RESEARCH OF DIFFERENT COLOUR MODEL OF COLOR CHARACTERISTIC IN DIGITAL IMAGE

[1]WENGE CHEN，[2]XUELIN HUANG

[1]Zhejiang University of Science and Technology, Hangzhou China

ABSTRACT

In this paper, using MATLAB and Photoshop to digital photos and all sorts of color model of color characteristics are researched, and writes a small program through the digital image processing software MATLAB。According to the number of color information which reflects the same photo with different color model of the three-dimensional spectrum. Using Photoshop histogram to verify the practicality of three-dimensional spectra, which has certain value for handling the digital original manuscript.

Keywords: *Color Model; Color Characteristics; Three-Dimensional Spectra; Digital Image; Histogram*

1. INTRODUCTION

With the rapid development of digital photography, digital image has become the most important original printing manuscript. Digital image is in different color mode, because color reappearance principle is different, display color that there is a great difference [1,2].And this difference is not much different from the naked eye, but the final output will have a greater impact[3]. Therefore, this paper shoot a group of digital photo experiment through the digital camera, The photo are converted to RGB, CMYK, LAB, indexes and other modes using Photoshop[4]；And this paper using image processing software MATLAB to prepare a small program, which is used to read the photo and data according to data drawn 3d spectrum diagram[5,6]. Analyzing color characteristics of different color mode photos and using Photoshop software display image histogram to analyze different color mode characteristics. And verify the correctness of the 3d spectrum diagram [7,8] for the printing of digital original manuscript collection, processing and output the required color mode selection which provides the basis for it.

2. EXPERIMENT

Experimental conditions: Digital camera, model: DSC-W5，Shooting light source: Cloudy day natural light, Shooting object: flower, Shooting pixel: 1280×960，Shooting temperature: 30℃，Relative humidity: 70%；Software: Photoshop7.0, MATLAB 6.5.

3. EXPERIMENTAL METHOD

Digital photo shooting: Using a digital camera to shoot a group of flower photos, choose one of the better photo as the experimental figure, and using Photoshop to convert photo color mode, photos default to RGB mode, and these modes respectively are converted to CMYK, Lab, indexed, bitmap mode

4. EXPERIMENTAL RESULTS AND ANALYSIS

Experimental results. The adoption of digital camera get photos as shown below: RGB mode JPG format; In order to reach unanimity, all picture format are converted to TIF format.
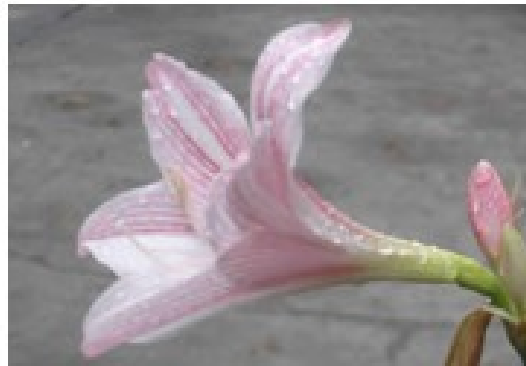

Figure1 Original Image

5. EXPERIMENTAL ANALYSIS

Figure2 RGB Model Image

Figure3 CMTK Model Image

Figure4 Index Model Image

Figure5 Lab Model Image

The color mode of figure 1 to figure 5 is different, but it's difficult for our eyes to distinguish these color difference and we must use image processing software or tools to identify. So in order to make eyes also can quickly judge that different color mode images with different color characteristics, writing a small program by using MATLAB software by reading the data of image and according to the data drawn images of three-dimensional spectrum. The images of color mode is different because coloring principle is different, color data is different also, the three-dimensional spectrum is different [8]. Small program is as follows:

```
P=imread('f:\1\RGB.tif');

[High, width, color] = size (P);

x=1: width;

y=1:high;

Mesh(x', y', double(P(:,:,1)));color bar;

Grid on,xlabel('x'),ylabel('y'),zlabel('z')

Title ('original figure ')
```

After the program runs, we can get three-dimensional spectrum of following color data:

Above figure 6 to the figure 10，the X and Y axes respectively represent the image size, the Z axis represents the color information. Above figure although it can be seen three-dimensional spectrum of figure 6 and figure 7 have a slight difference , but it is very similar. This is because the two color mode is RGB mode, only image format is a little different (jpg and tiff), so the color information is almost the same. From the figure can also be seen on the Z axis of maximum value is more than 200；while figure 8, figure 9 and figure 6 dimensional spectrum is obvious different in which figure 8 is a CMYK mode, Z-axis maximum value does not exceed 200, figure 9 is an index model. It is the greatest difference and the other figure from which we can see more color loss. Figure 10 is a Lab model three-dimensional spectrogram, rough look similar to figure 6, but the Z axis of the color information is different. In figure 6, the amount of information of three-dimensional spectrum more than 200 is more, in figure 10 almost no. Least amount of color information has also the same phenomenon. Therefore, from the three-dimensional spectrum can see color information quantity and distribution, as well as color information is different in same image. It provides help for the digital image of the in-depth study.

