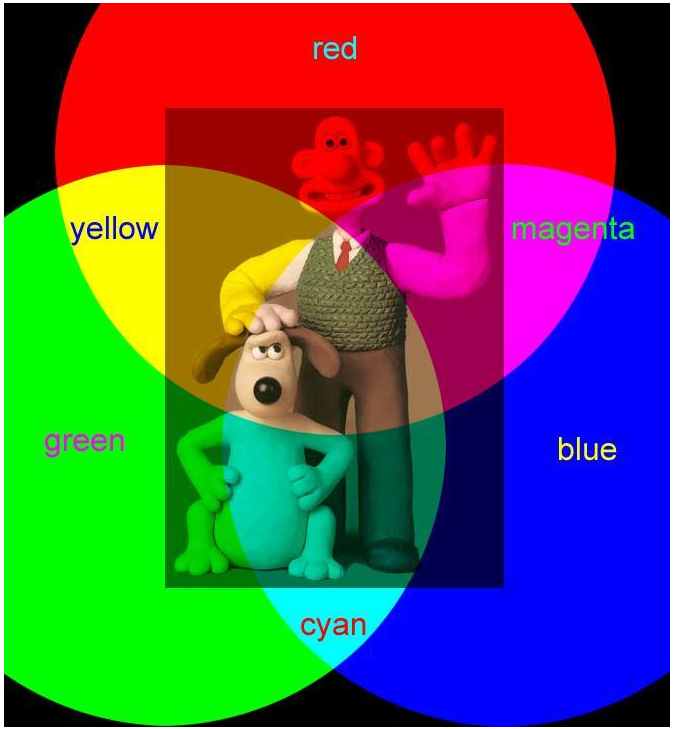
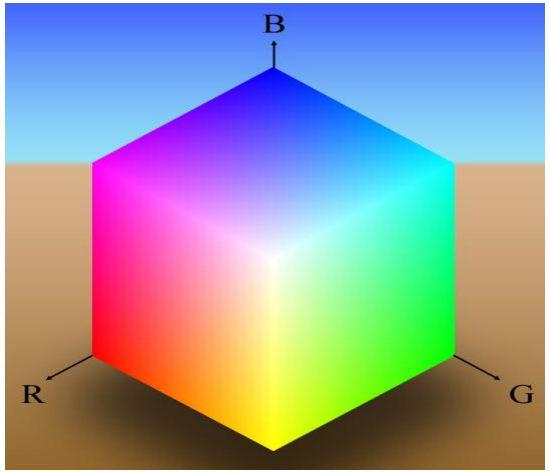
Renk Uzayları

Color Spaces

Renk

Tüm renler üç temel renk ile elde edilebilir.

