

Exercise 5

1.

```
Mat src; // Define src as a matrix
src = imread(argv[1], CV_LOAD_IMAGE_COLOR); // Read the image
namedWindow( "Original image", CV_WINDOW_AUTOSIZE ); // set the
windows name
imshow( "Original image", src); //show the image

vector<Mat> input_planes(3); //define input_planes as a vector
split(src, input_planes); //split src into 3
Mat channel1_display, channel2_display, channel3_display;
    imshow("Red", input_planes[2]); //show the image
'red' in red channel
    imshow("Green", input_planes[1]); //show the image 'green'
in green channel
    imshow("Blue", input_planes[0]); //show the image blue in
blue channel
```

First split the three channels image into three separated one channel image, which are the output in the code. The red, green, blue output are three single channel image showed in Gray. The red is the most white, the blue is the second, and the green is the last.

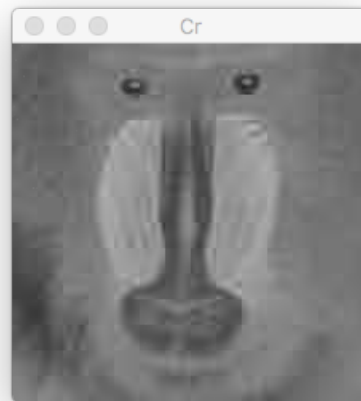
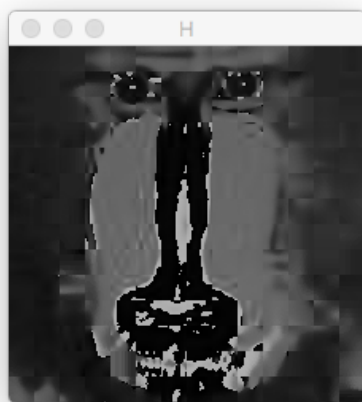
```
Mat ycrb_image;
cvtColor(src, ycrb_image, CV_BGR2YCrCb);
split(ycrb_image, input_planes);
    imshow("Y", input_planes[0]); //image in y channel
    imshow("Cb", input_planes[1]); //image in cb channel
    imshow("Cr", input_planes[2]); //image in cr channel
```

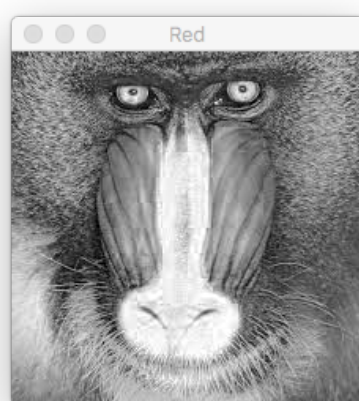
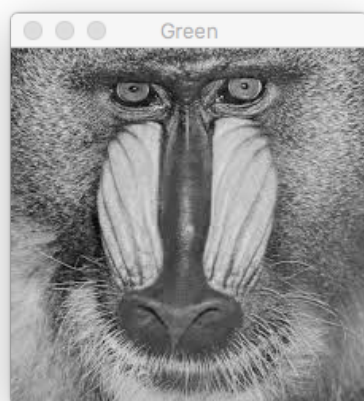
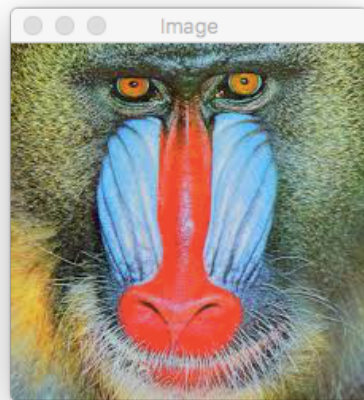
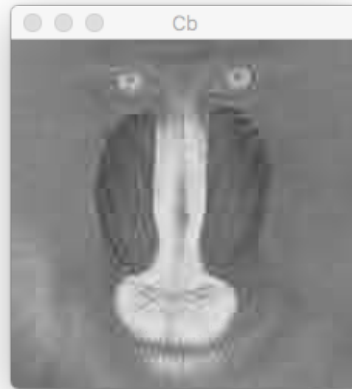
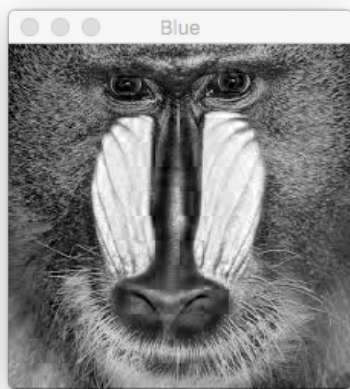
Then the function `cvtColor` is used to change the data we used in the previous function into other type of color code which is `CV_8GR2YCrCb` here. And the outputs show the different images we made. "Y" represents the lightness of the image. "Cb" represents the difference between red channel in previous function and "Y" channel. And the "Cr" represents the difference between "Y" channel and "blue" channel.

