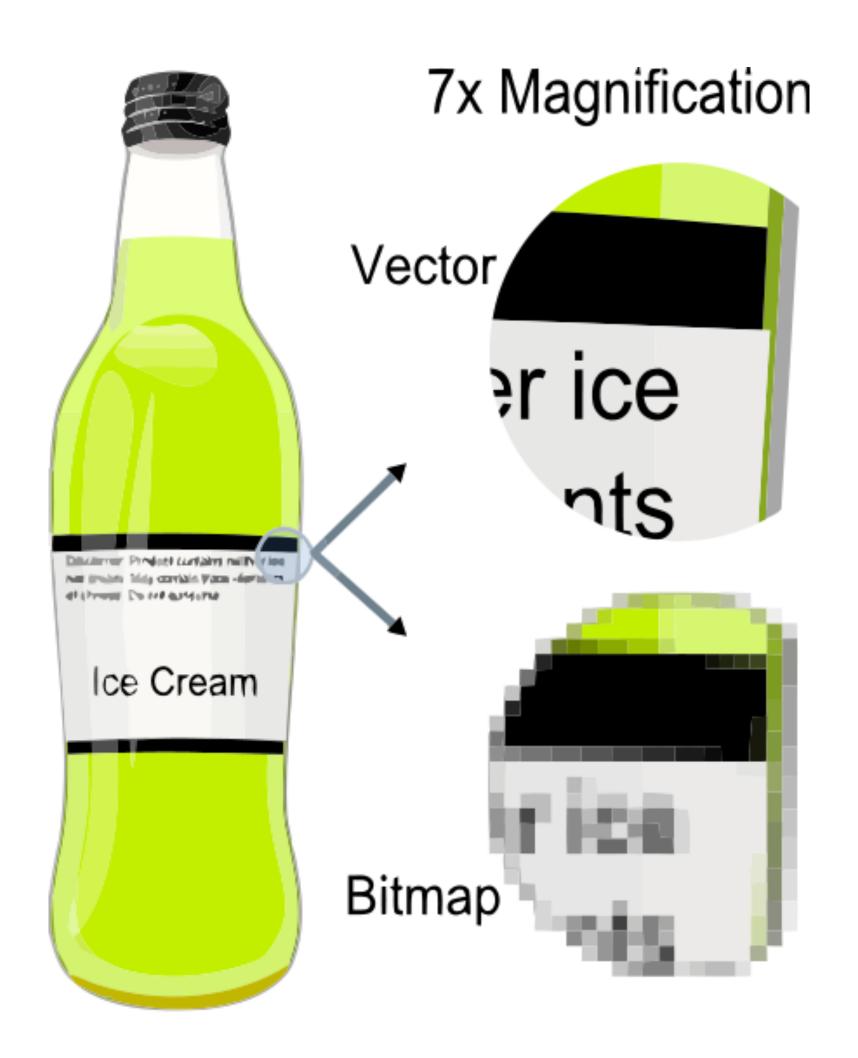
lmages



lmages



By The original uploader was Darth Stabro at English Wikipedia - Transferred from en.wikipedia to Commons by Pbroks13 using CommonsHelper., CC BY-SA 3.0, https://commons.wikimedia.org/w/index.php? curid=15789788 University

