

CS230 : Computer Graphics

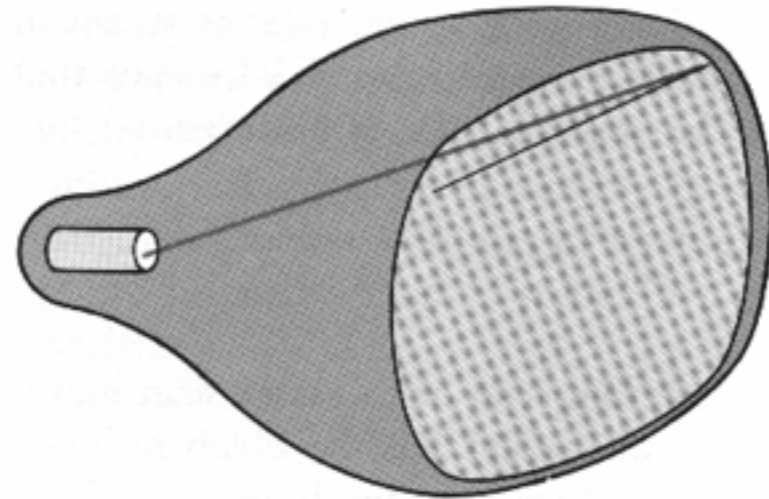
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Raster Devices and Images

