

# A review on image processing

**Ali Kohan**

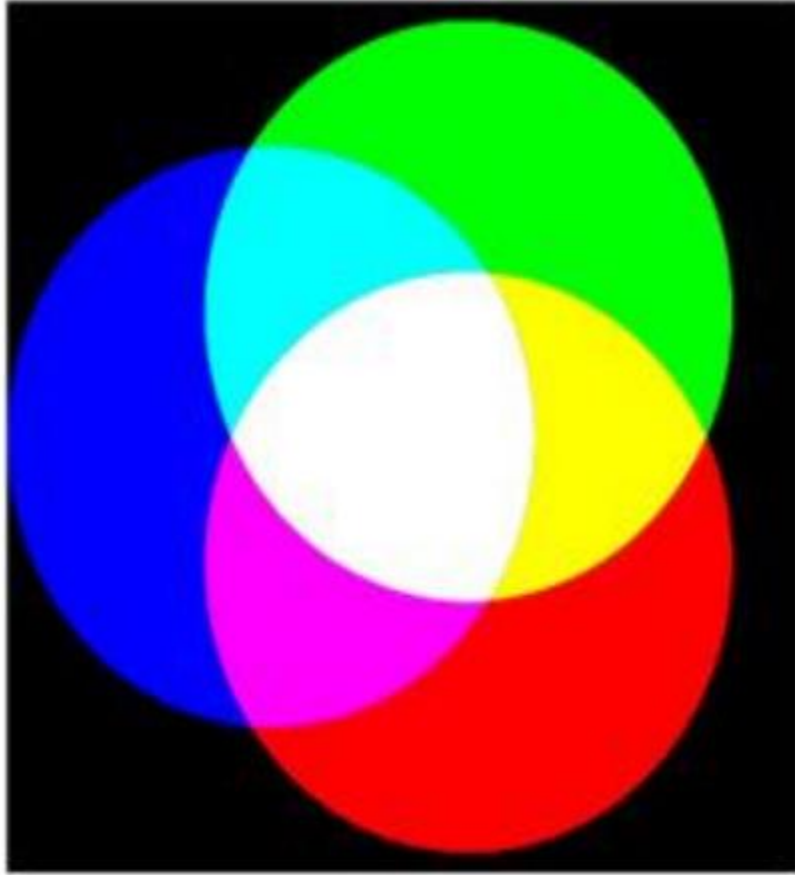


[Github.com/alikohan](https://github.com/alikohan)