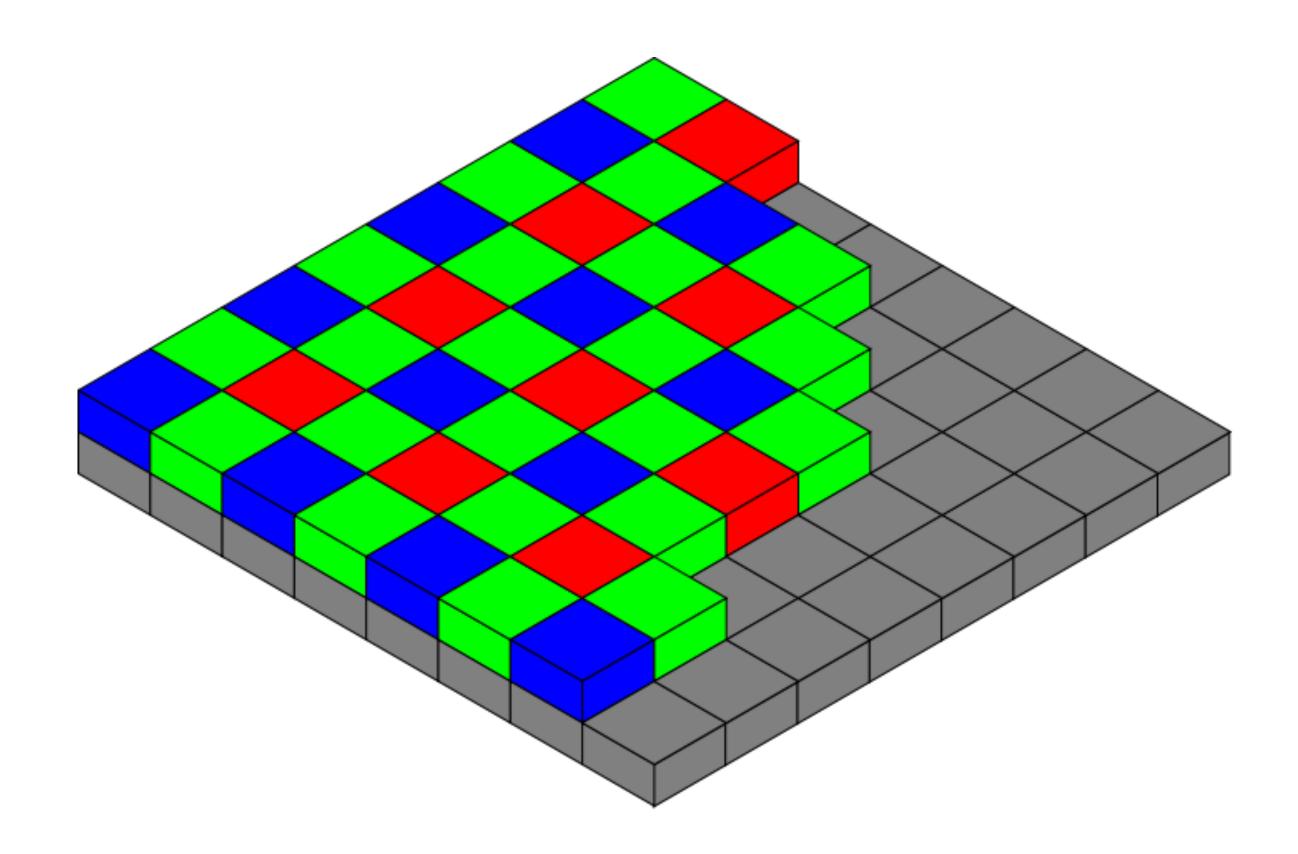
Raster Devices

- Output
 - 2D: Display (LCD,LED)
 - 1D: Hardcopy (ink-jet, dye sublimation)