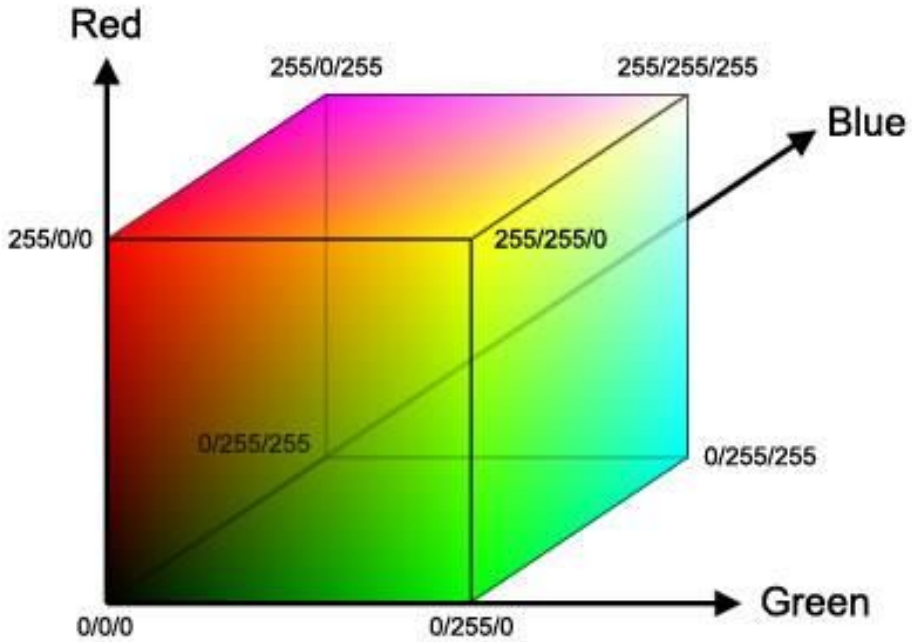




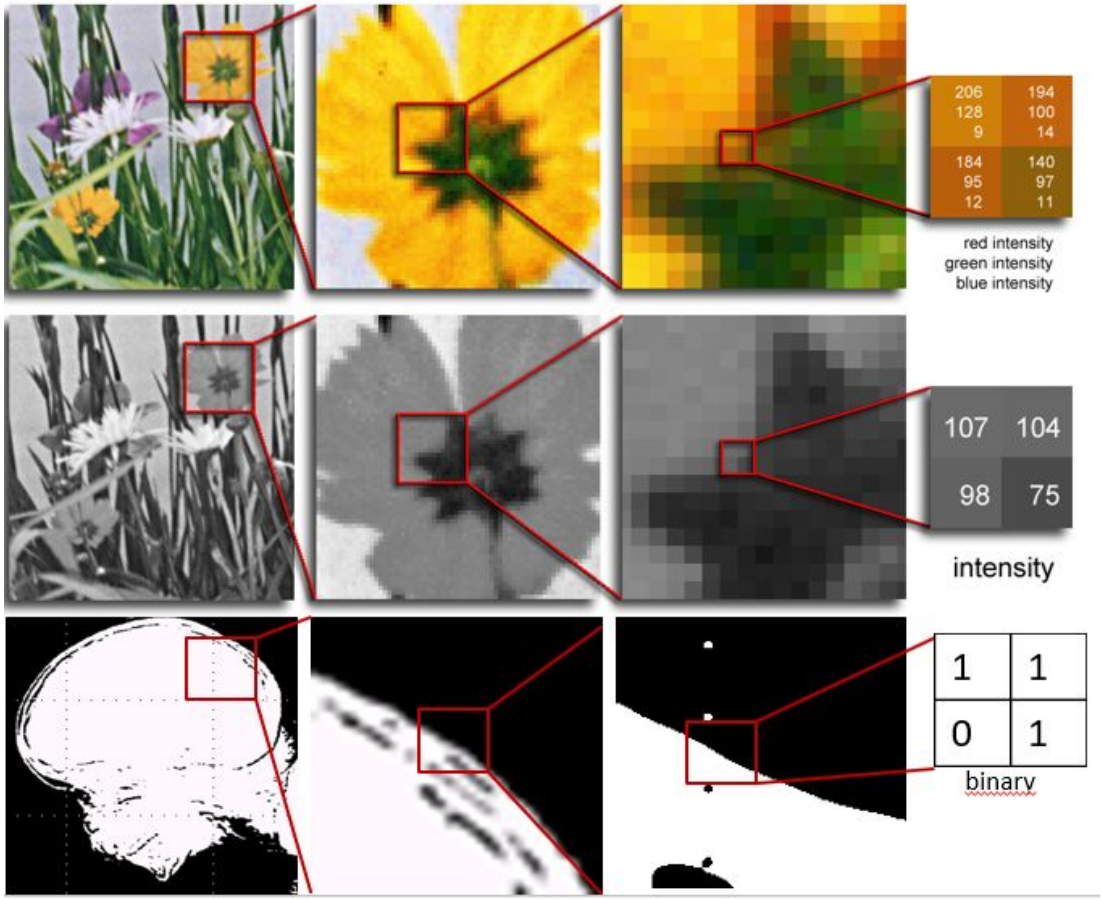
- Her bir renk 8-bits (0-255) ile ifade edilir.
- Negatif değerli renk olmaz.
- 8 bitlik renk uzayı küpünde

256^3 = 16,777,216 renk vardır.

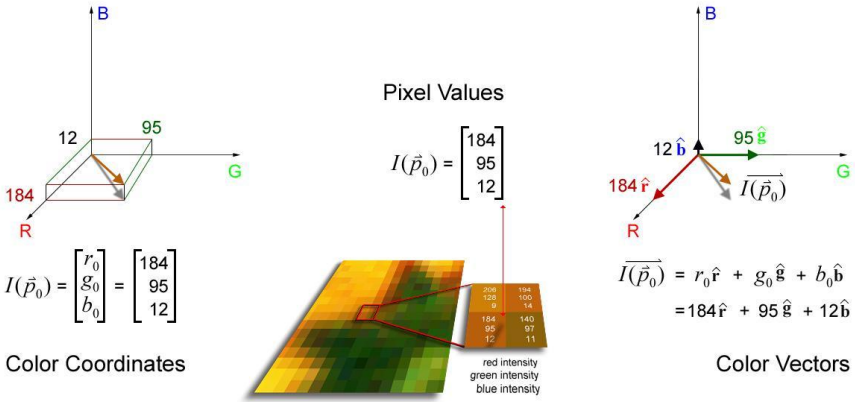
RGB- Red, Green, Blue

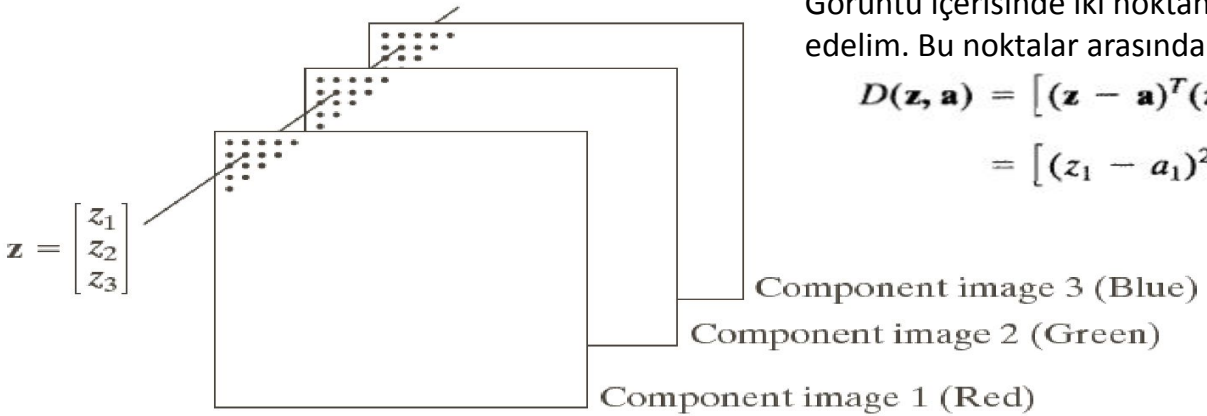


RGB, Gray, Binary



İki piksel arası uzaklık





Görüntü içerisinde iki noktanın renk değerlerini **z** ve **a** olarak ifade edelim. Bu noktalar arasındaki **Öklid uzaklığı:**

$$D(\mathbf{z}, \mathbf{a}) = \left[(\mathbf{z} - \mathbf{a})^T(\mathbf{z} - \mathbf{a})\right]^{\frac{1}{2}}$$

$$= \left[(z_1 - a_1)^2 + (z_2 - a_2)^2 + \cdots + (z_n - a_n)^2\right]^{\frac{1}{2}}$$