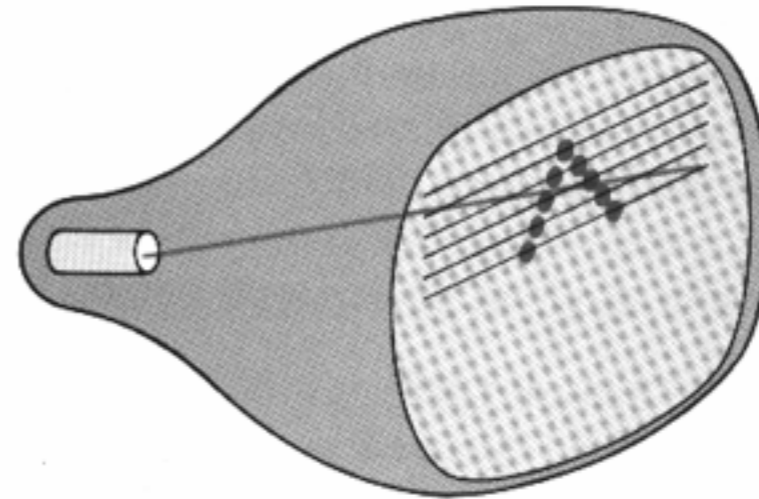
Raster Devices



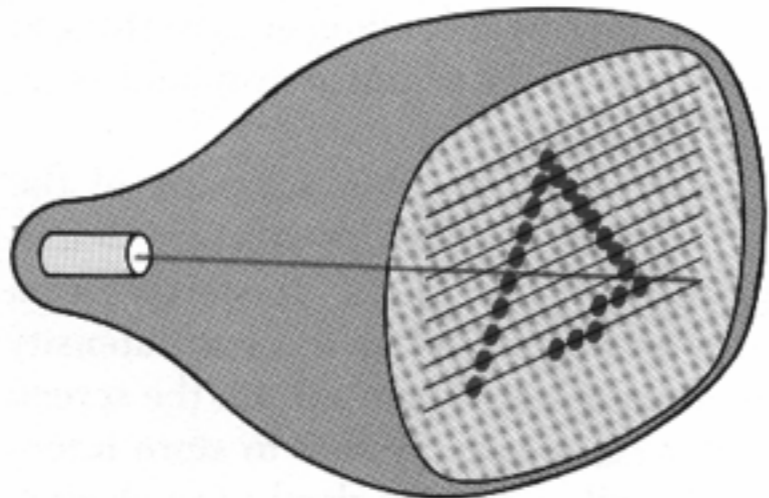
Raster Display



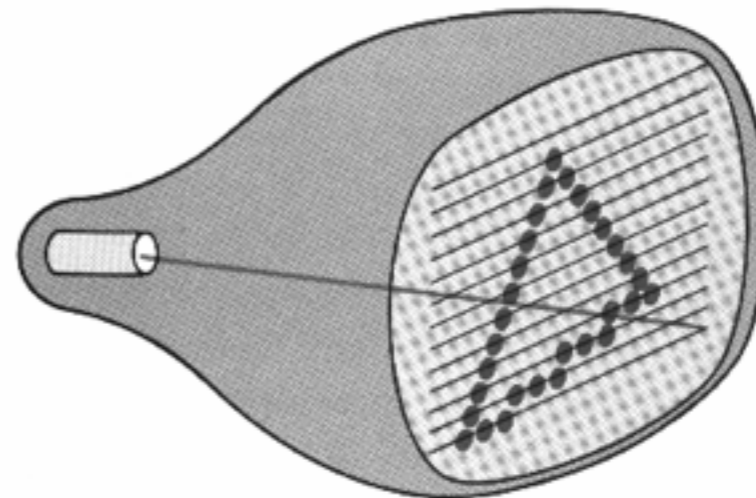
(a)



(b)

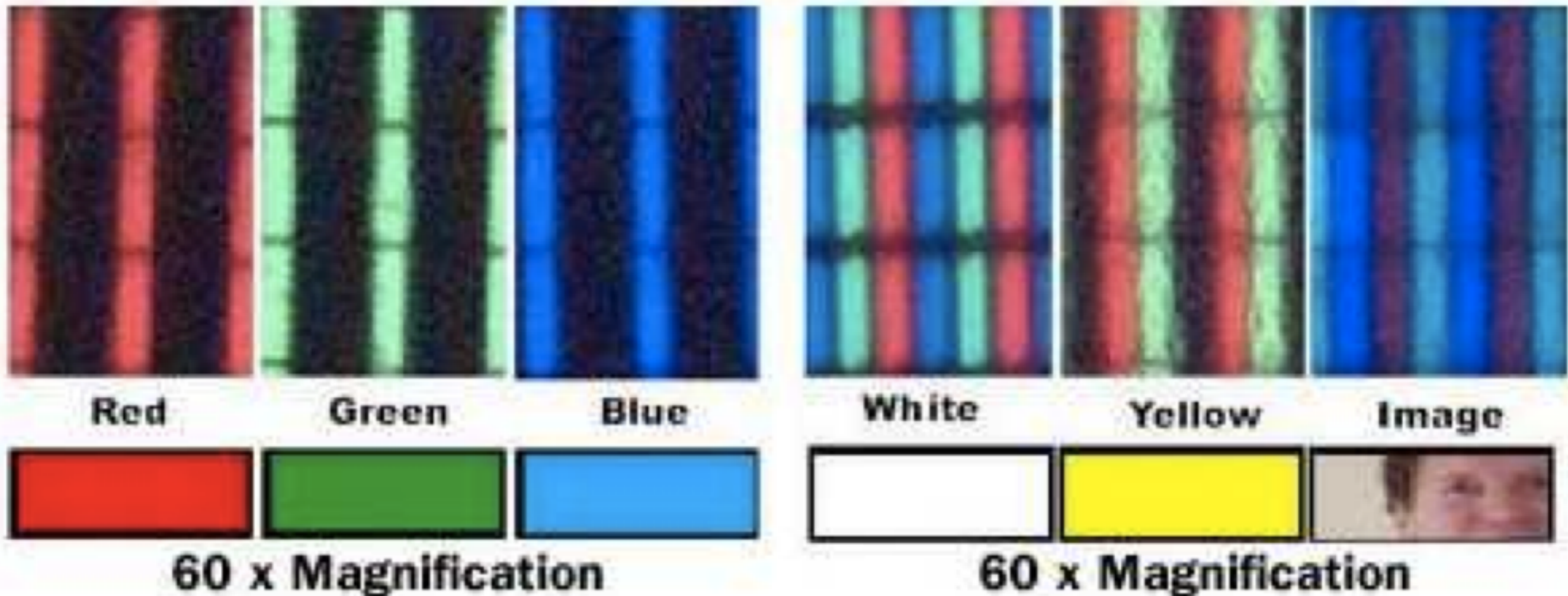


(c)



(d)

Raster Display



red, green, blue subpixels

What is an image?

