Homework #1 – Color Transform

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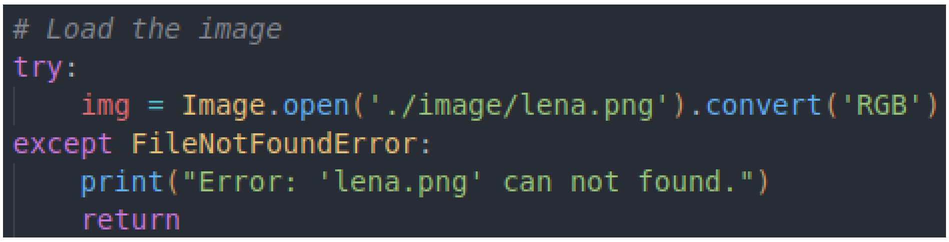
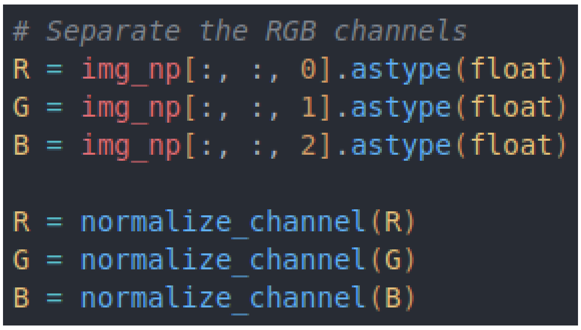
Code

Load image with Pillow package



```python
# Load the image
try:
    img = Image.open('./image/lena.png').convert('RGB')
except FileNotFoundError:
    print("Error: 'lena.png' can not found.")
    return
```

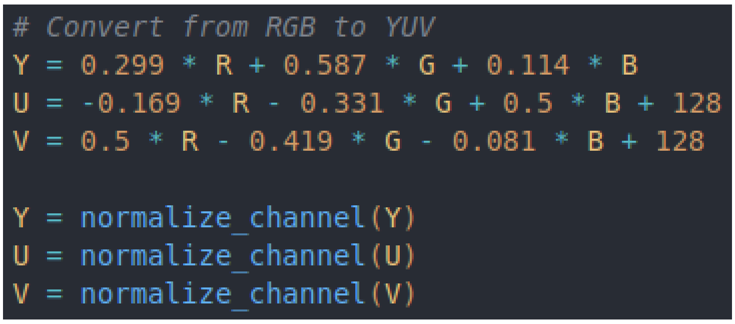
Separate the RGB channels



```python
# Separate the RGB channels
R = img_np[:, :, 0].astype(float)
G = img_np[:, :, 1].astype(float)
B = img_np[:, :, 2].astype(float)

R = normalize_channel(R)
G = normalize_channel(G)
B = normalize_channel(B)
```

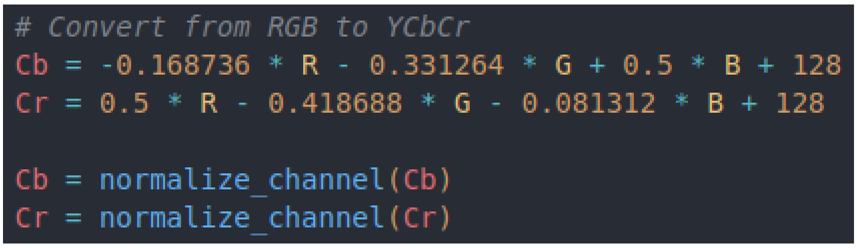
Convert from RGB to YUV



```python
# Convert from RGB to YUV
Y = 0.299 * R + 0.587 * G + 0.114 * B
U = -0.169 * R - 0.331 * G + 0.5 * B + 128
V = 0.5 * R - 0.419 * G - 0.081 * B + 128

Y = normalize_channel(Y)
U = normalize_channel(U)
V = normalize_channel(V)
```