6. DIGITAL IMAGE HISTOGRAM PROCESSING

Baes on the above digital photos，it Shows the histogram in Photoshop and analyzing color characteristic based on histogram[5].Shown in Figure 11 to 15.
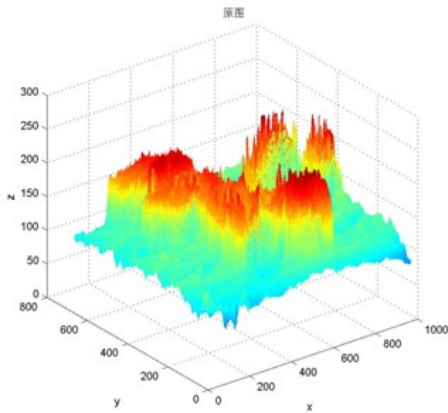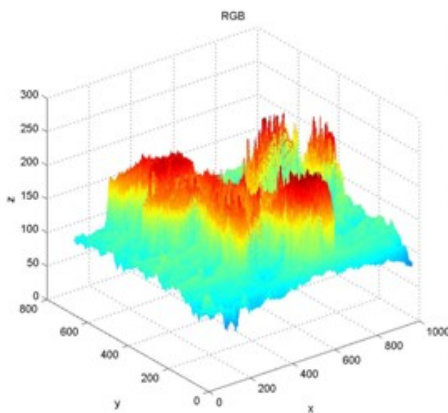

Figure6 Original Image Of Three-Dimensional Spectra

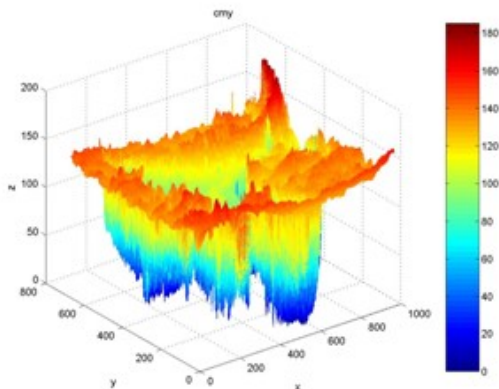*Figure7 RGB Model Of Three-Dimensional Spectra*

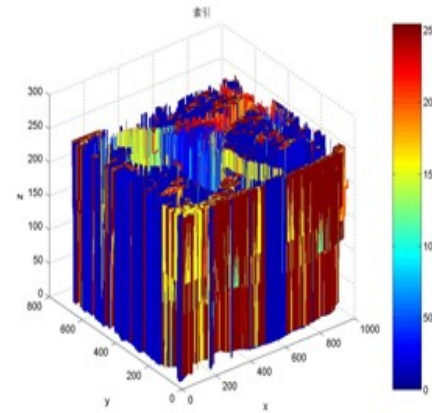*Figure8 CMYK Model Of Three-Dimensional Spectra*

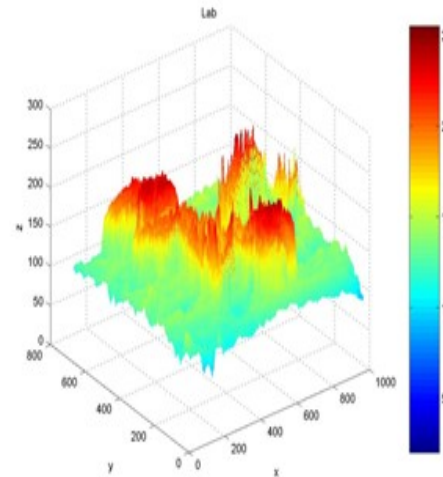*Figure9 Index Model Of Three-Dimensional Spectra*