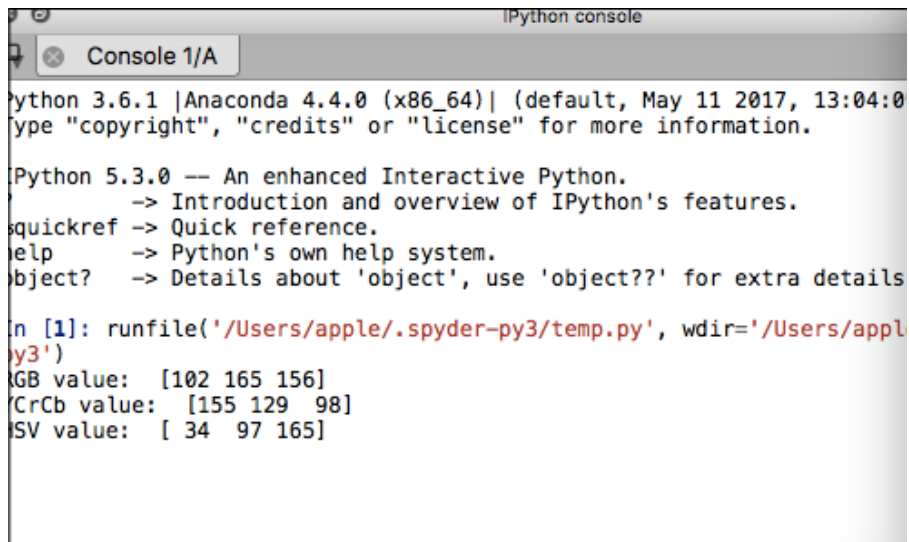
```
Mat hsv_image;
cvtColor(src, hsv_image, CV_BGR2HSV);
```

```
vector<Mat> hsv_planes(3);
split(hsv_image, hsv_planes);
    imshow("Hue",  hsv_planes[0]); //image in hue channel
    imshow("Saturation",  hsv_planes[1]); // image in
saturation channel
    imshow("Value",  hsv_planes[2]); // image in value channel
```

This time the code changes the color code to CV_BGR2HSV. And also the outputs show the different images we made. “Hue” channel represents the level of hue of the image. “Saturation” represents the level of saturation of the image. And the “value” means the level of darkness of the image.







```
IPython console
Console 1/A
Python 3.6.1 |Anaconda 4.4.0 (x86_64)| (default, May 11 2017, 13:04:00)
Type "copyright", "credits" or "license()" for more information.

Python 5.3.0 -- An enhanced Interactive Python.
-> Introduction and overview of IPython's features.
quickref -> Quick reference.
help      -> Python's own help system.
object?   -> Details about 'object', use 'object??' for extra details

In [1]: runfile('/Users/apple/.spyder-py3/temp.py', wdir='/Users/apple/.spyder-py3')
GB value: [102 165 156]
CrCb value: [155 129 98]
SV value: [ 34 97 165]
```

2.

The range will be 0~255