

Key terms:

Bit-map image: System that uses pixels to make up an image.

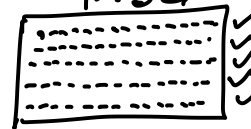
Pixel: Smallest picture element that makes up an image.

Colour Depth: $2^8 = 256$ $\xrightarrow{\text{Colour Depth}}$ $2^5 = 32$
Number of bits used to represent the colours in a pixel.

Image Resolution: Number of pixels that make-up an image.

Software

$4096 \times 3192 = 12738656$
Rows Columns. Pixels in total

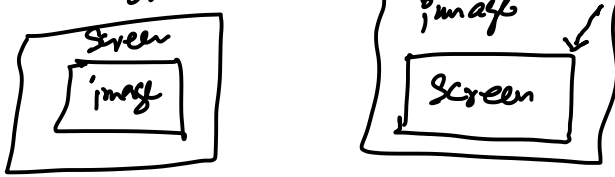

109 pixels
Resolution

||||| ≡ ≡ ≡

Screen Resolution: number of horizontal and vertical pixels that make-up a screen display.

Hardware

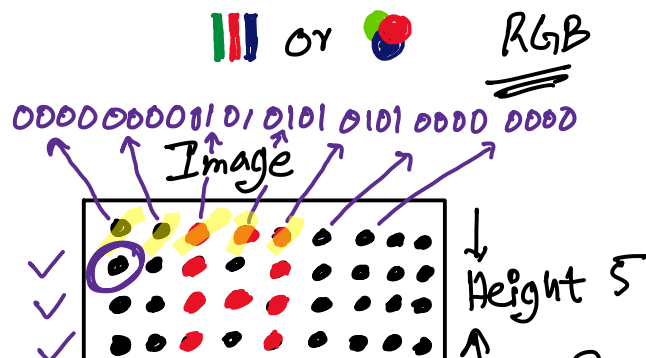
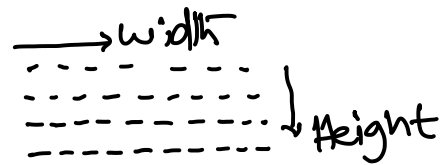
If the screen resolution is smaller than the image resolution, the whole image can't be shown on the screen, or the original image will become lower quality.



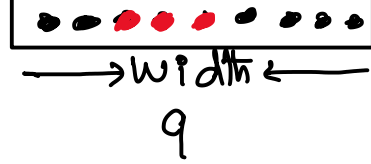
Resolution: Number of pixels per column and per row on a monitor or a TV screen.

pixel Density: Pixels per inch (PPI)
Number of pixels per square inch.

Bit-map Images: Are made-up of pixels (picture elements); the image is stored in a two-dimensional matrix of pixels.



- Resolution
- Pixel
- Image
- Color



Resolution
 $9 \times 5 = 45$

Color Depth
 (Range)

White = 0

Red = 5

Colors = 16

Depth = 4 bits

This image has 16 Colors/pixel.

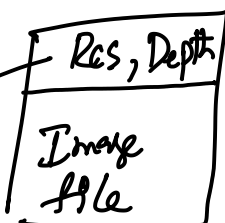
Color Depth
 $2^4 = 16 \rightarrow 0 (0000)$
 $\equiv 15 (1111)$

Next Row
 1 2 3 4 5 6 7 8 9
 0000 0000 0101 0101 0101 0000 0000 0000 0000 0000 0000
 0101 0000 0101 0000 0000 0000 0000 0000 0000 0000 0101 0101
 0000 0000 0000 0000

Information required by the operating system related to this image.
 ① Resolution ② Color Depth.

9×5
 $\frac{c}{r}$

File Header



1B $2^8 \rightarrow$ bits per pixel = 256 Colors $\rightarrow 0$
 $\rightarrow 255$

2B $2^{16} = 65k$

3B $2^{24} = 1.7$ millions

File Sizing

$\text{Size} = \text{Resolution} \times \text{Depth}$
 $(W \times H)$

✓ Image 10x10 Resolution

✓ Color 32

✓ Image Resolution = $10 \times 10 = 100$

- ✓ Image Resolution = 1024
- ✓ Color Depth $2^5 = 32$ (5)

