

Chapter3 Raster Image

Pixel is short for picture element

A raster images is simply a 2D array that stores the pixel value for each pixel
image pixels != display pixel

3.1 Raster Devices

- Output
 - Display
 - Transmissive: liquid crystal display LCD
 - Emissive: light-emitting diode LED display
 - Hardcopy
 - Binary: link-jet printer
 - Continuous tone: dye sublimation printer
thermal dye transfer donor ribbon continous tone
ppi: pixel per inch
dpi: dots per inch
stair stepping
- input
 - 2D array sensor: digital camera
CCD: charge-coupled devices
CMONS: complimentary metal-oxide-semiconductor
 - 1D array sensor: flatbed scanner

3.2 Images, Pixels, Geometry

$$I(x, y) : R \rightarrow V$$

$R \subset \mathbb{R}^2$ is a rectangular area and V is the set of possible pixel values

3.2.2 Monitor intensities and Gamma

- monitors are nonlinear with respect to input
displayed intensity = (maximum intensity) a^γ

a in the input pixel value between 1 and 0

describing a display's nonlinearity using γ is only an **approximation**

3.3 RGB Color

```
black = (0, 0, 0)
red   = (1, 0, 0)
green = (0, 1, 0)
blue  = (0, 0, 1)
yellow = (1, 1, 0)
magenta = (1, 0, 1)
cyan   = (0, 1, 1)
white  = (1, 1, 1)
```

3.4 Alpha Compositing

pixel coverage α fraction of pixel covered by the foreground layer

$$c = \alpha c_f + (1 - \alpha) c_b$$

alpha mask alpha channel

- Image Storage
 - jpeg: lossy
 - tiff: lossless
 - ppm: lossless
 - png: lossless