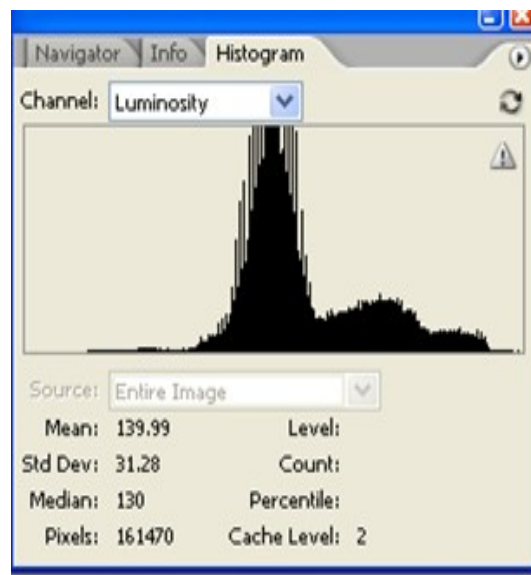

Figure10 Lab Model Of Three-Dimensional Spectra

Figure11 Original Image Of Histogram

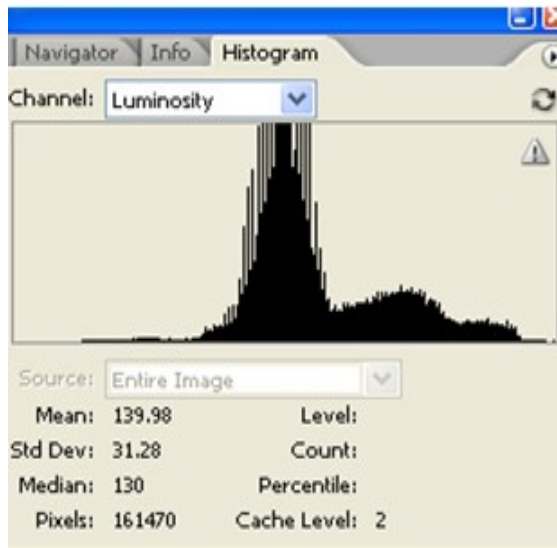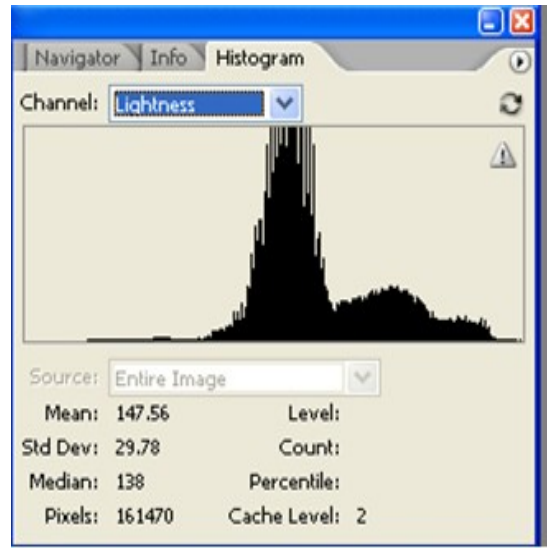*Figure12 RGB Of Histogram*
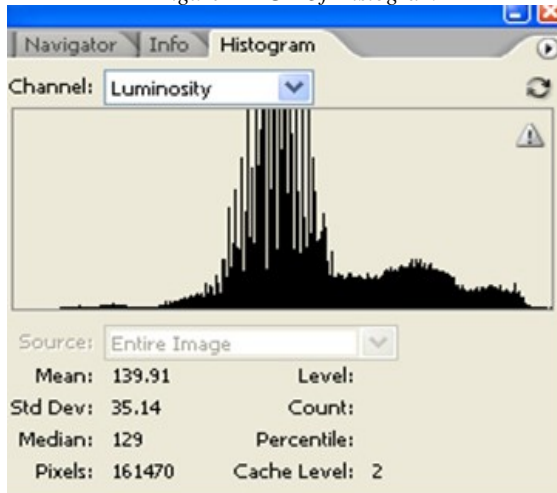

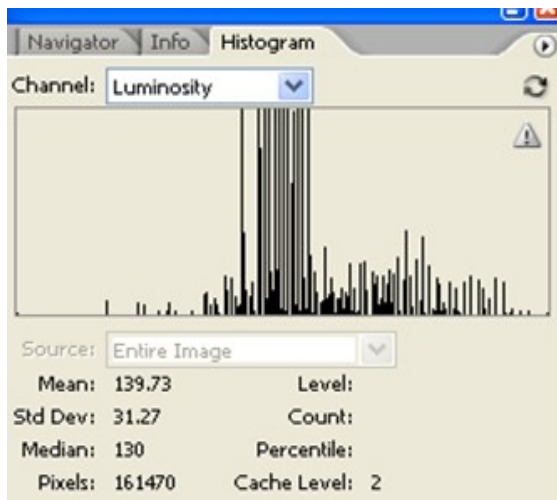*Figure13 CMYK Of Histogram*

Figure14 Index Of Histogram

Figure15 Lab Of Histogram

From the above several histograms we can see, Figure 11 and Figure 12 almost exists no difference, and the data of information content is the same, these figures and the above three dimensional spectrum figure are the same. Figure 13, figure 14，figure 15 and figure 11 except the pixel are 644916, despite histogram or data information are different. And especially histogram of figure 13 CMYK mode and figure 14 index mode are different. These figures and the above three dimensional spectrum figure are also the same. FromThe histogram, we can see, Figure 13 and figure 14 have gap, especially gap of the index mode histogram are larger. These gaps show the color information of image have produced loss, while there is no image histogram exists in RGB mode. Therefore, reading the image color information draw color three-dimensional spectrum figure that can be used to illustrate an image color characteristics and color loss.

7. CONCLUSION

In this paper, shooting a group of digital photo，using MATLAB software programming to display color information of three dimensional spectrum，the color characteristic of the same image in different color mode is different. Using the Photoshop histogram verifies the three-dimensional spectrum and the image relationship. In this paper，the image color information drawing three-dimensional spectrum to digital manuscript collection that has a certain guiding role.

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