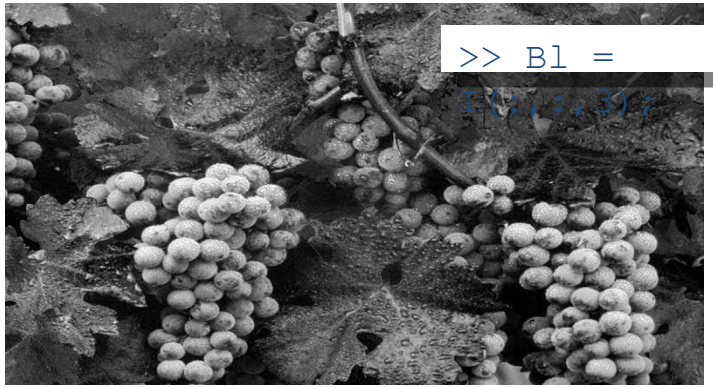
R,G,B Kanallar

```
>> I =
imread('blue_grapes_sm.jpg');
```

```
>> Rd =
I(:,:,1);
```

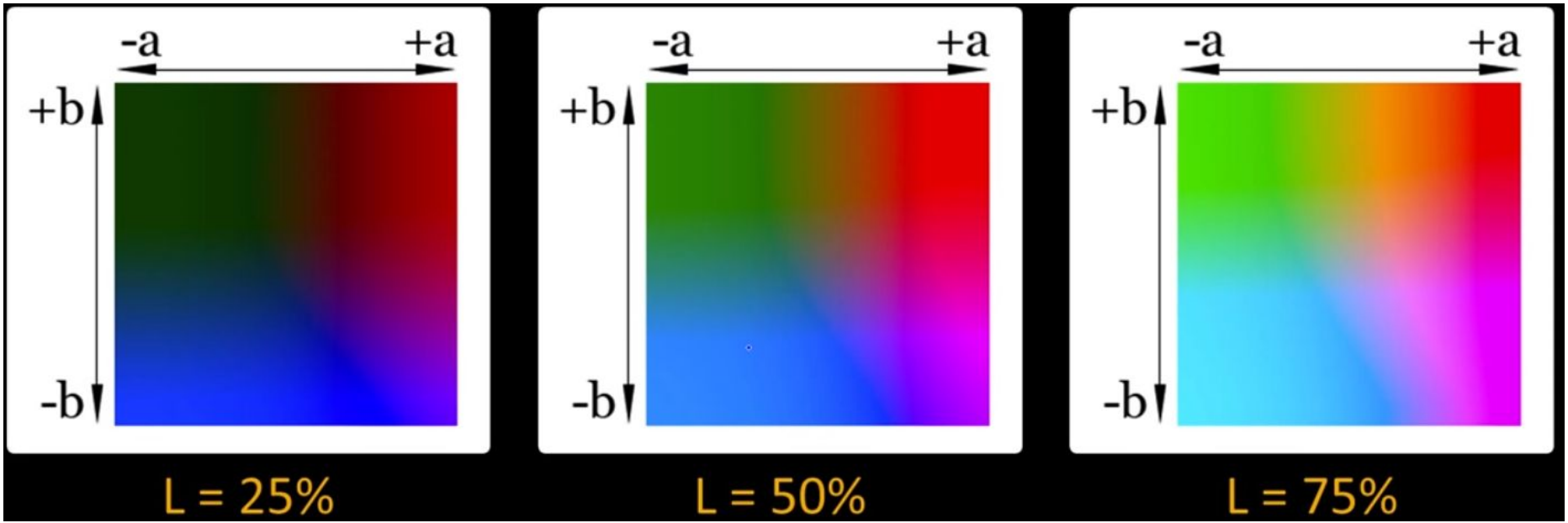
```
>> Gn =
I(:,:,2);
```

```
>> Bl =
I(:,:,3);
```