- Input
 - 2D Array: digital camera
 - 1D Array: scanner



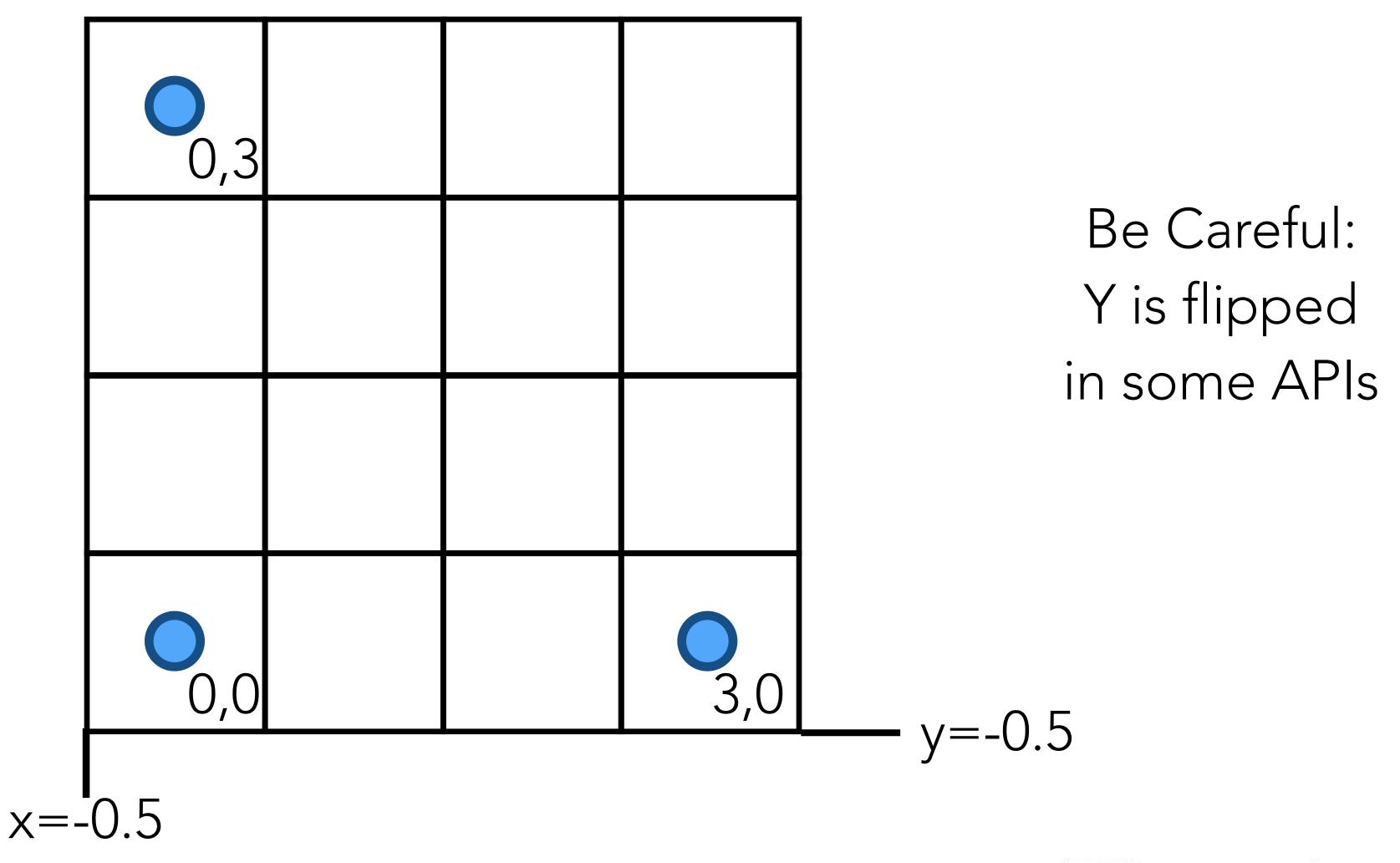
Bayesian Color-Filter



By en:User:Cburnett - Own workThis vector image was created with Inkscape., CC BY-SA 3.0, https://commons.wikimedia.org/w/index.php?curid=1496858



Pixel Coordinates - Raster Image



Pixel Values (Framebuffer format)

- 1-bit greyscale text
- 8-bit RGB (24 bits) web and email
- 8-bit RGBA (32 bits) alpha channel, see next slide
- 16/24/32bits high accuracy for photography and HDR



Monitors Intensity, Gamma Correction

- What is the minimal and maximal light intensity?
- The intermediate intensities are different for each person, and it is non-linear
- Monitors needs to be calibrated for a certain viewer, using a procedure called "Gamma Correction"
- The rule is simple: displayed intensity = (max intensity) * a γ Pixel Value

