Firstly the program uses the code "imshow("Original image", src);"to import the image and transfer it as a image matrix src.

Secondly, the program defines the channel amount as 3 using the code vector<Mat> input_planes(3);"

Then the program splits the image matrix from three channel into three single channels using the code "split(src,input_planes);"so the image named "Original image" is an image with three single channels.

vector<Mat> input_planes(3);

split(src,input_planes);

Mat channel1_display, channel2_display, channel3_display;

    imshow("Red",   input_planes[2]);

    imshow("Green",   input_planes[1]);

    imshow("Blue",   input_planes[0]);

The images named "Red", "Green" and "Blue" are the single-channel images split from the three-channel image "Original Image" according to the channel red, channel green and channel blue. The reason why all these three are seems gray is because when a single channel is split，the other two single channels are set with the same values. So for example when the Red channel is split, the Green channel and the Blue channel are set with the same value as the Red channel, so there will be only gray(or black and white) shown. But in the picture that split by Red, if pixel looks more white than other pixels means it has more red than other pixels in the Original Image.

Mat ycrcb_image;

cvtColor(src, ycrcb_image, CV_BGR2YCrCb);

split(ycrcb_image,input_planes);

    imshow("Y",   input_planes[0]);

    imshow("Cb",   input_planes[1]);

    imshow("Cr",   input_planes[2]);

Then the program split the Original Image according to YCrCb. Y means luminance, Cr means red offset component in the image and Cb means blue offset component in the image.

Mat hsv_image;

cvtColor(src, hsv_image, CV_BGR2HSV);

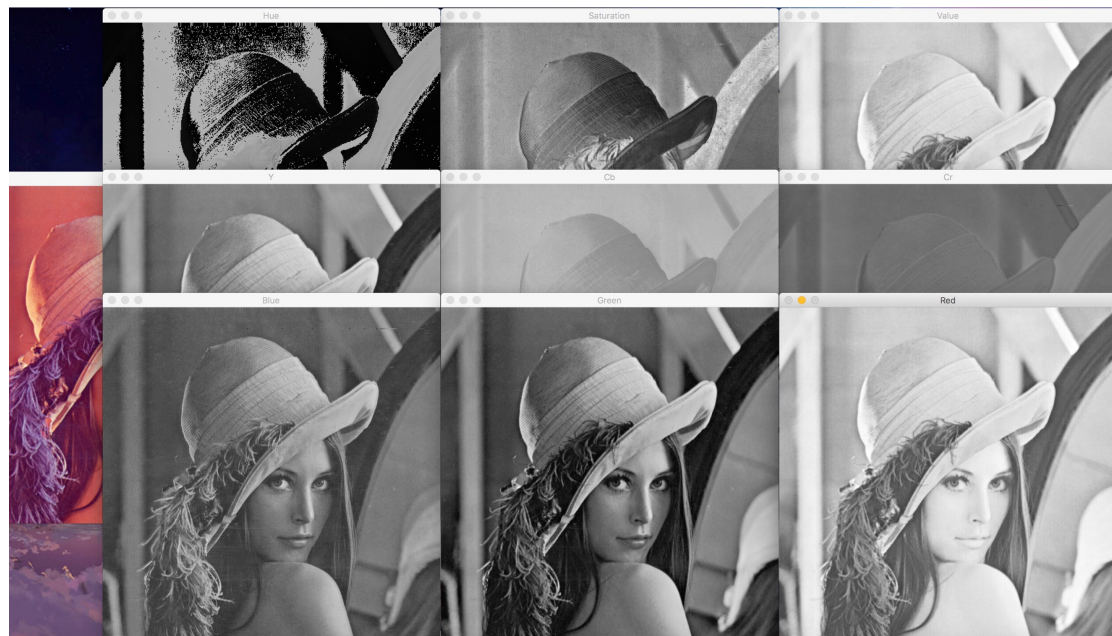vector<Mat> hsv_planes(3);

split(hsv_image,hsv_planes);

     imshow("Hue",   hsv_planes[0]);

     imshow("Saturation",   hsv_planes[1]);

     imshow("Value",   hsv_planes[2]);

HSV also a kind of 3-D colorspace to describe images. H means hue，type of color. S means saturation, or chromatic purity, freedom from dilution with white and hence vivid in hue. V means value，the greater V is, the darker the image will be.

And this is the result of running the python in Exercise 2:

The ranges of pixel values in each channel of each of the above mentioned colorspaces is 0 to 255.