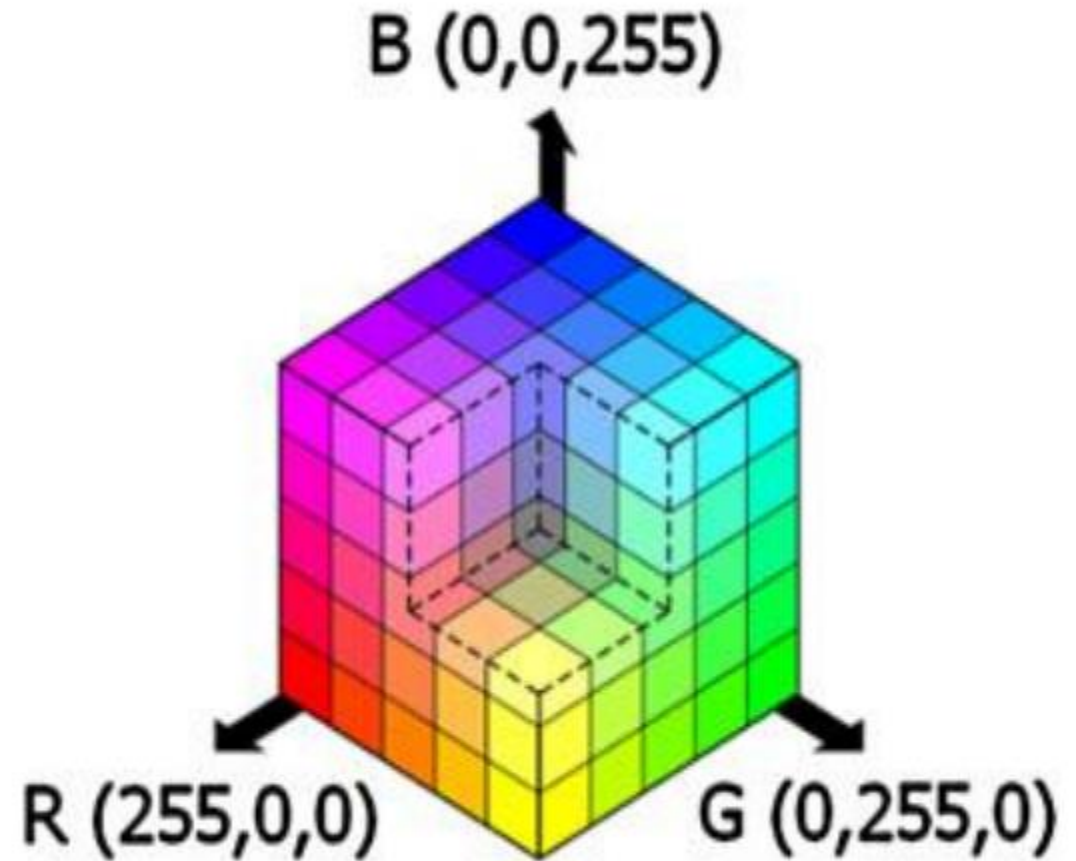


[linkedin.com/in/alikohan/](https://linkedin.com/in/alikohan/)