Continuous image

$$I : R \rightarrow V$$

$$R \subset \mathbb{R}^2$$

$$V = \mathbb{R}^+ \quad (\text{grayscale})$$

$$V = (\mathbb{R}^+)^3 \quad (\text{color})$$



What is an image?

Sampled image

$$I : R \rightarrow V$$

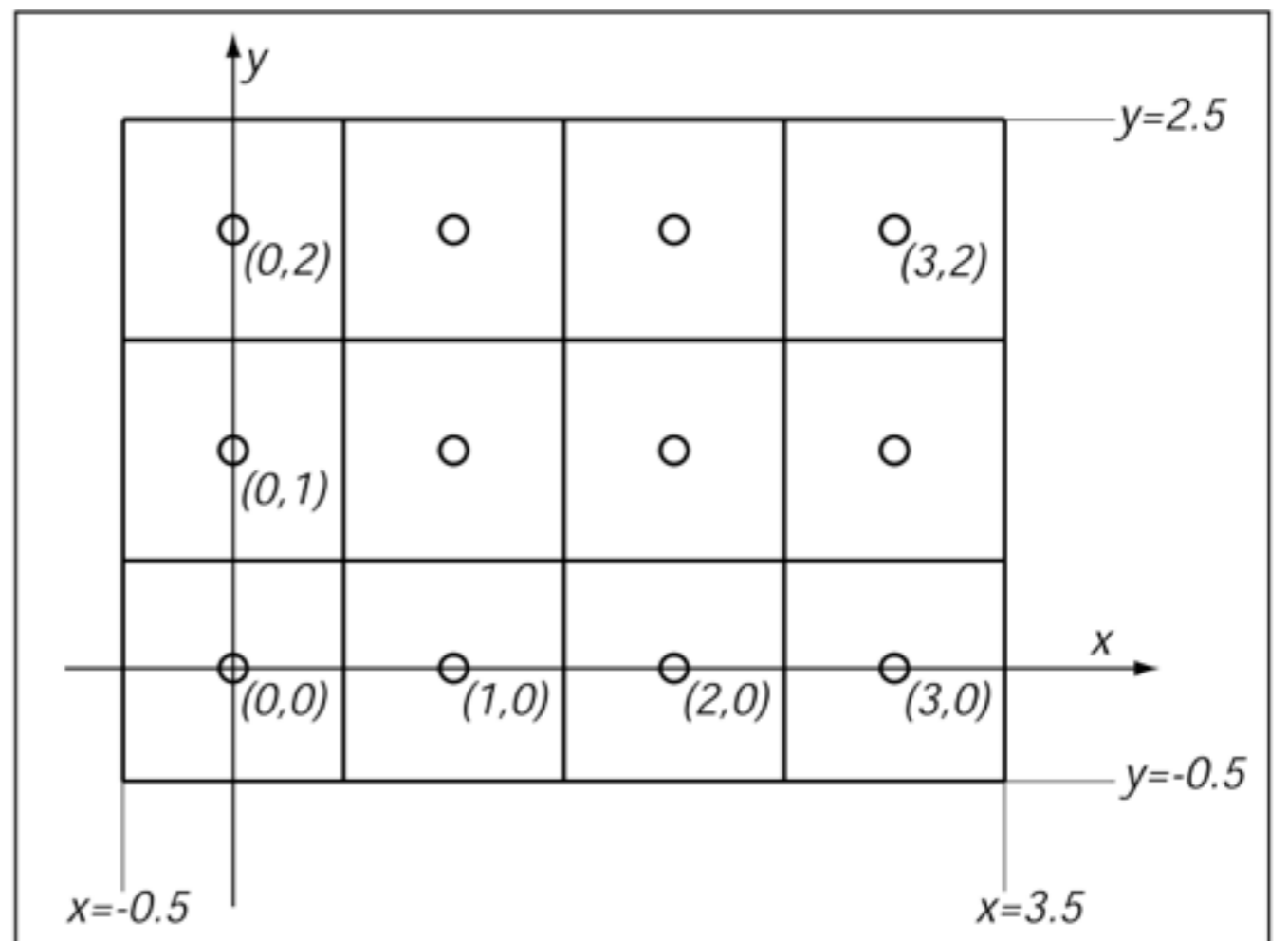
$$R \subset \mathbb{Z}^2$$

$$V = [0, 1] \quad \text{(grayscale)}$$