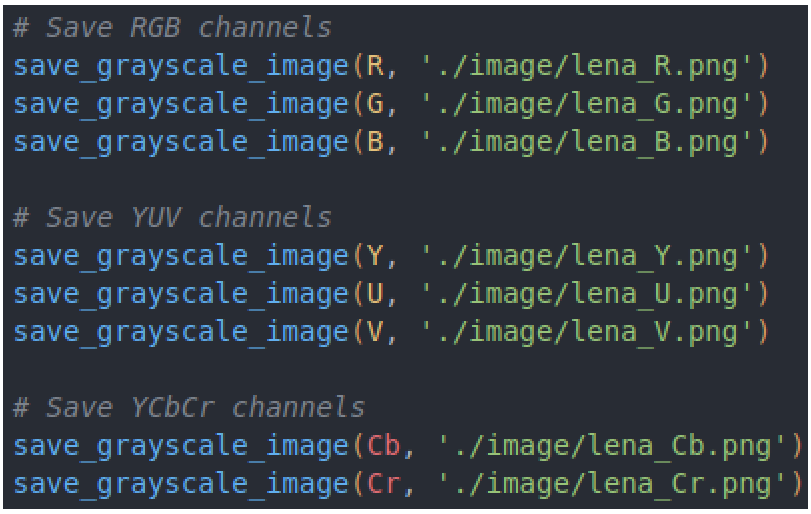
Convert from RGB to YCbCr



```
# Convert from RGB to YCbCr
Cb = -0.168736 * R - 0.331264 * G + 0.5 * B + 128
Cr = 0.5 * R - 0.418688 * G - 0.081312 * B + 128

Cb = normalize_channel(Cb)
Cr = normalize_channel(Cr)
```

Save images

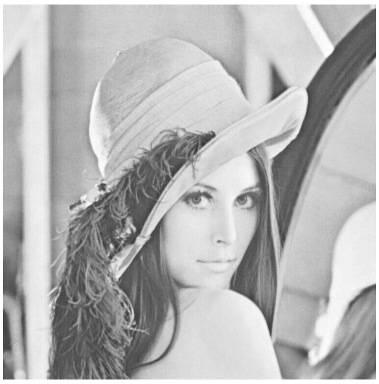
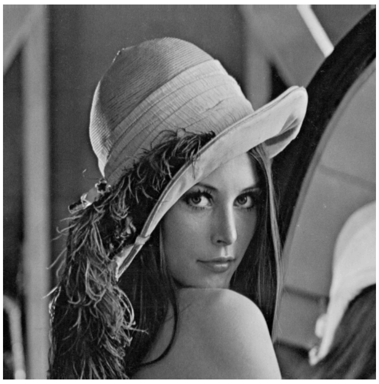
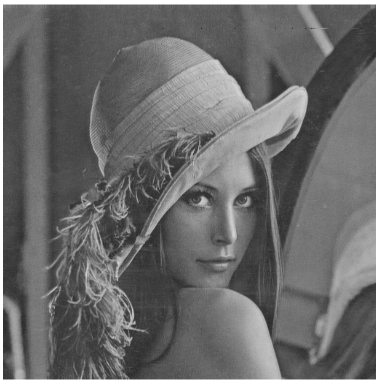
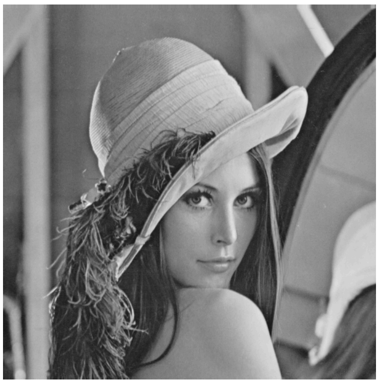
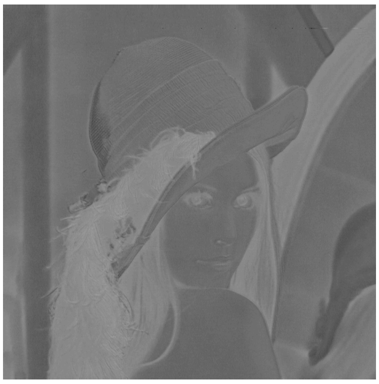
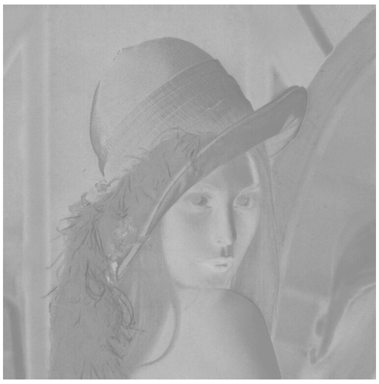


```
# Save RGB channels
save_grayscale_image(R, './image/lena_R.png')
save_grayscale_image(G, './image/lena_G.png')
save_grayscale_image(B, './image/lena_B.png')

# Save YUV channels
save_grayscale_image(Y, './image/lena_Y.png')
save_grayscale_image(U, './image/lena_U.png')
save_grayscale_image(V, './image/lena_V.png')

# Save YCbCr channels
save_grayscale_image(Cb, './image/lena_Cb.png')
save_grayscale_image(Cr, './image/lena_Cr.png')
```

Result

R	G	B
		
Y	U	V
		
Original	Cb	Cr