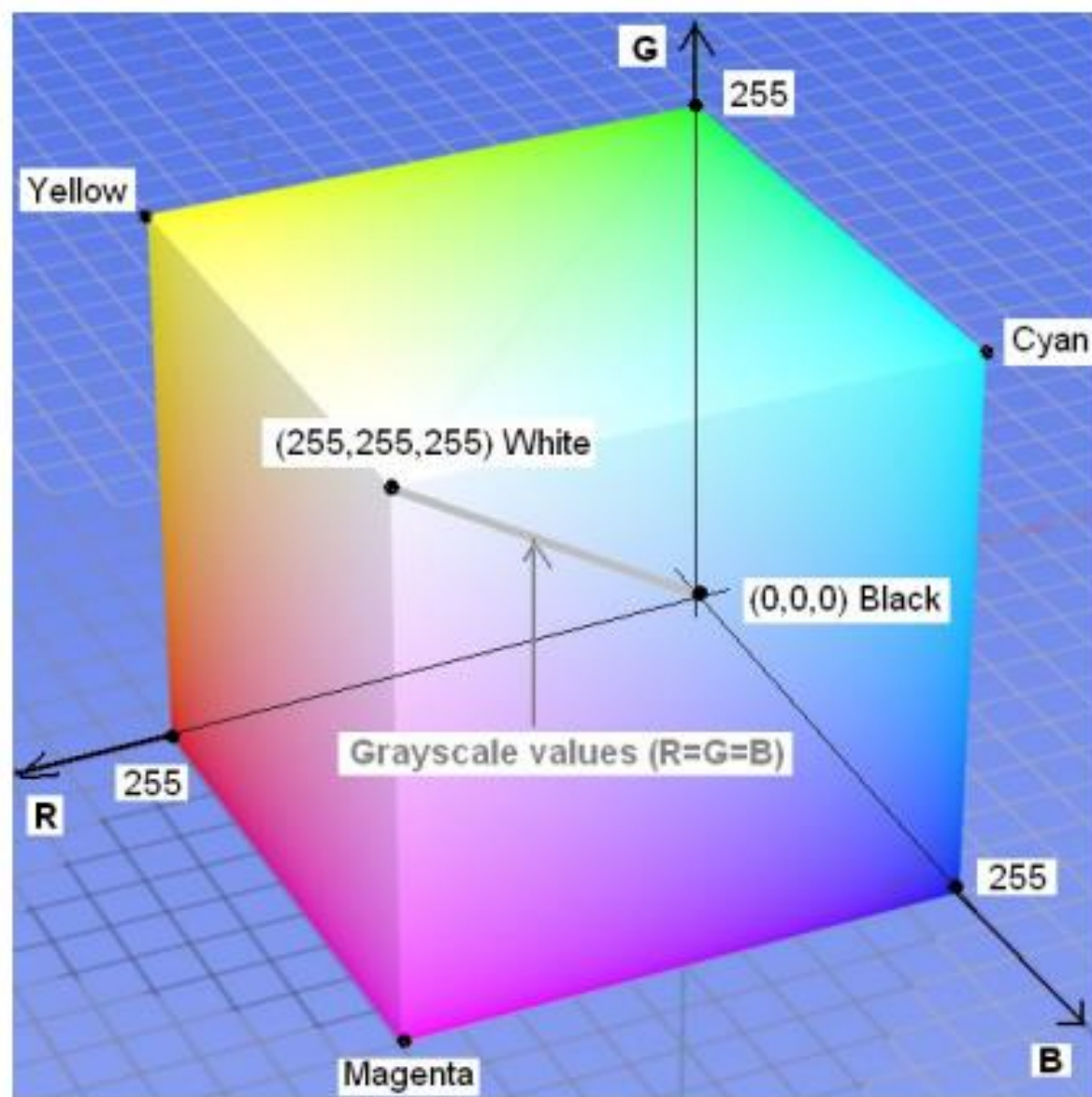
# RGB color space



(a)

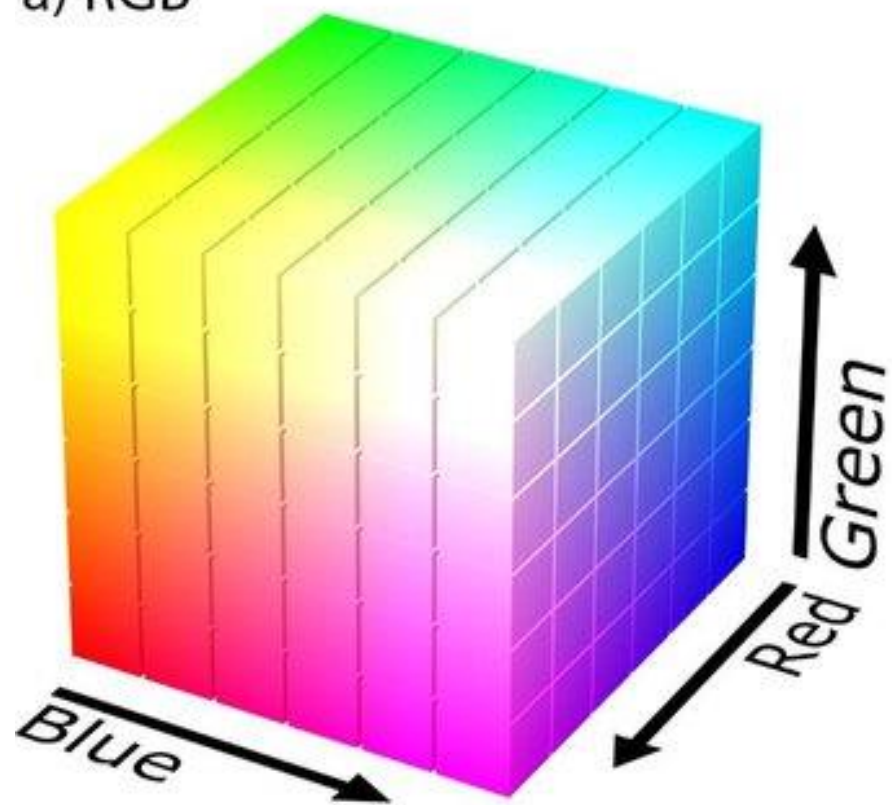


(b)