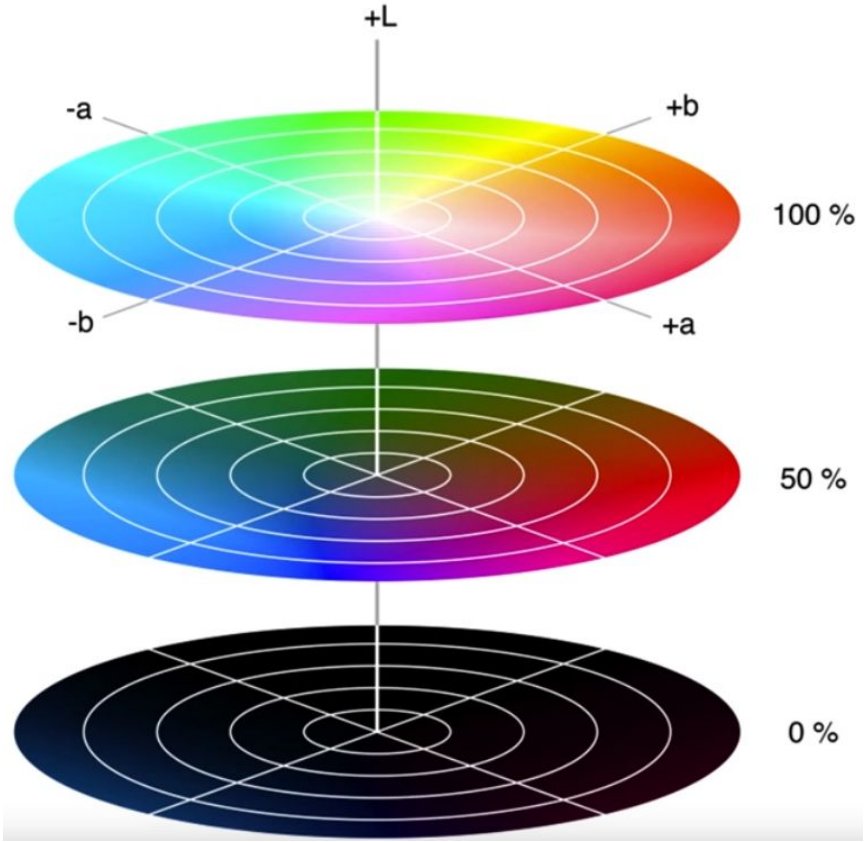


L * a * b renk uzayı

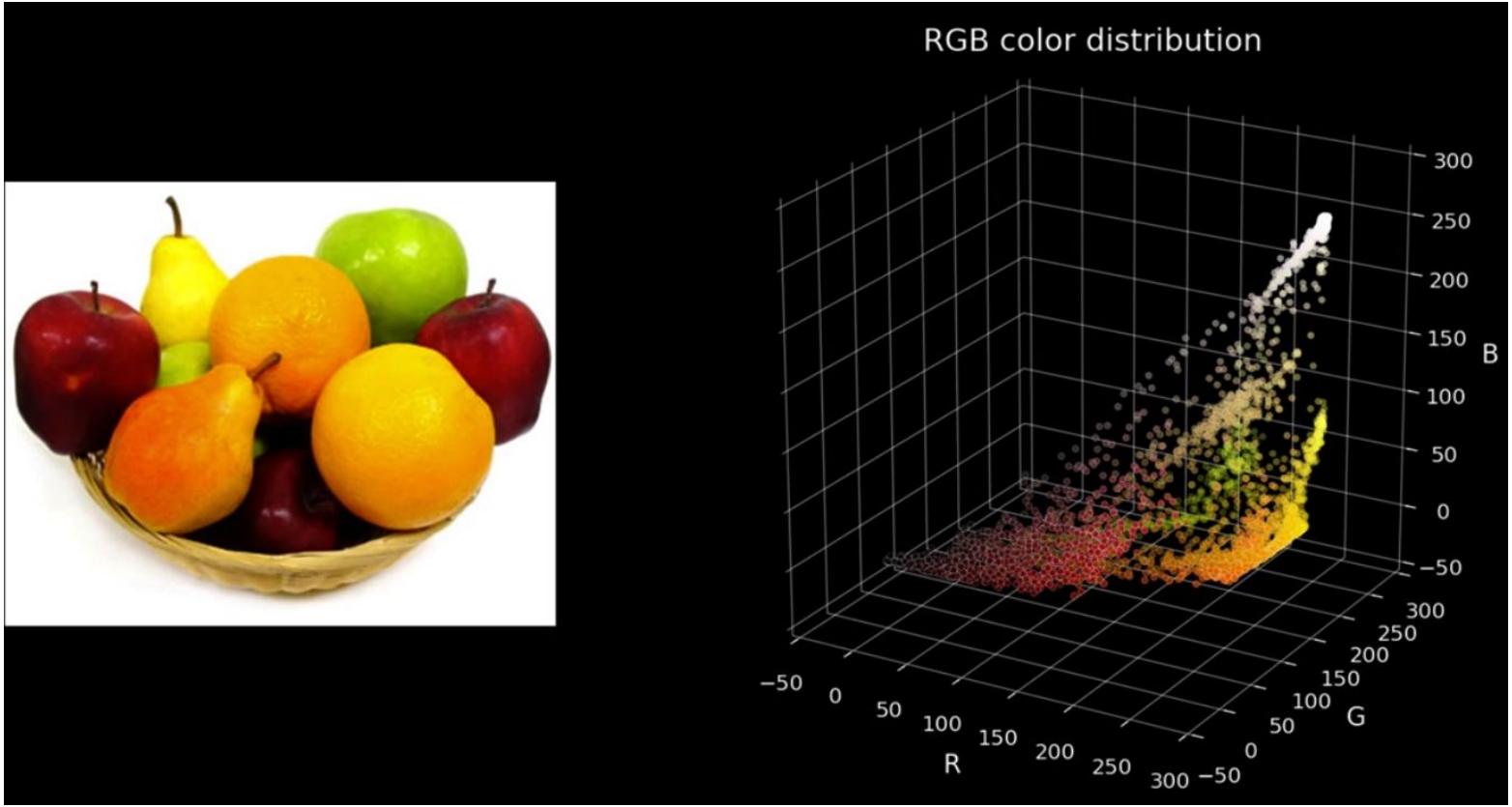
L: Parlaklık
a ve b : İlgili rengi elde etmek için kullanılır.



