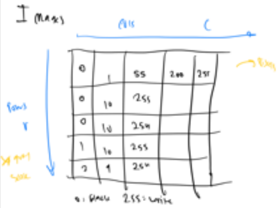
Images



- Number represents power / luminance
- Common with 8 bit b/c standard

Main Memory

RAM is 1D: addresses and values

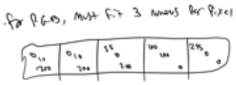
addr	value
0	0
1	1
2	55
3	200
4	255
5	0
...	10
⋮	⋮
24	250

5x5 img (8 bit pix = 256 vals)

$i = r \times num\_cols + c$

$r = i / cols$, $c = i \% cols$ (int div)

For RGB, must fit 3 numbers per pixel



addr	val
0	0
1	10
2	200
3	0
4	10
5	200
6	55
⋮	200
	⋮

$25 \cdot 3 - 1$ = 74

Plane order: R_0, R_1, R_2 ... (rarely used)
G, ...
B, ...

Pixel order: shown above
$R_0, G_0, B_0, R_1, G_1, B_1, \ldots$

For RGB

$i = (r \times cols + c) \times 3$ + 0 R
+1 G
+2 B

$r = (i/3)/cols$, $c = (i/3) \% cols$ (row/col coords)

- For 8 bit color, store with unsigned char type

```
unsigned char image2D[5][5]
  int rows = 5; int cols = 5;
```

- When using 2D array in C, consider the above formula to reduce dims

When size unknown:

```
unsigned char *image;
```

- When storing in file, need more info than just image (meta data)

Formats

PPM: Portable Pixmap (not compressed)

- Simplest possible form

P2: Grayscale, P3: RGB (ASCII)

- For all imgs, 1st 2 bytes indicates how bytes are stored (format)

Metadata:

P5 _ COLS _ ROWS _ 255 _

(whitespace) (max pixel value)

bridge.ppm (8-bit) → 16-bit display → linux
→ 8 bit color map (windows)

retina.ppm (24-bit) → 16-bit display (both)

unsigned char * filedata, * dispdata

8 bit to 16 bit conversion

filedata[0] = 133; → to binary

16 bit display desire: (only most significant bits)

- human eyes more green sensitive
- image copied to all colors in display b/c grey

dispdata[0] = 132   dispdata[1] = 48

task: read in 8 bit grayscale and convert to 16 bit RGB

- lots of bitwise

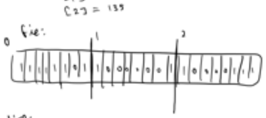
Windows 16 bit

- windows does not dedicate 6 bits to green

24 bit displays RGB

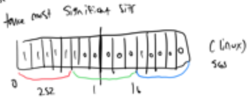
filedata[0] = 255 → matches red
[1] = 128
[2] = 133

file:

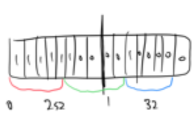


disp:

- take most significant bit

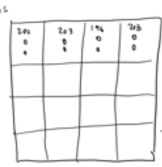


Windows: 555X



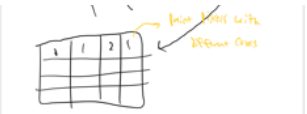
Color map

display:



Map:

index	R	G	B
0	200	0	0
1	203	0	0
2	196	0	0
3			



- Color | Stored in table and written to display
- Escape: Yellow line on text cell field or writing on screen

- OS reserves lowest part of RAM for display or ROM
- May have to Context X Put img
- X Put img is Stream function