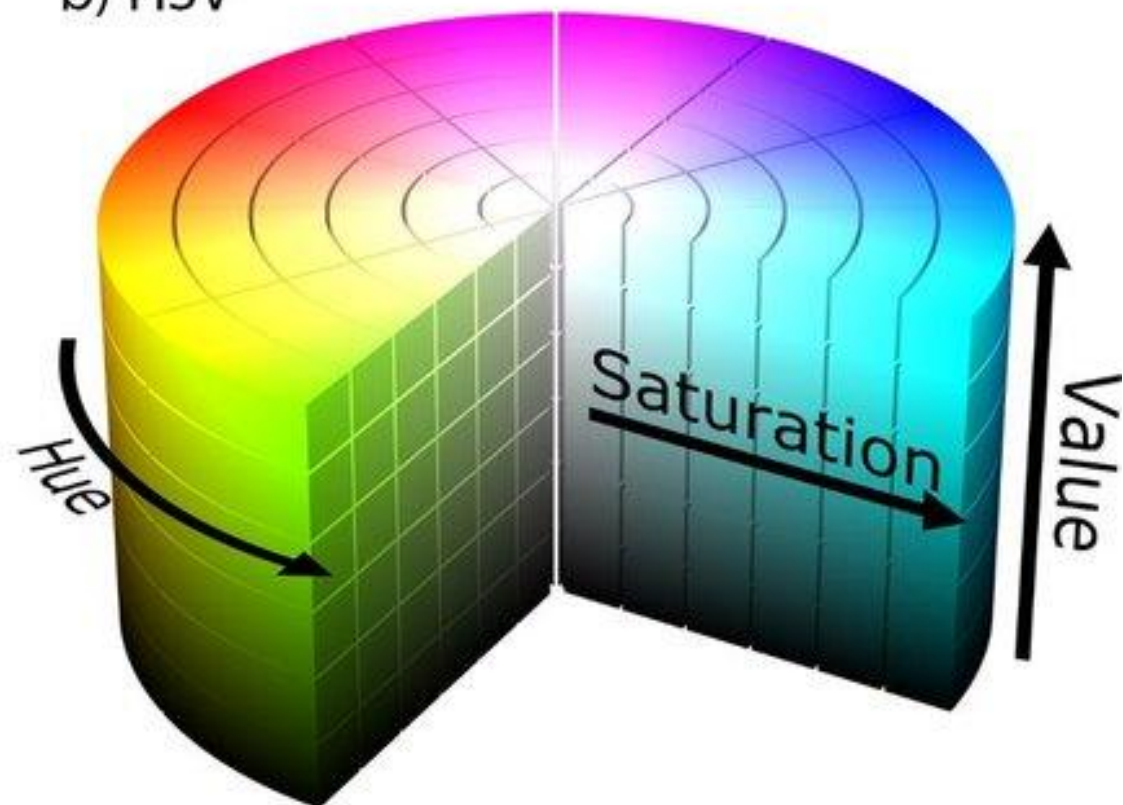


**Fig. 2.3.** The RGB color space mapped on a cube. Here, each color axis is represented on 8 bits (256 levels) (RGB24 bitmap images). The total number of colors is  $2^8 \times 2^8 \times 2^8 = 2^{24} = 16,777,216$ .