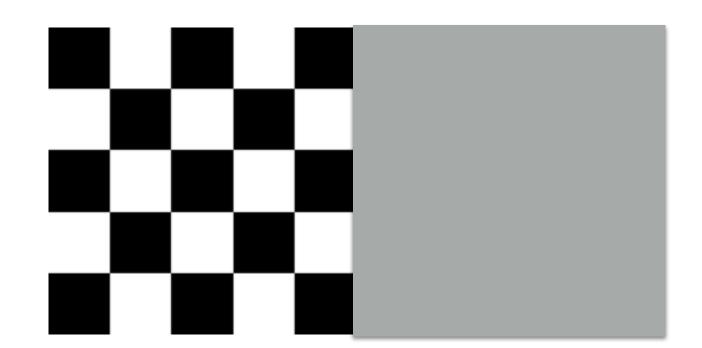


Gamma Correction



- Find the neutral gray: $0.5 = a^{\gamma}$
- Compute

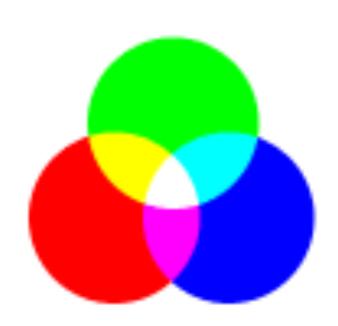
$$\gamma = \frac{\ln 0.5}{\ln a}$$

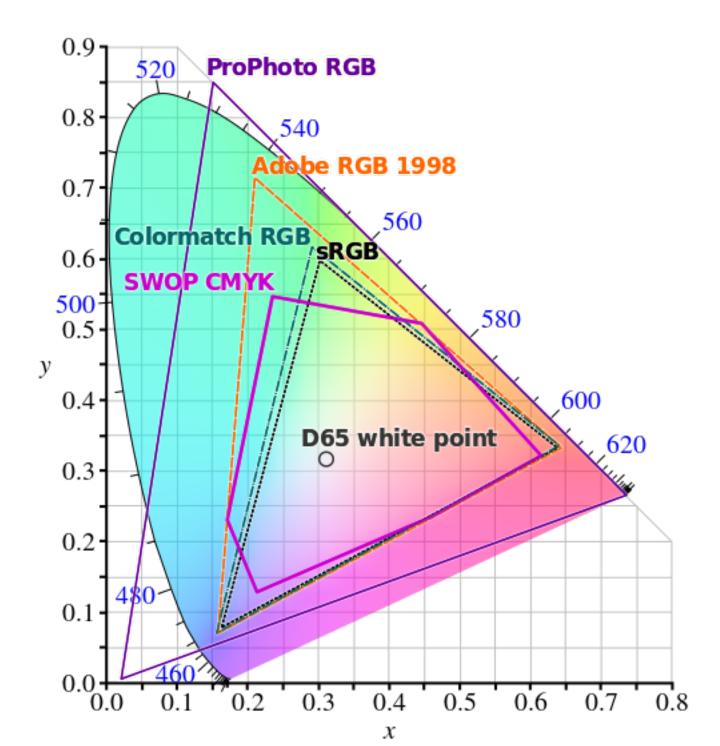


• The colors will not be uniform on normal screens, one of the major factor affecting the cost of screens is their ability to be consistent on all pixels!

