund The variance		
	R1	R2	R3	R1	R2	R3	R1	R2	R3
1	6	20	10	2.1	1.3	1.3	4	1.7	1.7
2	28	79	42	6.3	2.2	2.8	40	5.0	8.1
3	39	110	58	4.1	2.1	2.46	17	4.4	6.0
4	38	106	53	2.9	1.6	2.9	7	2.7	8.8
5	39	113	66	2.9	1.8	2.2	8	3.3	5.1
6	48	112	58	1.9	1.3	1.8	3	1.6	3.2
7	46	115	64	4.3	1.4	2.9	17	2.0	8.9
8	45	114	63	2.91	1.5	1.9	8	2.4	3.6
9	46	114	63	2.8	1.4	2.4	8	2	5.9
10	55	113	55	2.4	1.8	1.7	6	3.6	2.9

Table.4 The(R1, R2, R3)it is meaning(R red , R green ,R blue)

No. of image	Mean B Image for reign blue bund (μ)of homogenous region			STD B for Image for reign blue bund (σ)of homogenous region			Vr B Image for reign blue bund The variance		
	R1	R2	R3	R1	R2	R3	R1	R2	R3
1	3	11	32	1	1.1	3	1	1.2	9.2
2	5	42	107	3.3	1.8	3.1	11	3.2	9.9
3	3.3	2.1	2.2	3.3	2.1	2.2	11	4.6	5.1
4	9	64	144	5.6	2	2.4	32	4	6
5	4	62	151	1.2	1.4	1.42	1.6	2.1	2
6	13	57	135	2	1	2	4	1.6	4.5
7	11	61	144	3.4	1.3	2.2	11	1.8	4.8
8	6	58	142	1.9	1.6	1.7	3.9	2.7	3.1
9	9	58	142	2.2	1.2	1.7	5.1	1.6	3.1
10	19	57	130	1.5	1.5	1.88	2.3	2.2	3.5

11	14	58	135	2.1	1.7	1.4	4.5	2.9	2.1
12	23	53	113	1.3	1.3	2.2	1.7	1.8	4.9
13	18	56	126	2.44	1.51	1.9	5.9	2.2	3.6
14	22	59	131	2	1.4	1.8	4.1	2.2	3.4
15	25	60	123	1.3	1.6	1.7	1.9	2.5	2.9
16	24	65	138	2.3	1.3	2.5	5.3	1.9	6.7
17	31	68	130	1.9	1.3	1.8	3.9	1.9	3.2
18	25	64	136	1.6	1.2	1.4	2.8	1.6	1.9
19	29	63	125	2.1	1.2	1.8	4.7	1.4	3.3
20	32	65	128	2.2	1.8	2.4	4.8	3.4	5.8
21	20	64	143	3.1	1.7	1.4	9.8	2.9	2.1
22	30	64	125	1.8	1.4	1.8	3.2	2.1	3.4
23	18	60	139	2.3	1.6	1.2	5.3	2.6	1.6

B. The third part of this project, we use the TLC SCNNER 4 from HPTLC (High performance thin layer chromatography) this system work, So as to highlight different wavelengths on the images And see how much influence the reversal of these wavelengths and the impact of colors.

- We take image No.1 and 10 to make sure there is deferent in information colure
- The system take one line of image it start (20, 20,100) mm, (x1, y1, y2) see the Fig.8, and calculated the reflection of the difference wave length (400-750) nm.

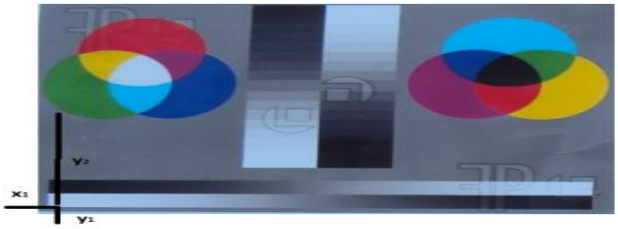


Fig.8 The line of image it starts

The difference can be seen from Fig.9, The clarity of descendants of variation in the severity of absorbed and reflected between the different wavelengths and each of the following wavelengths (400 ,428 ,438,461,476,514,552,590.628, 666,704, 742) nm. See the Fig.9.