a) RGB

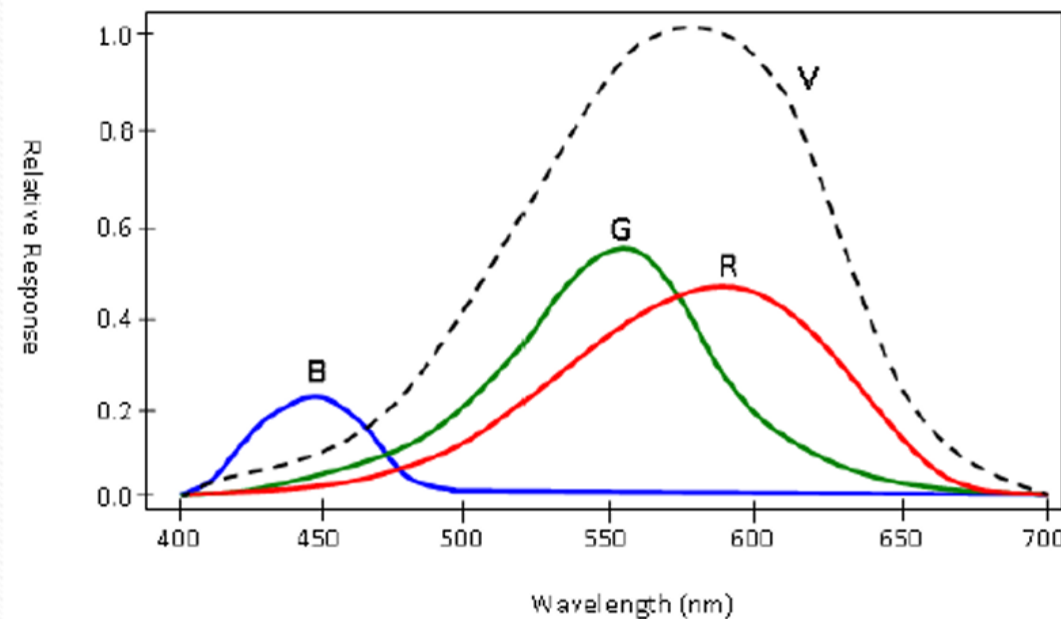


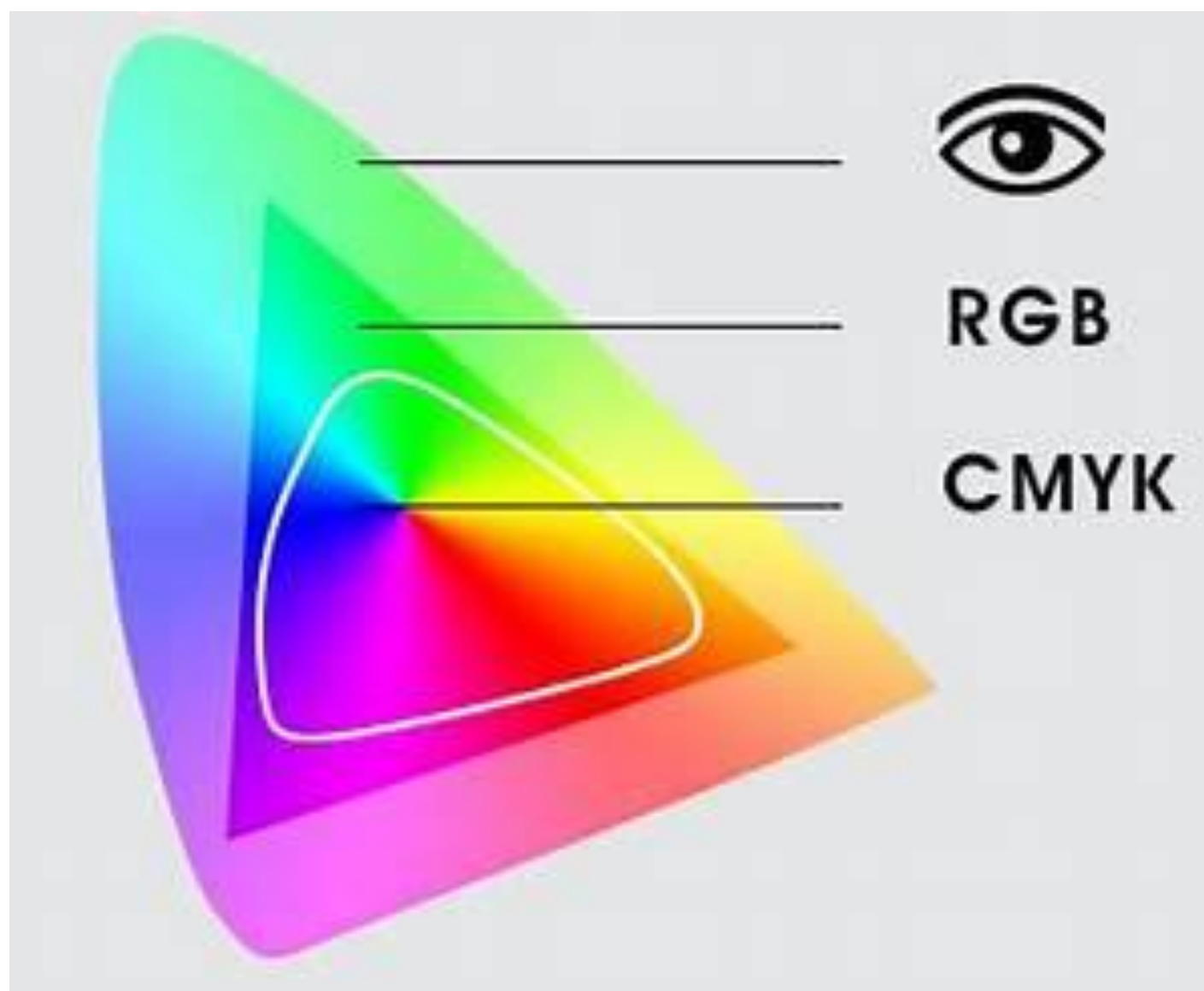
b) HSV



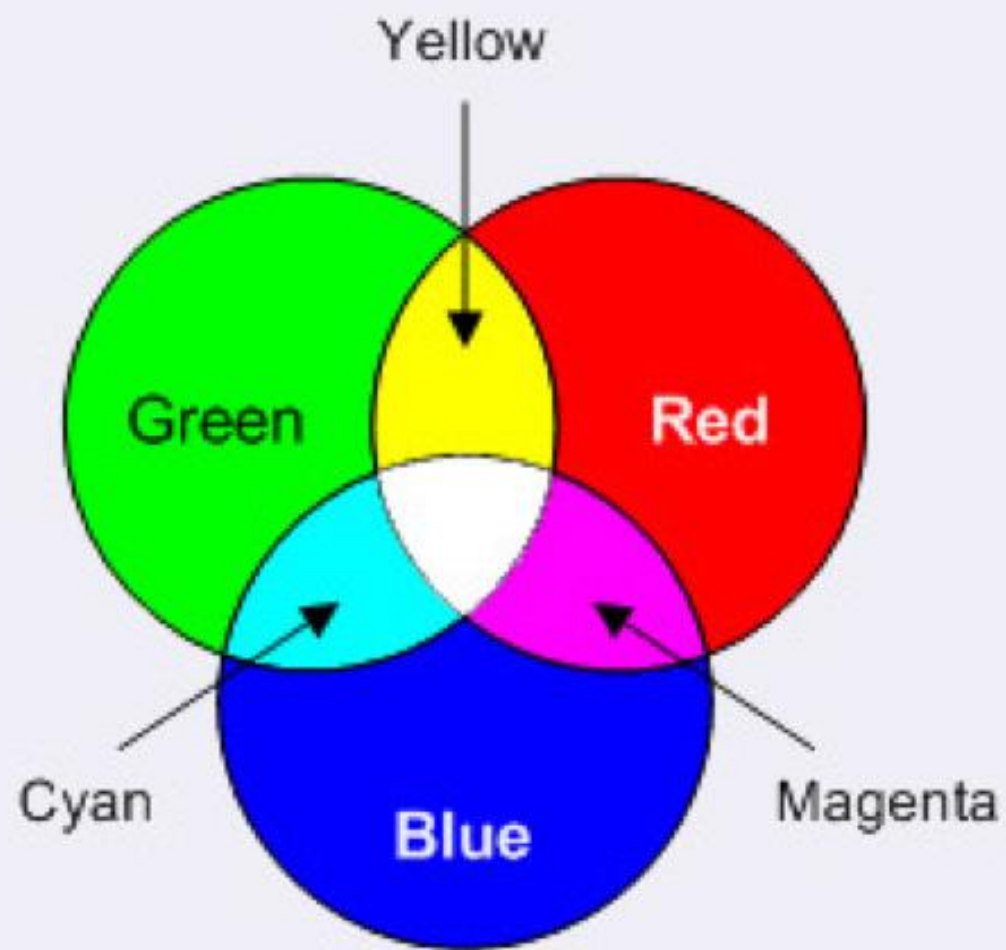
$$\text{Grayscale pixel} = 0.299 \cdot \text{Red} + 0.587 \cdot \text{Green} + 0.114 \cdot \text{Blue}$$

