**Exercise 1:**

We can use CV-MAT-ELEM, and the cvGetRealXD( ) function to read objects. This method can only visit one dimensional and two dimensional objects. Although this method is simple, it is not effective enough to deal with high intensity computation.

We can also use pointers to visit elements in cvMat object. This method could visit n-dimensional matrix and it is more effective than the previous one.

The order of pixel structure is cvMat\* cvCreateMat ( int rows, int cols, int type ), rows and columns helps to find the pixel and type indicates the predefined type: CV <bit depth>(SjUjF) C<number of channels>.

**Exercise 2:**

1. The first image is the original image of Lenna.

The second image shows the intensity of red in the original image.

The third image shows the intensity of green in the original image.

The fourth image shows the intensity of blue in the original image.

The fifth one shows the luma component of the Lenna.jpg

The sixth and seventh image shows the blue-difference and red difference chroma components of the original image.

The eighth shows the angular dimension from red primary to the blue primary.

The ninth shows the closeness of the color to the spectrum color.

The last one shows the brightness of the color.

1. Sorry, I used the whole weekend to setup the environment of OpenCv, but either my Win10 or Ubuntu16.04 couldn’t work, so I can’t run my code, then I can’t answer this question.

**Exercise 4:**

1. The first image shows the original Lenna.jpg.

The second image shows image that the threshold is over 127 and the contrast is decreased.

The third image shows the image with only black and white pixels.

The fourth image shows opposite image of the third one with all white pixels turned to black and vice versa.

The semi threshold calculates the threshold between high value and low value.

The adaptive method divides the image into parts and calculates the threshold individually

1. Binary threshold only shows the white and black pixels and do not have gray scale considered, thus, the color shades would lose and lots of information are lost.
2. Adaptive Threshold could be useful when we want to extract some specific information from an image yet the single threshold is not enough.