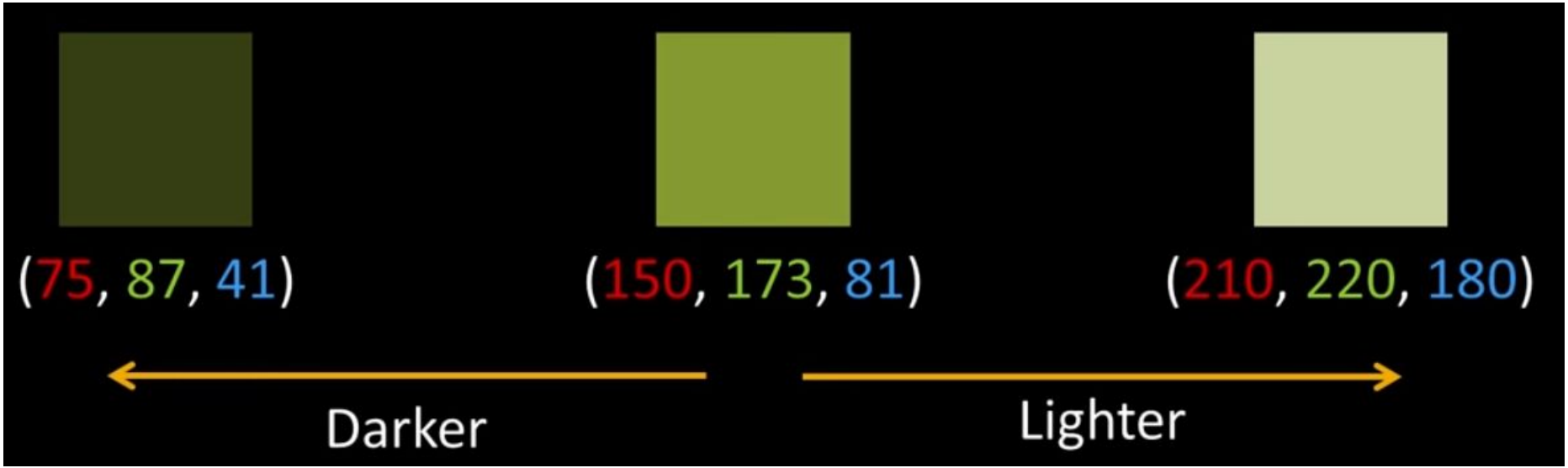
L * a * b renk uzayı (silindirik görüş)



Renk dağılımı



Parlaklık rengi nasıl değiştirir?



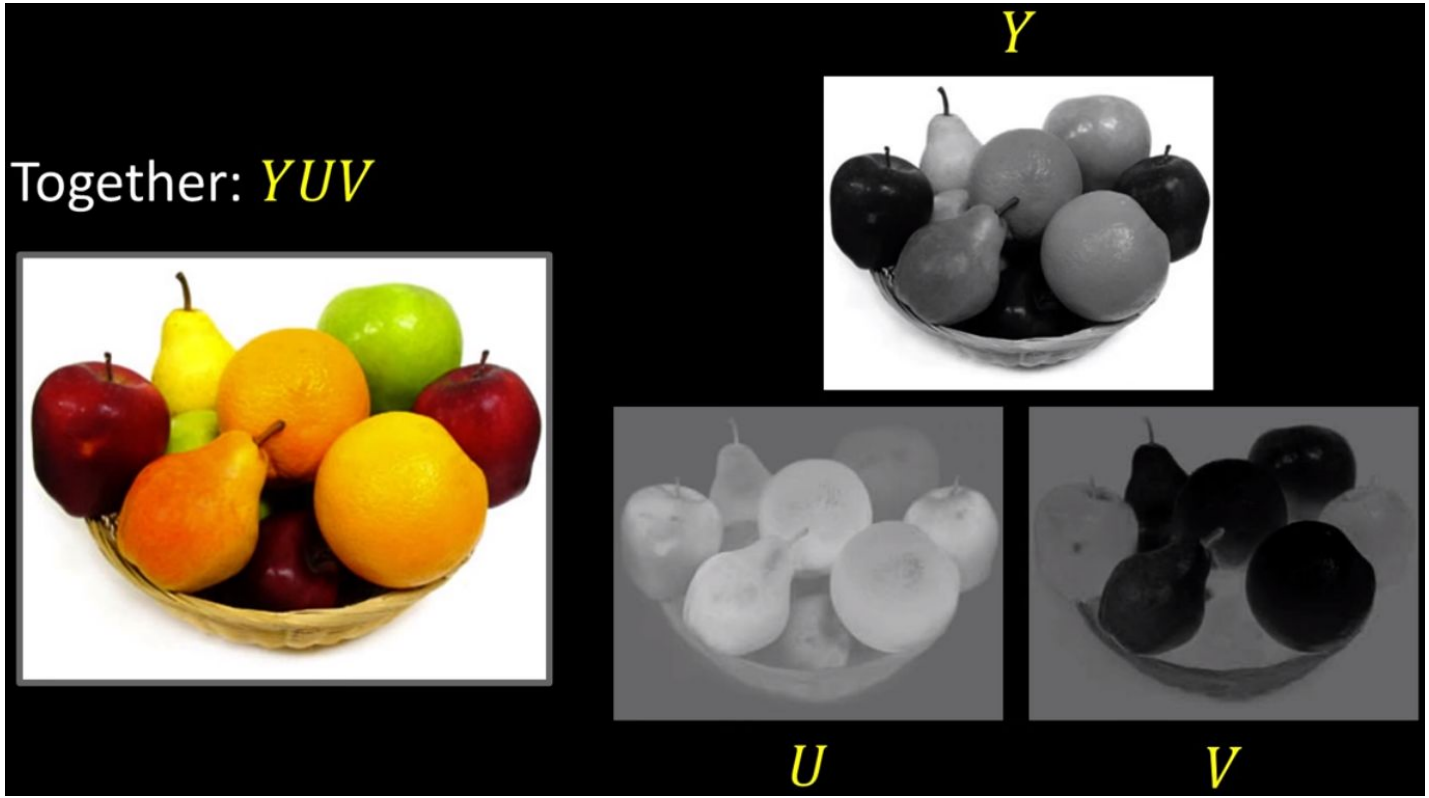
Renk ile ışık yoğunluk bilgisini nasıl ayırabiliriz? YUV renk uzayı