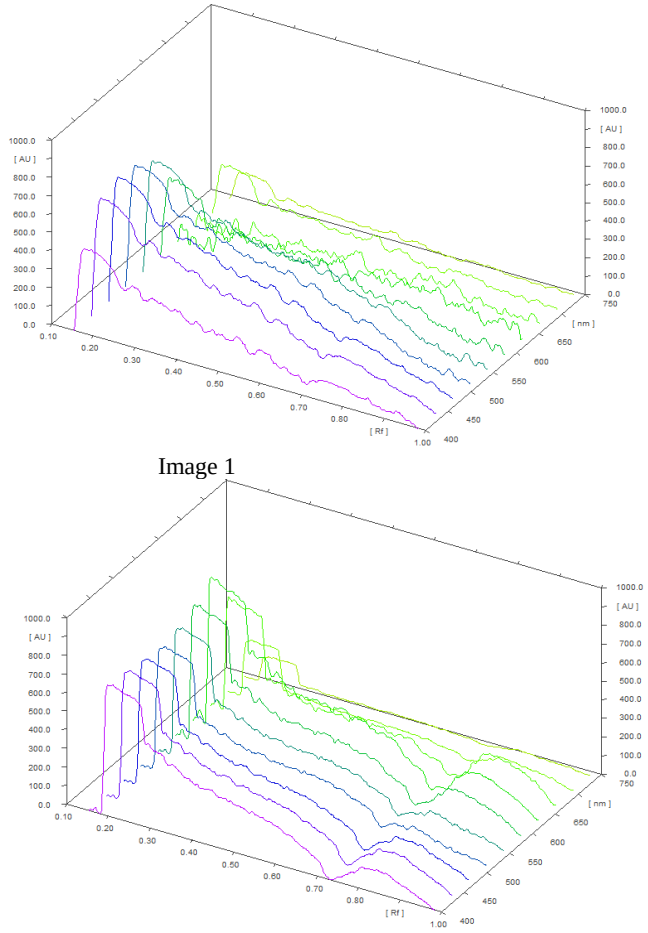


Image 1

Image 10

Fig.9. the absorbed in different wavelengths for image

.

We take image No.1, 2,3,4,5,6,7,8 and 9 to capture image from Visualizer in deferent wave length (254,366) nm see the Fig.10.

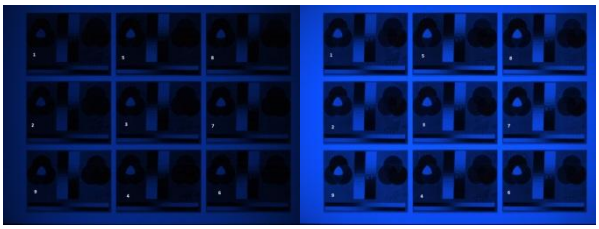


Image in 254 nm capture. Image in 366 nm capture

Fig.10. capture image in 366 & 254 nm.

We work in image No.1& 9 to calculate properties image also we select three reigns for pixel form image to see the band of colures see the Fig.11.

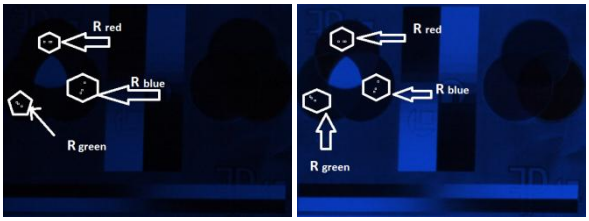
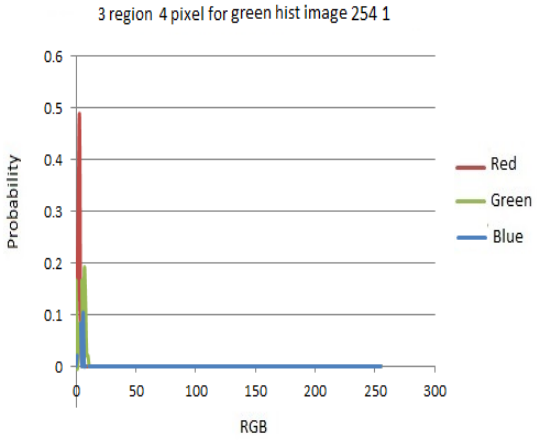
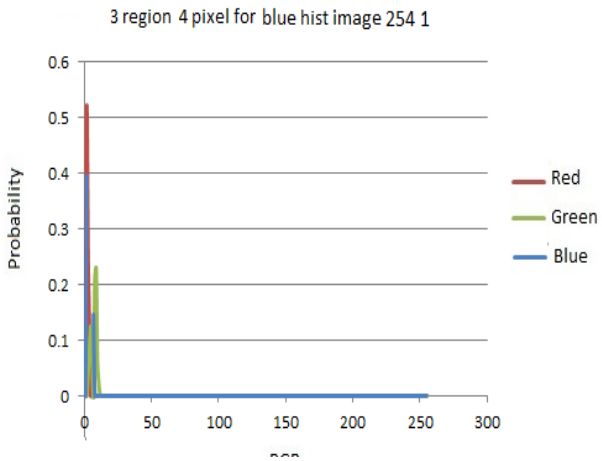
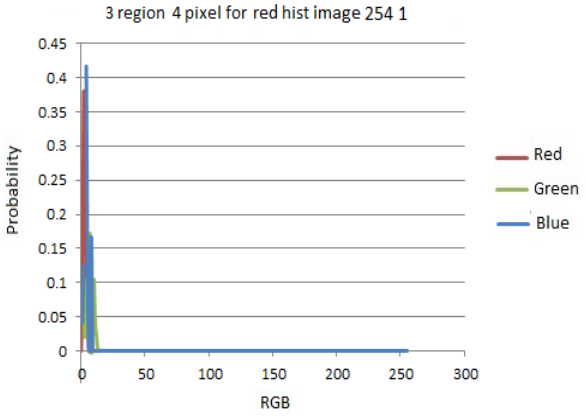