✓ $100 \times 5 = \frac{500 \text{ bits}}{8} = 62.5 = \boxed{63B}$

②

Image 1024 x 768 Resolution
15521 Columns

Colors 65536 Colors

Image Resolution = 1024×768
= 786432 pixels ✓

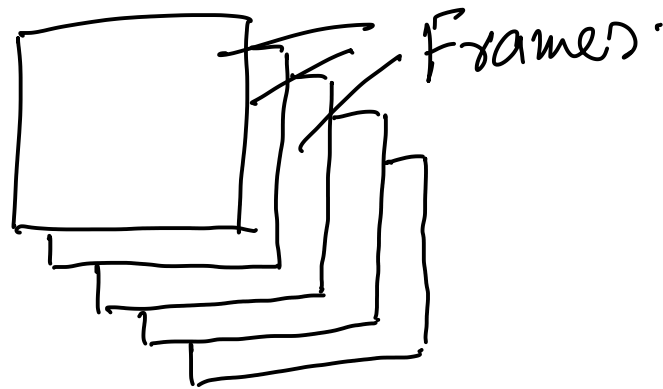
Color Depth = $2^{16} = 65536$
16 bit

16 bits. ✓

Resolution \times Depth
786432 \times 16 = 12 582 912 bits \checkmark

$$12582912 / 8 = \underline{\underline{1572864 \text{ Bytes}}}$$

Video



$$\text{Video File Size} = \text{Resolution} \times \text{Color Depth} \times \frac{\text{Frames}}{\text{per Second}} \times \frac{\text{Time}}{\text{in Seconds}}$$

$$\begin{aligned} \text{Resolution} &= 10 \times 10 = 100 \text{ pixels} \\ \text{Colors} &= 32 = 2^5 = 5 \text{ bits Color depth} \end{aligned}$$

$$\text{FPS} = 10$$

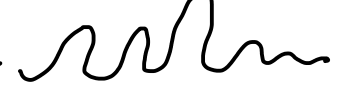
$$\text{Time} = \frac{1}{2} \text{ minute} = 30 \text{ seconds}$$

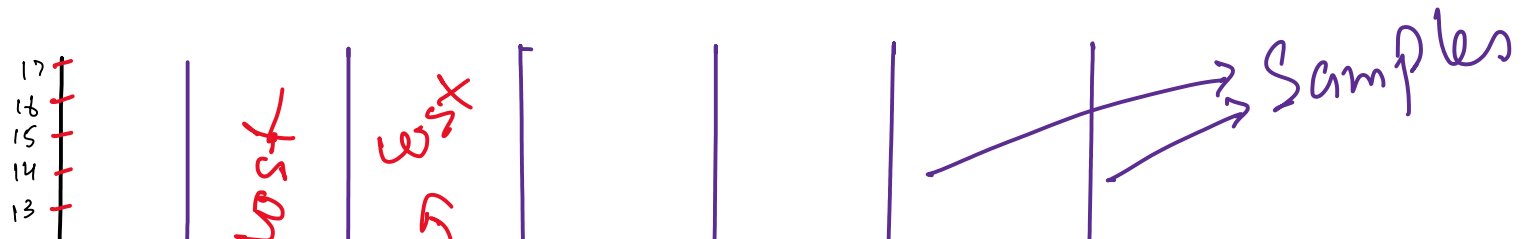
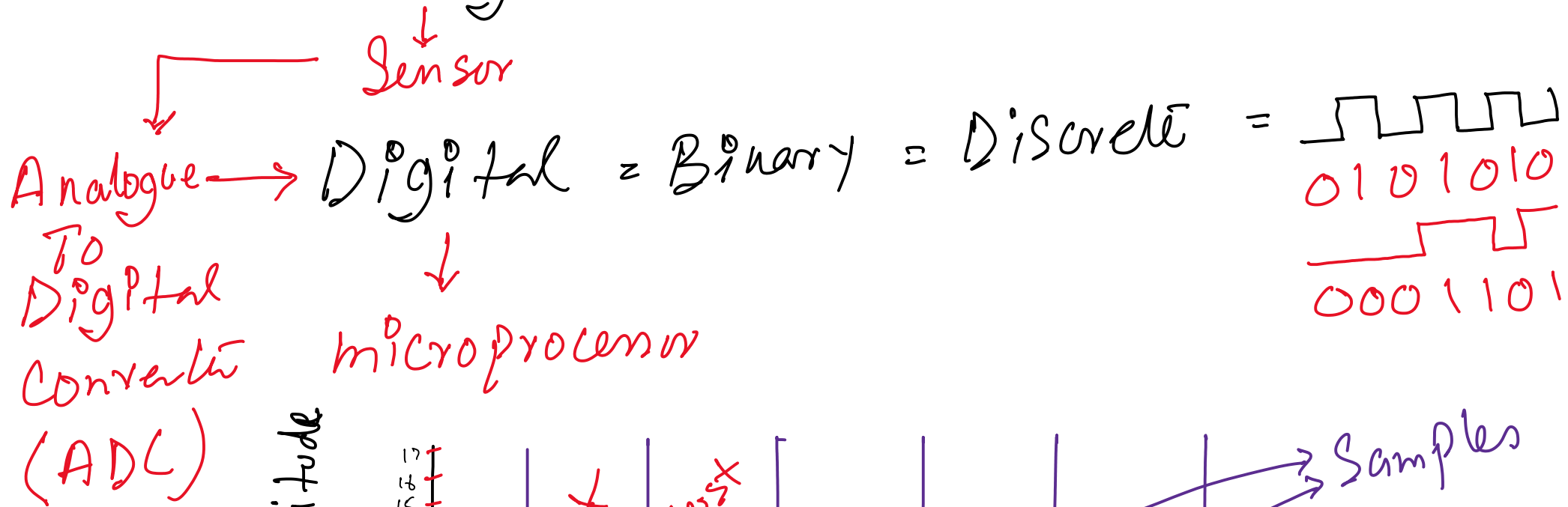
$$\text{Video File Size} = 100 \times 5 \times 10 \times 30 = 150000 \text{ Bytes}$$