$$Y = 0.299*R+0.587*G+0.114*B$$

$$U = U_{max}\frac{B-Y}{1-W_B} \approx 0.492 \times (B-Y)$$

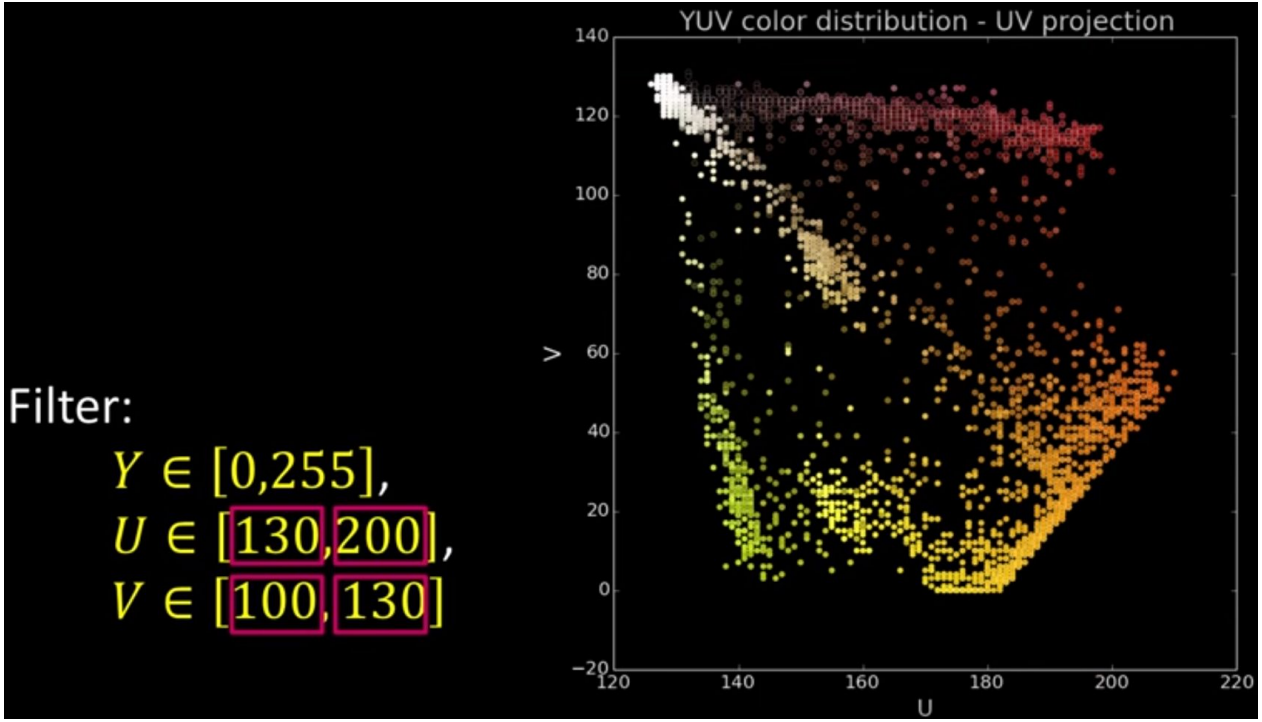
$$V = V_{max}\frac{R-Y}{1-W_R} \approx 0.877 \times (R-Y)$$

YUV

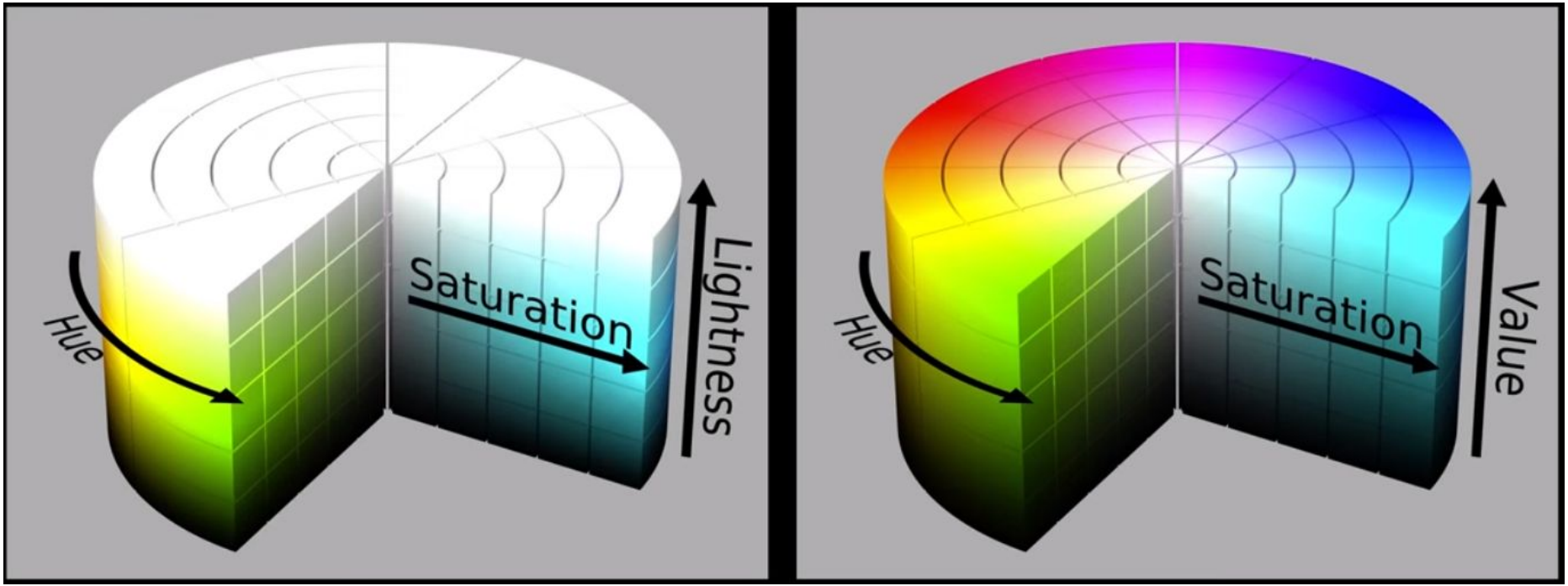


YUV da kırmızıyı nasıl filtreleriz?