Fig.11 Image No. 1&9 reign location at 254 nm:Image No. 1&9 reign location at 366 nm.

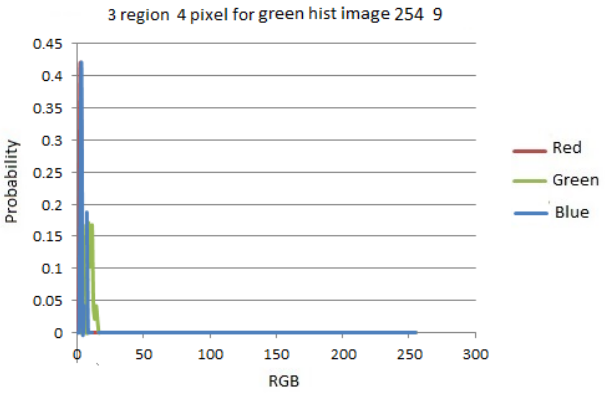
The image histogram in 255 nm and 366 nm in the Fig.12, and the Table.5 the (RGB) result from the image.

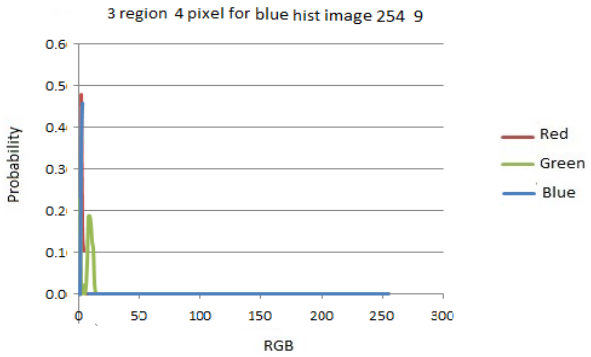


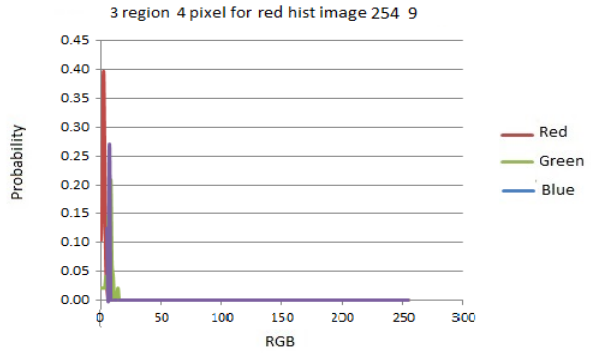




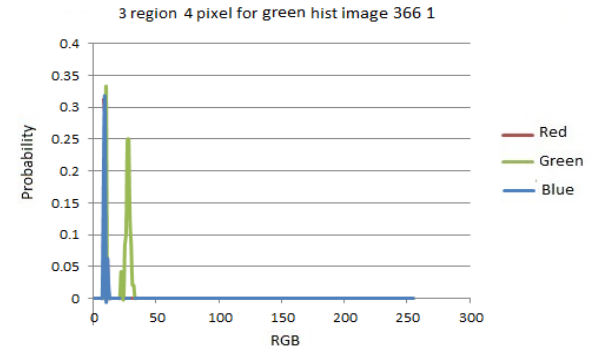
This histogram for (Red :Green :Blue) at 254nm image No.1