$$V = [0, 1]^3 \quad \text{(color)}$$

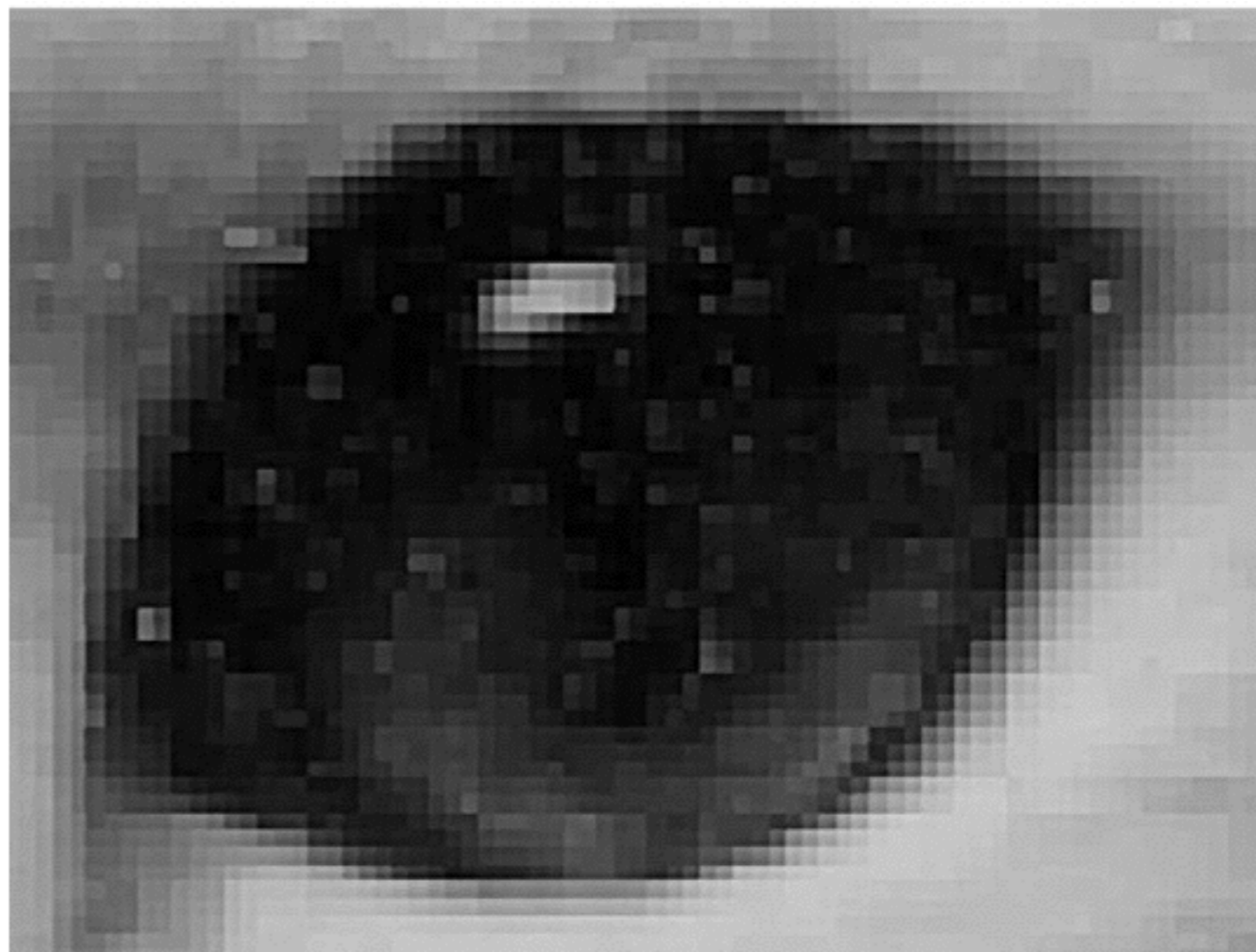
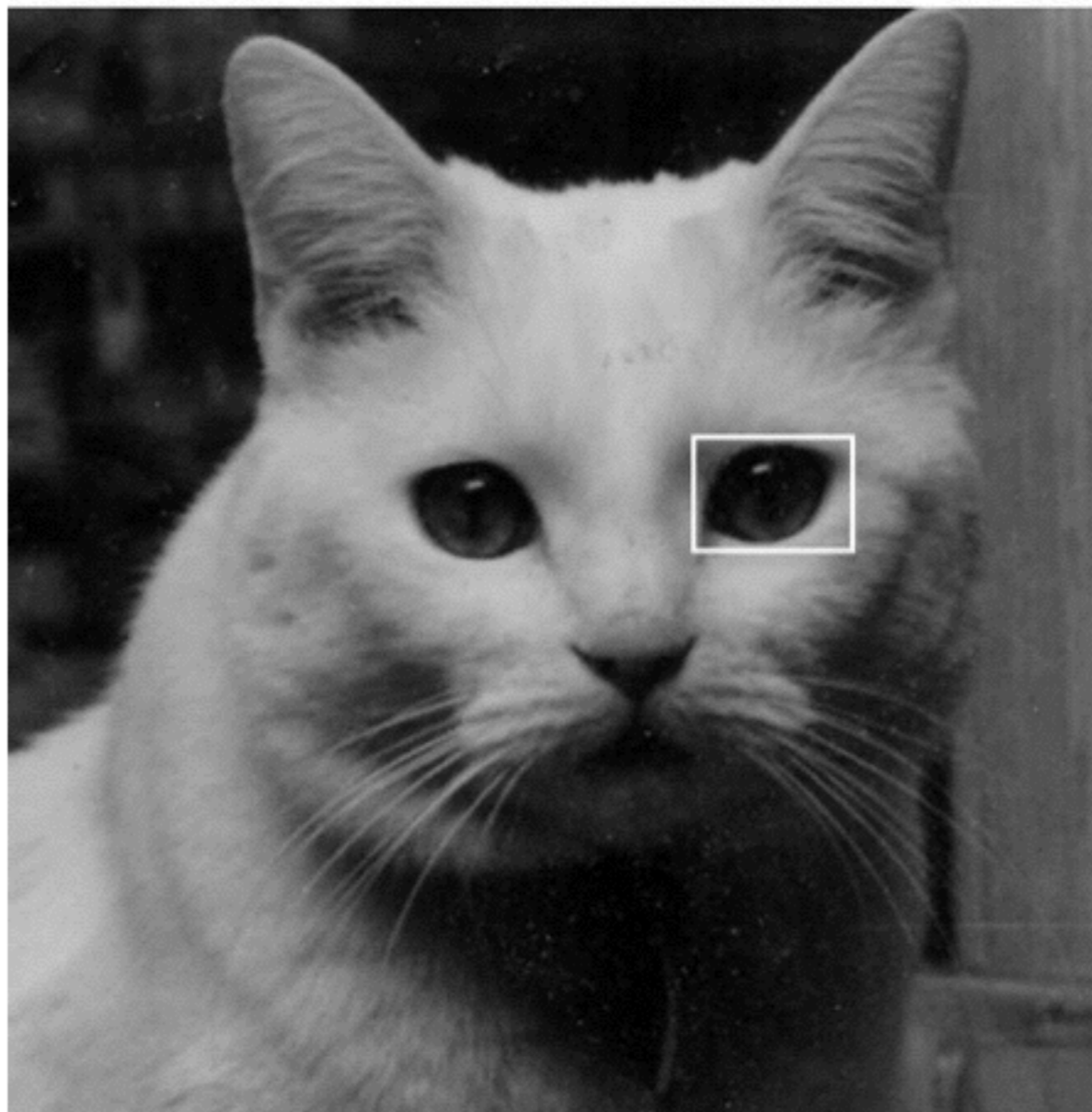
n_x = number of columns