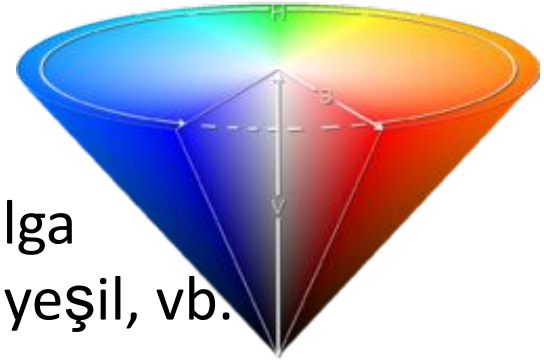
U ve V ye izdüşüm alındıktan sonra filtre uygulanır.



HSL - HSV



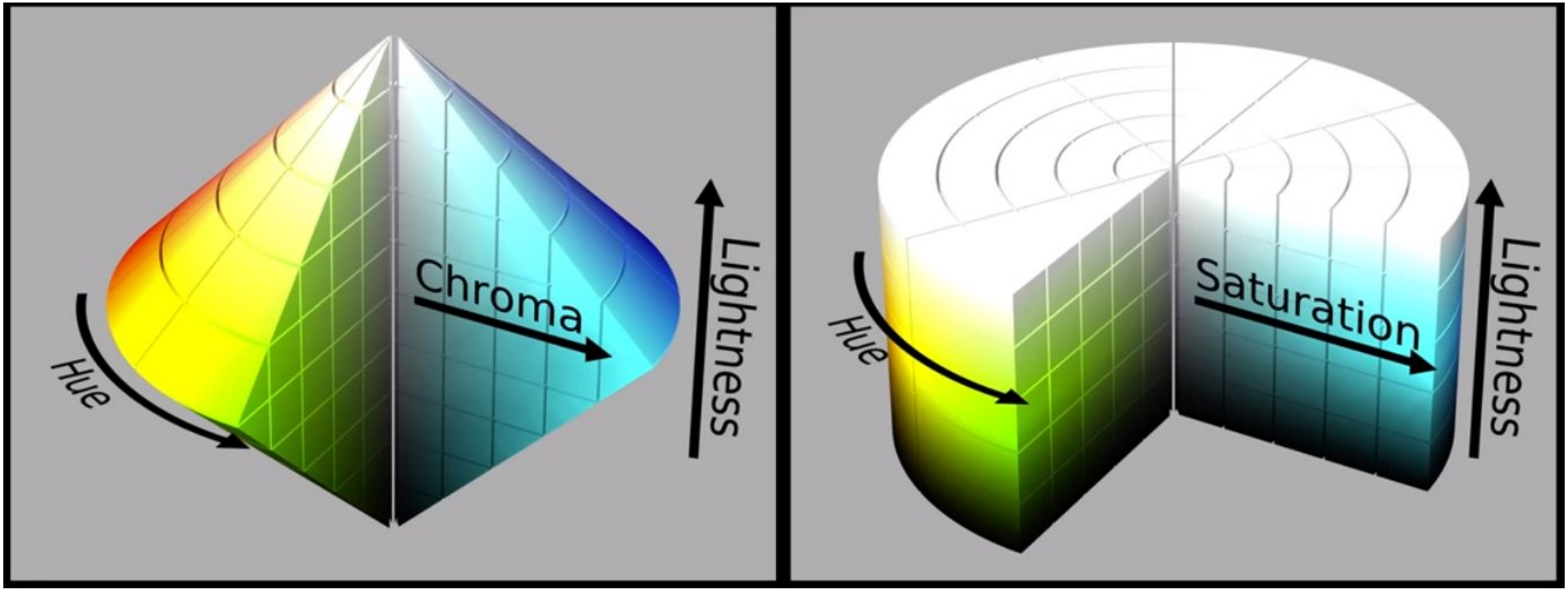
HSV - **H**ue, **S**aturation, **V**alue