$$= \frac{150000 \text{ bits}}{8} = 18750 \text{ bytes}$$

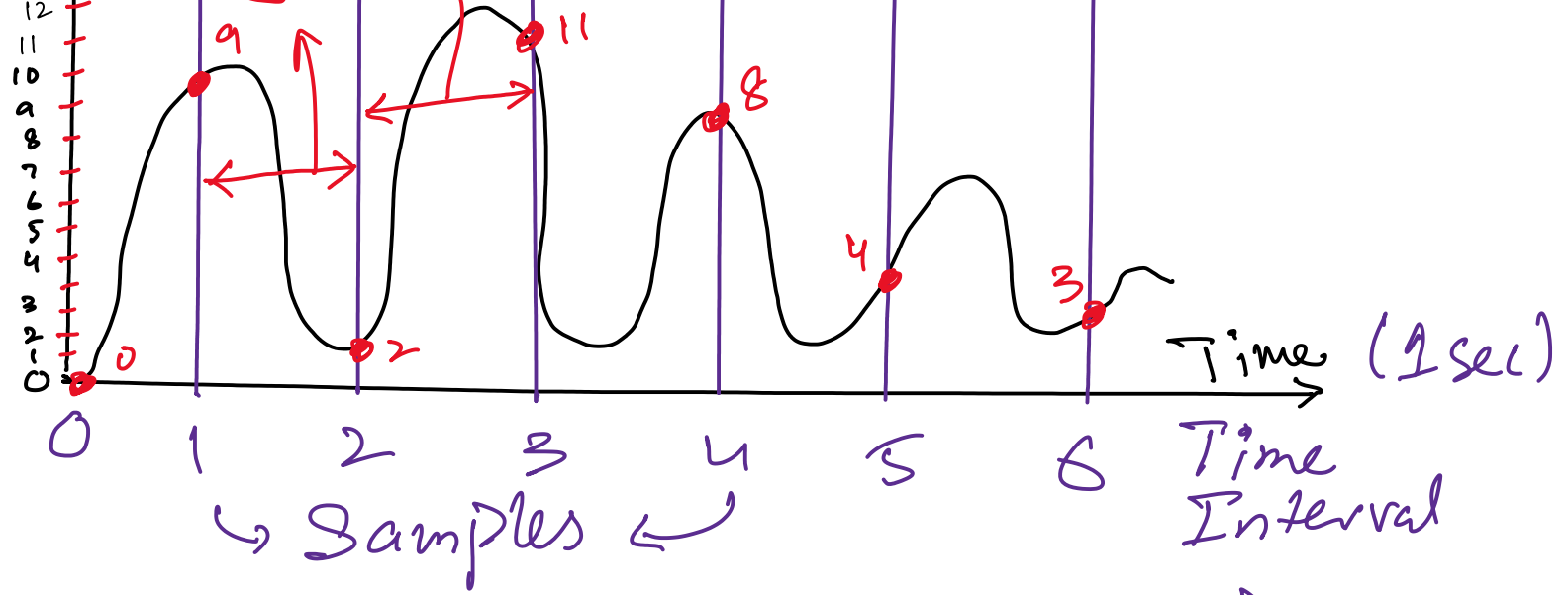
Sound (music)

Sound:

Analogue = Natural = Continuous = 



Pressure
Sound Amplitude



$$2^4 = 16$$

bit
Depth = 4 bits

0	9	2	11	8	4	3	Decimal
0000	1001	0010	1011	1000	0100	0011	Binary