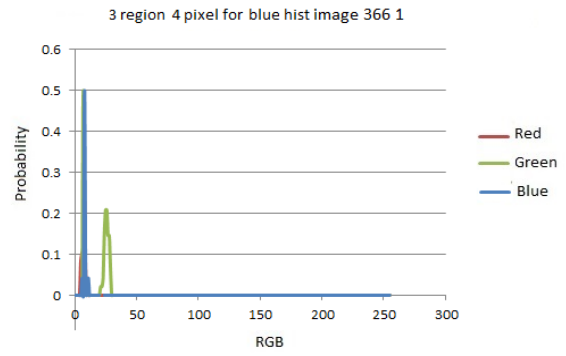


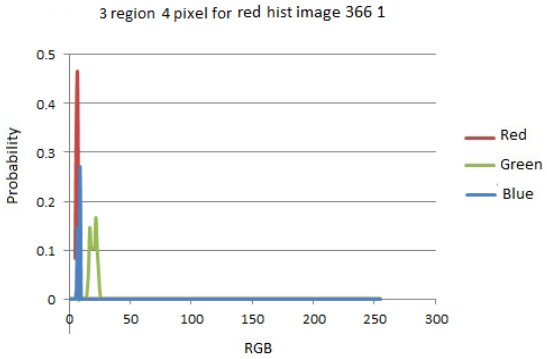




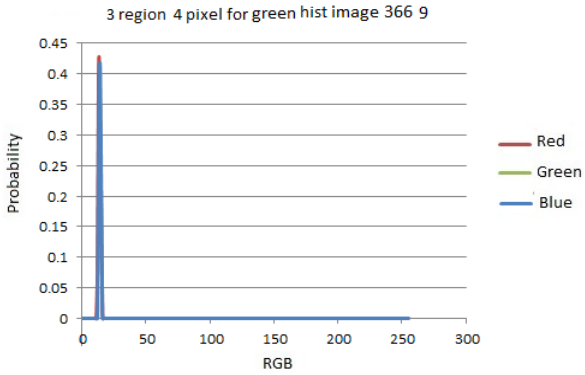
This histogram for (Red: Green: Blue) at 254nm image No.9

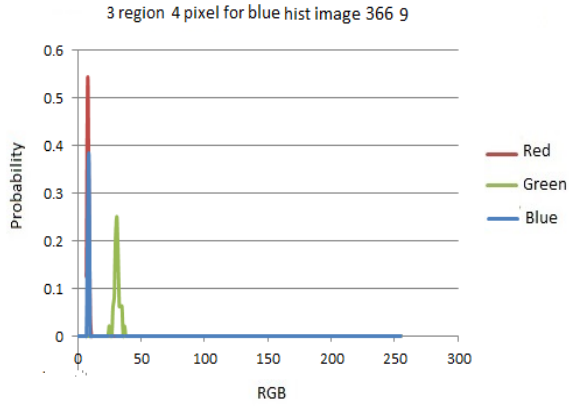






This histogram for (Red: Green: Blue) at 366 nm image No.1





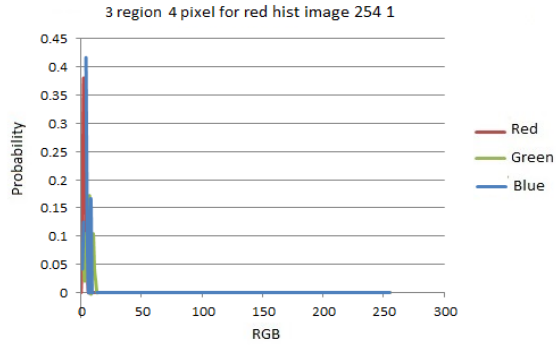


Fig.12 this histogram for (Red: Green: Blue) at 366 nm image No.9.

Table.5 the (R1, R2, R3) it is meaning (R red, Rgreen ,R blue)