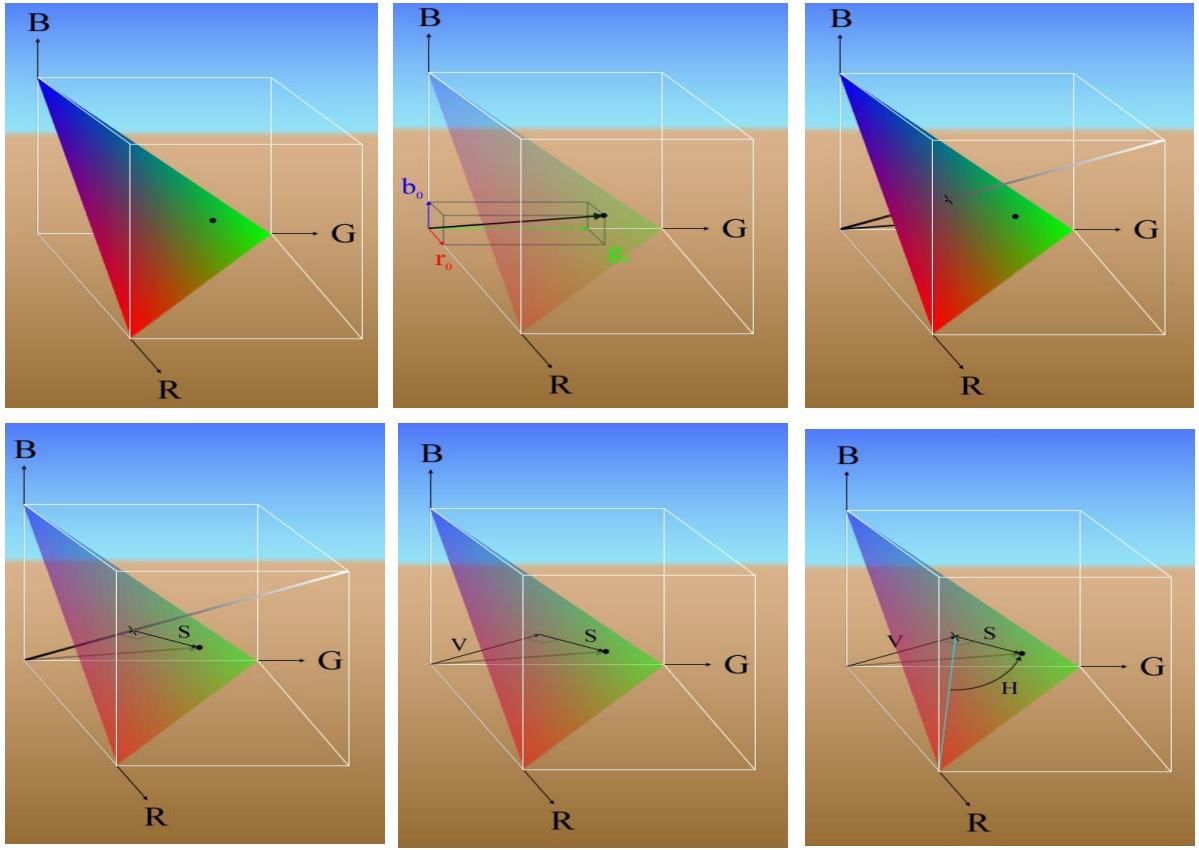
- **H**ue (Renk tonu -özü) : Rengin baskın dalga uzunluğunu belirler, örneğin sarı, mavi, yeşil, vb. Açısal bir değerdir 0° - 360°.
- **S**aturation (Doygunluk) : Rengin "canlılığını" belirler. Yüksek doygunluk canlı renklere neden olurken, düşük olasılık rengin gri tonlarına yaklaşmasına neden olur.
- **V**alue (Parlaklık) : Rengin aydınlığını yani içindeki beyaz oranını belirler.

Dikkat: Renk bilgisi RGB'de 3, Lab'da 2, HSV'de bir kanalla ifade edilir.

Favori renk uzayı



RGB→HSV



$$M = \max(R, G, B)$$
$$m = \min(R, G, B)$$
$$C = M - m$$

$$H' = \begin{cases} \text{undefined}, & \text{if } C = 0 \\ \frac{G-B}{C} \mod 6, & \text{if } M = R \\ \frac{B-R}{C} + 2, & \text{if } M = G \\ \frac{R-G}{C} + 4, & \text{if } M = B \end{cases}$$

$$H = H'/6$$

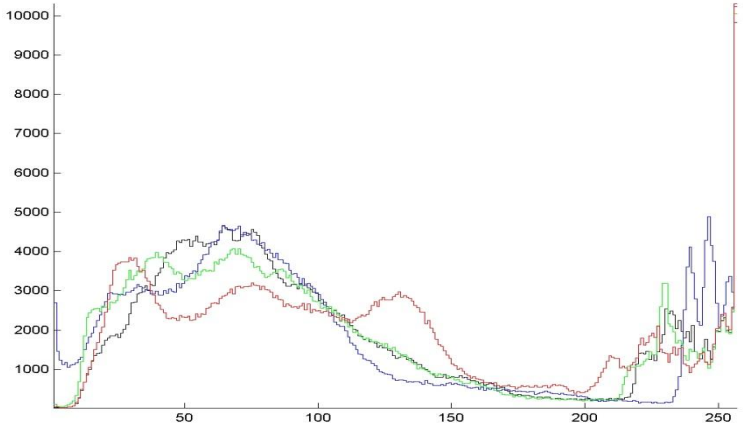
$$V = M$$

$$S_{HSV} = \begin{cases} 0, & \text{if } V = 0 \\ \frac{C}{V}, & \text{otherwise} \end{cases}$$

HSV- H bandı

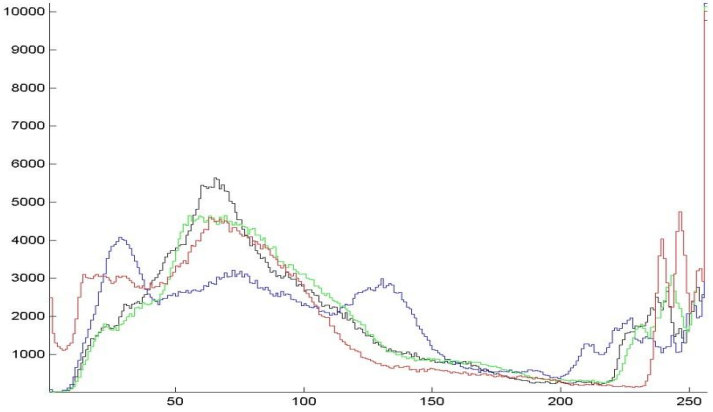
orijinal

R → R
Y → Y
G → G
C → C
B → B
M → M



hue + 180°

R → C
Y → B
G → M
C → R
B → Y
M → G



HSV- S bandı

orijinal

saturation + %50

saturation - %50