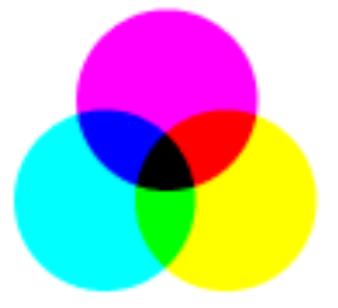
RGB vs CIMYK colors

RGB is additive





CMYK is subtractive



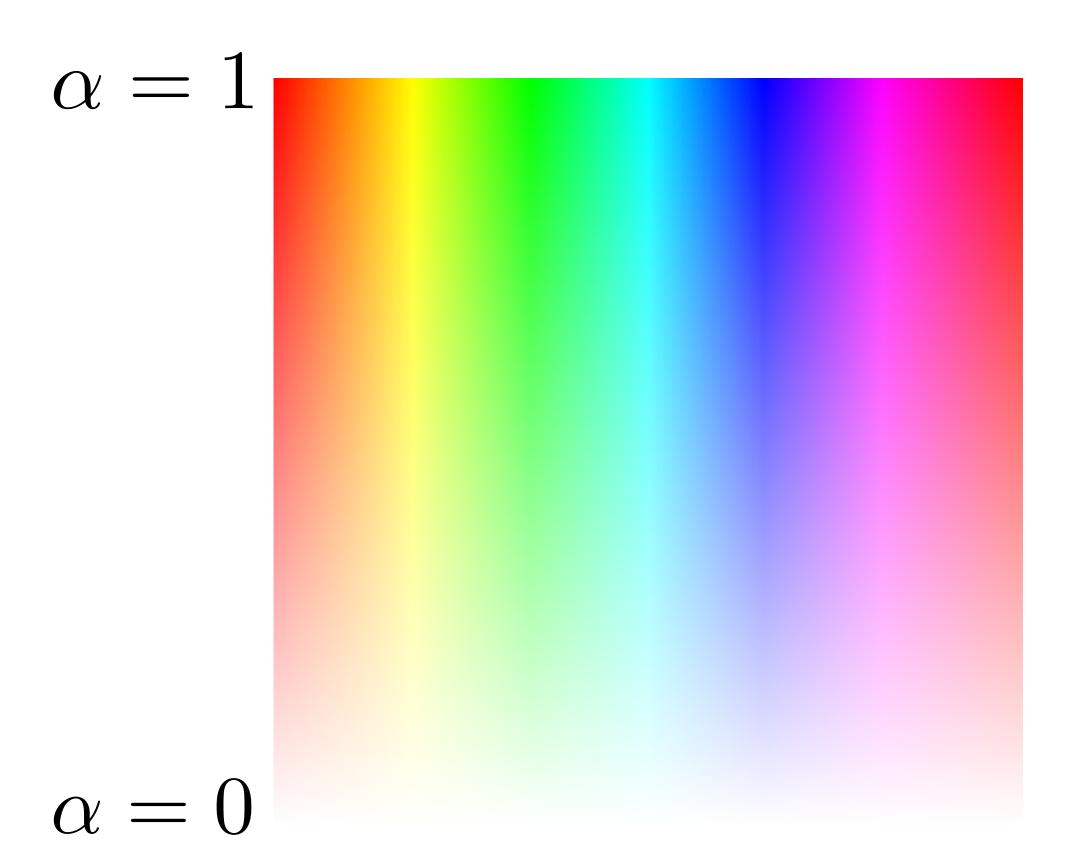
By BenRG and cmglee - http://commons.wikimedia.org/wiki/File:CIE1931xy_blank.svg, CC BY-SA 3.0, https://commons.wikimedia.org/w/index.php?curid=32158329

Calibration is very important!



Alpha Compositing

- A way to represent transparency
- The pixels of an image are blended linearly with the image below
- $\mathbf{c} = \alpha \mathbf{c_{new}} + (1 \alpha) \mathbf{c_{old}}$



RGBA is very common, and you will use it often!



Image Formats

- Lossy:
 - jpeg compact, introduces artifacts
- Lossless:
 - png common for web applications
 - ppm very simple, not compressed
 - tiff mostly scientific use



References

Fundamentals of Computer Graphics, Fourth Edition 4th Edition by Steve Marschner, Peter Shirley

Chapters 1,2,3