Number of image	Mean R Image for reign red bund (μ)of homogenous region			STD R for Image for reign red bund (σ)of homogenous region			Vr R Image for reign red bund The variance		
	R1	R2	R3	R1	R2	R3	R1	R2	R3
1 at 254 nm	4	3	6	2.2	1.0	2.8	5.2	1.0	8.0
9 at 254 nm	3	2	6	1.5	1.1	2.3	2.3	1.2	5.9
1 at 366 nm	6	7	20	1.5	0.7	2.5	2.4	0.5	6.5
9 at 366 nm	7	7	20	1.0	1.2	1.7	1.0	1.4	3.0
Number of image	Mean G Image for reign Green bund (μ)of homogenous region			STD G for Image for reign Green bund (σ)of homogenous region			Vr G Image for reign Green bund The variance		
	R1	R2	R3	R1	R2	R3	R1	R2	R3
1 at 254 nm	2	2	4	1.8	0.7	2.7	3.5	0.6	7.7
9 at 254 nm	2	3	9	1.7	1.0	2.3	3.2	1.0	5.6
1 at 366 nm	3	9	27	1.9	0,9	2	3,7	0.8	4.0
9 at 366 nm	4	14	39	1.9	0.8 6	2.6	3.7	0.7	6.8
Number of image	Mean B Image for reign Blue bund (μ)of homogenous region			STD B for Image for reign Blue bund (σ)of homogenous region			Vr B Image for reign Blue bund The variance		
	R1	R2	R3	R1	R2	R3	R1	R2	R3
1 at 254 nm	2	2	7	1.9	0,8	1.9	3.9	0.6	3.9
9 at 254 nm	1	2	8	1.4	0.9	2.4	2.0	0.9	5.8
1 at 366 nm	3	7	25	1.8	1.0	1.8	3.3	1.1	3.2
9 at 366 nm	2	8	31	1.6	0.7	2.1	2.8	0.5	4.5

3. RESULTS OF EXTRACT FROM IMAGE

One image have been properties (Iw*Ih) 498*363 bit plane 24bpp and the smoothing effects, this is, image have size (256X256) and grays ranged between 0 (dark) to 256 (bright). The results obtained by perform each of mean filters are demonstrated as follows:

- Fig.3, represent the original images (i.e. the image Taken from camera original, noisy) .The histograms of the original image are shown in Fig.3. The histograms results are for original. After application Mean filter on the original images, the result in the Fig.5, the histograms of the original image are shown in Fig.6. The properties of all image in (RGB) by calculated (STD & σ) in the table (1-1)
- Three homogenous regions have been selected to compute the mean (μ) and the variance (Vr), for each image region within all original, noisy in the Table. (2), (3) & (4). And filtered images. These values have been used to judge the performance of the adopted results of the original image. And preserved μ values constant. Another quality test has been carried on the selected regions of all noisy.

4. DISCUSSION

Tables Conclusion According to the quantitative measures given in Table.1, in which the mean, the STD homogenous, the adopted can be discussed as follows:

- We can see the increase over time based on the increase in sunlight

Even up to the highest value and return to the descent (on STD & σ), the reason towards the sun goes down, so the Red Green Blue beams Increases significantly when you increase the light of the sun and at the beginning of the down fall at moment of sunrise.

- For reign Red in the red space in image ,Table.2,as we know the red reign it is space have (RGB) (red ,green ,blue) band but the red band is greater. The change is depending on light of sun. We can see different in the result between image 1 & 2 it is so bigger because in is the time of the sun risen
- For reign green in the green space in image ,Table 3,as we know the green reign it is space have (RGB) (red ,green ,blue) band but the Green band is greater. The change is depending on light of sun. So the different in the result between image 1 & 2 it is so bigger because in is the time of the sun risen (but

less then red bend) that means the san is effect on red band more then green

- For reign blue in the blue space in image ,Table .4,as we know the blue reign it is space have (RGB) (red ,green ,blue) band but the blue band is greater. The change is depending on light of sun. So the different in the result between image 1 & 2 it is so bigger because in is the time of the sun risen (but less then red bend and more than blue) that means the san is effect on red band more than green & blue
- The Fig.9, we can see the reflection of different wave length (400, 428, 438,461,476,514,552,590.628, 666,704, and 742) nm, for one line in image 1 & 9. The image one is les resolution from image 9 because the light of sun in les then (Moment Sunrise) for all wave length. But the image 9 is great then.
- For three reign (RGB) space in image taken in different wave like 254&366. We can fine no different in the sum reign but there is different anther, that is meaning when we use one wave length to take image , this image still have the variant of probates of (RGB colure) .the Fig.12, we can see the histogram and the different between image properties
- It is noted the existence of the difference clear in histogram between the original of images taken at different times and the histogram of images after improvement mean filter .see the Fig.4&6,With note The disappearance of some packages in times of colorimetric and its appearance at other times based on the intensity and angle of light Source.

5. CONCLUSION

a. Some of bund color disappear when the intensity and angle of light fall change on the picture.

b. We can get the information for a color picture despite the use of a single wavelength of Photography because of the Image Save Information of reign (Red ,Green, Blue)

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