- چشم انسان بیشترین حساسیت را به نور در میانه نمودار طیف بینایی دارد

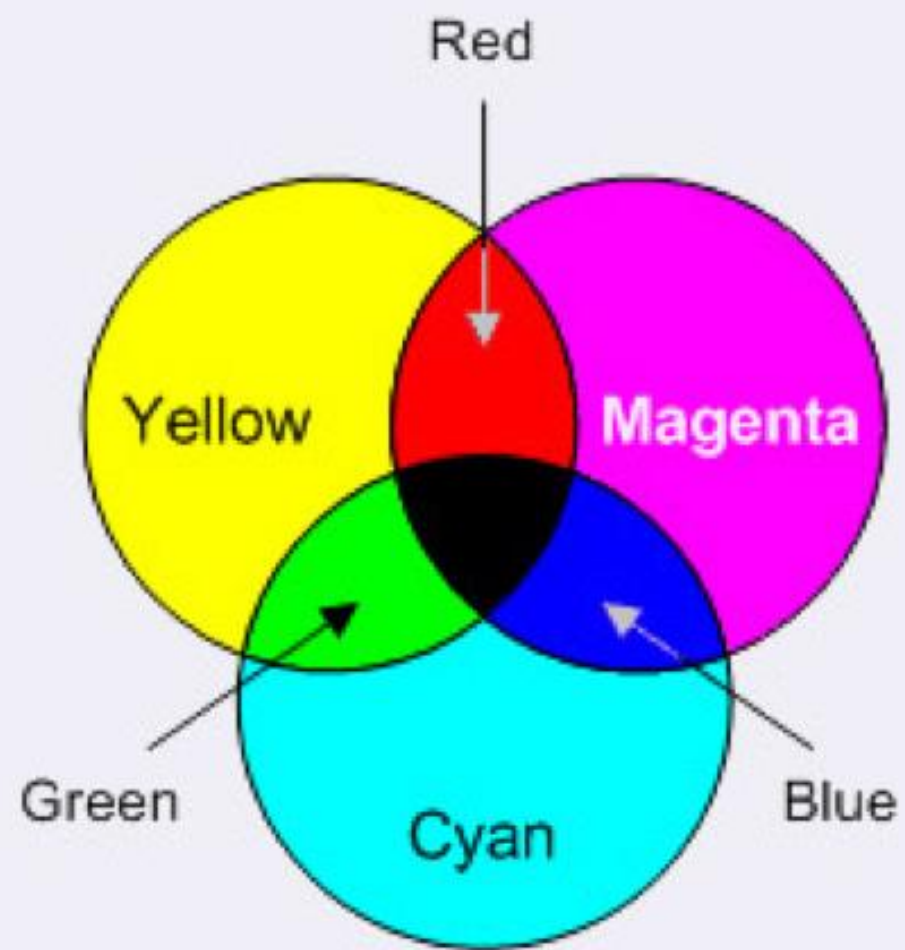








Additive (light)



Subtractive (paint)

**Additive and subtractive color combinations**

To calculate the size of a bitmap image:



X (3000)

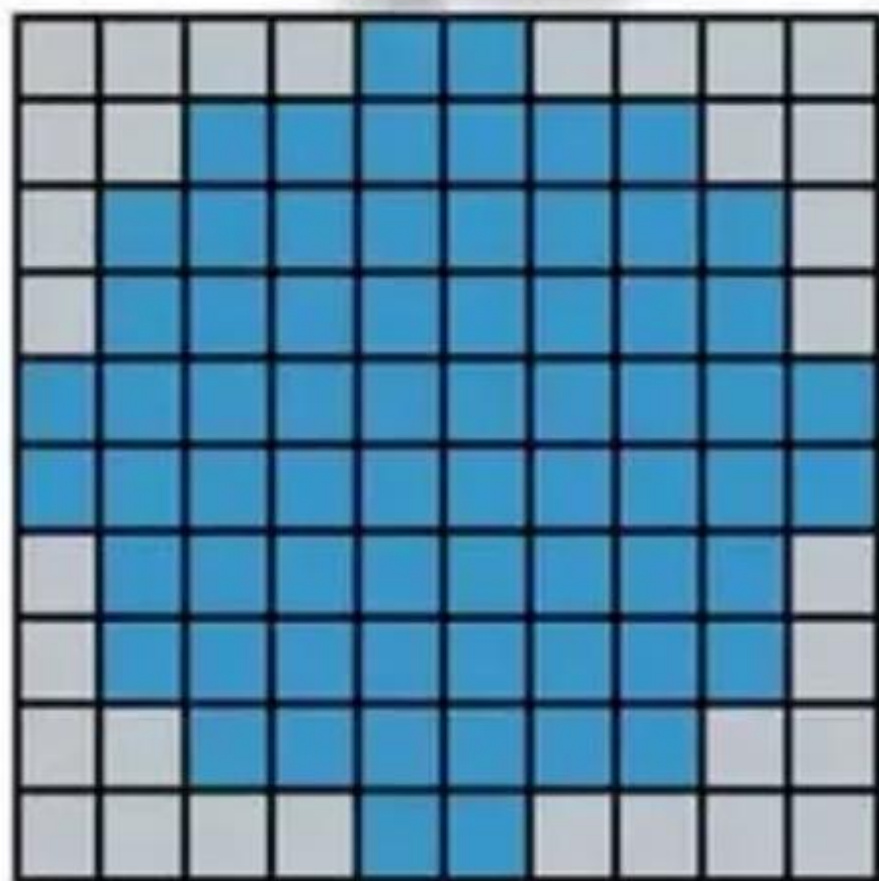
Y  
(2000)

