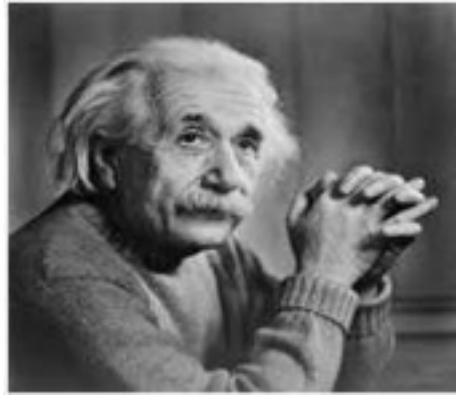


# GRAY SCALE IMAGES

- Initially for old TV displays, 2,3,4,5,6 bit color formats were used.
- Nowadays, 8 bit color format is used which has 256 different shades ( $2^8=256$ ) of colors in it, commonly known as Gray scale image.
- Range of colors varies from 0-255 where 0-> black and 255-> white.



# PIXEL

- Smallest element of an image.
- Also known as PEL.
- Each pixel corresponds to only one value. In an 8-bit gray scale image, the value of the pixel is between 0 and 255.

- The value of a pixel at any point correspond to the intensity of the light photons striking at that point.
- Total number of pixels = number of rows ×  
number of  
columns
- Value 0 means absence of light i.e. 0 denotes dark, so at that point, black color will be formed.

Total no of pixels = total no. of rows X total no. of columns  
= 3 X 3  
= 9.

0	0	0
0	0	0
0	0	0

- Black color image formed with 9 pixels having dimensions of 3 rows and 3 columns.



# PIXEL RESOLUTION

- In **pixel resolution**, the term resolution refers to the total number of count of pixels in an digital image. For example. If an image has M rows and N columns, then its resolution can be defined as  $M \times N$ .
- Higher the pixel resolution, higher the quality of image.

## IMAGE SIZE

- The size of an image depends upon three things.
  - ✓ Number of rows
  - ✓ Number of columns
  - ✓ Number of bits per pixel(bpp)
- The formula for calculating the size is given below.

$$\text{Size of an image} = \text{rows} \times \text{cols} \times \text{bpp}$$

1) Assuming a gray scale image has 1024 rows

and 1024 columns.

$$\begin{aligned}\text{Size of an image} &= \text{rows} \times \text{cols} \times \text{bpp} \\ &= 1024 \times 1024 \times 8 \\ &= 8388608 \text{ bits.}\end{aligned}$$

- Converting into bytes =  $8388608 / 8 = 1048576$  bytes.

2) Suppose we have an image of resolution  $4*4$

That supports 128 gray levels. Calculate its size.

$L = 2^k$ , L-number of discrete gray  
levels=128

$K=7$ , gray levels-(0-127)

Size of an image = rows  $\times$  cols  $\times$  bpp  
 $= 4 \times 4 \times 7$   
 $= 112$  bits.

3) Suppose we have an image of resolution



512\*512 that supports 256 gray levels. Calculate its size.

$$\begin{aligned}\text{Size of an image} &= \text{rows} \times \text{cols} \times \text{bpp} \\ &= 512 \times 512 \times 8 \\ &= 2097152 \text{ bits.} \\ &= 262144 \text{ bytes}\end{aligned}$$