n_y = number of rows



$$[-0.5, n_x - 0.5] \times [-0.5, n_y - 0.5]$$

Raster Image



Bit depth - defined by device standards

Bit-Depth	Number of Colors
1	2 (monochrome)
2	4 (CGA)
4	16 (EGA)
8	256 (VGA)
16	65,536 (High Color, XGA)
24	16,777,216 (True Color, SVGA)
32	16,777,216 (True Color + Alpha Channel)

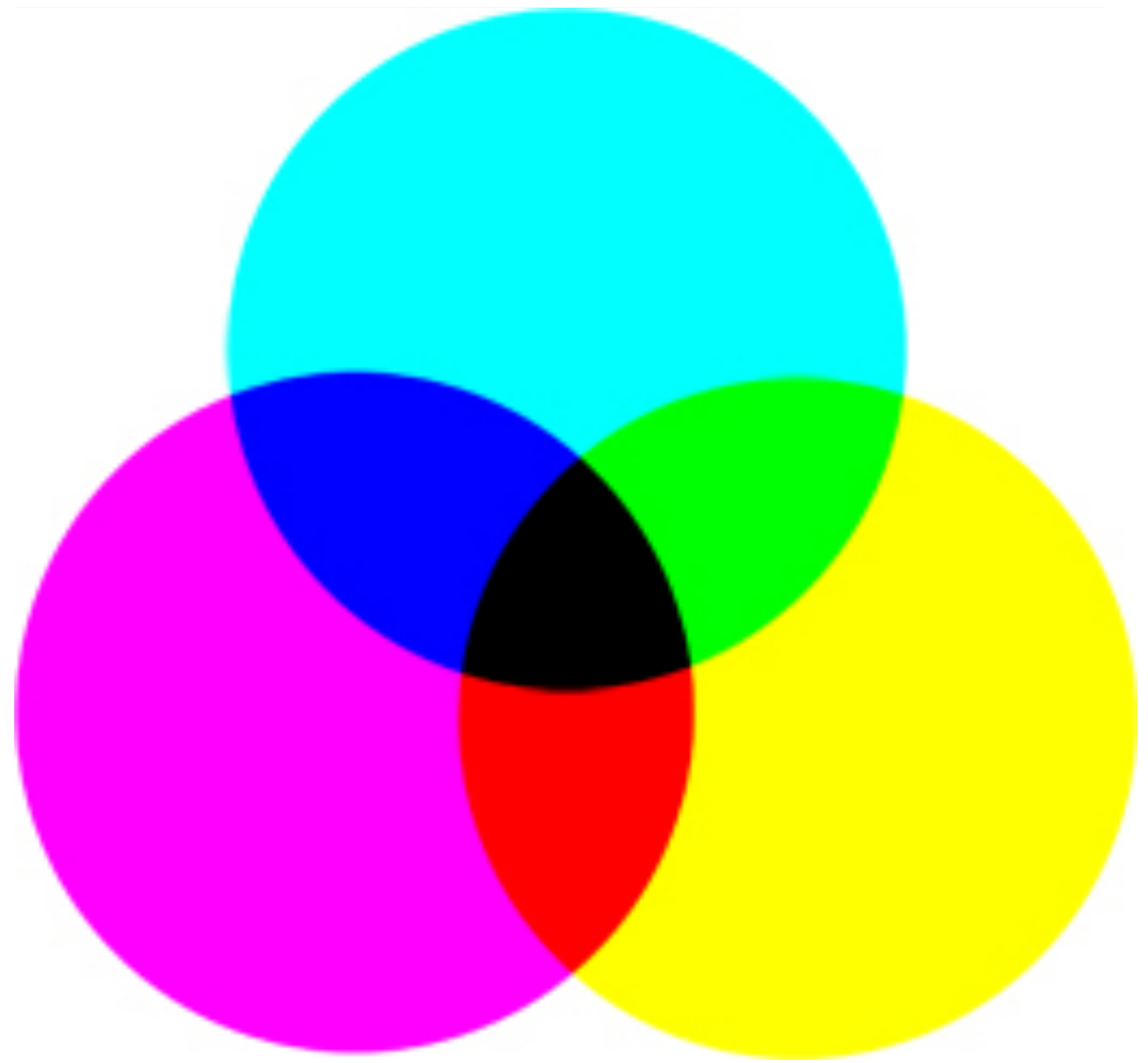
(Note alpha)

(Humans can perceive ~10,000,000 colors)

Color representation



additive
RGB



subtractive
CMYK

Alpha Channel

$$\mathbf{c} = \alpha \mathbf{c}_f + (1 - \alpha) \mathbf{c}_b$$