**X pixels \* Y pixels \* bit depth / 8**

*(3000 X 2000 X 16 / 8 = 12,000,000 bytes or 12 Mb)*



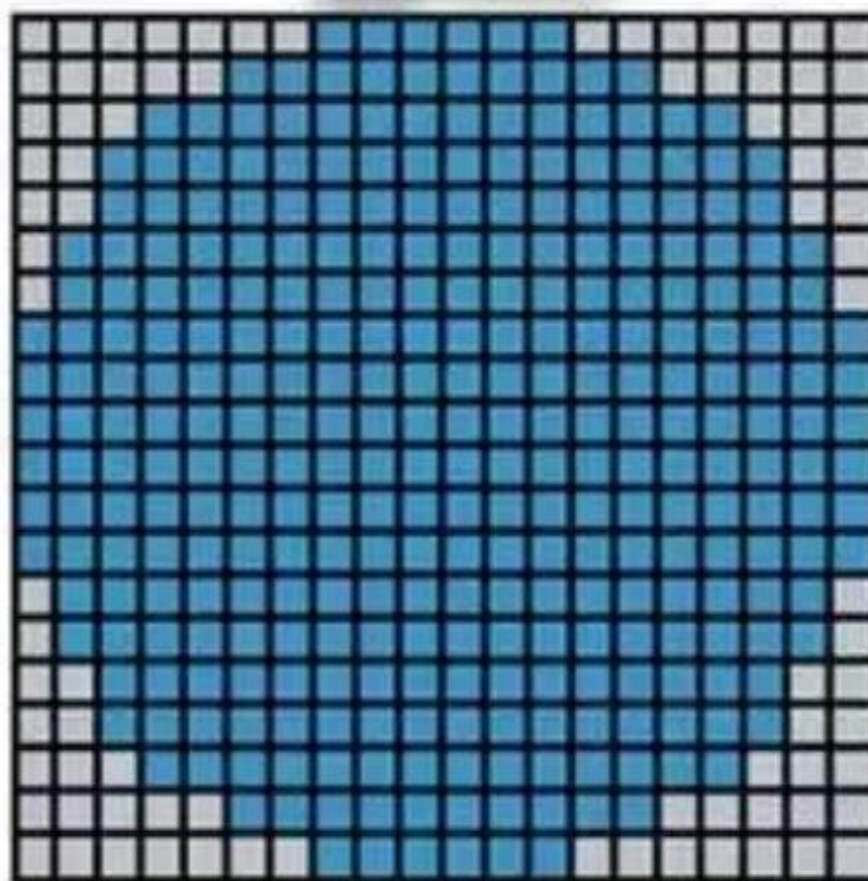
10 PPI



2,54 cm



20 PPI



2,54 cm



# HOW TO CHOOSE BETWEEN LOSSY VS LOSSLESS COMPRESSION

	Lossless Compression	Lossy Compression
When to use it	When data loss is unacceptable or could cause an issue (e.g: financial data or high-quality images for a photographer)	When data loss is acceptable When you need to display the file on mobile devices and websites. When you have limited space available on your computer.
Image reconstruction	Yes - Also known as reversible compression	No - Also known as irreversible compression. <i>(But if you pick the right tool, you can reverse the compression)*</i>
Impact on the quality	No	Yes (but invisible to the human eye most of the time)
Data reduction	Lower	Higher

Mean

Error

Squared

$$\text{MSE} = \frac{1}{n} \sum_{i=1}^n (Y_i - \hat{Y}_i)^2$$