16 July Day 7

28 November 2022 06:54

Pixel

it's nothing but an smallest element of an image.

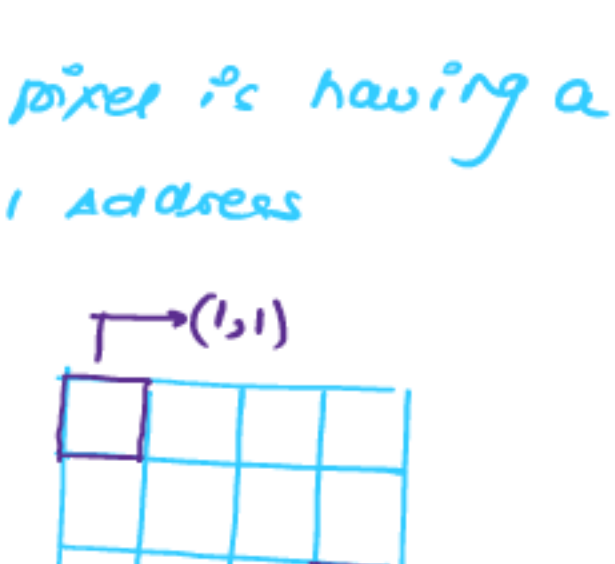
Pixel value Ranges from (0 - 255)
→ 8 bit

Pixel ⇒ sp. format
Dot.

basic building block of image.

pixel / inch [↑] quality [↑]

Every pixel is having a logical address



pixel value ranges from 0 to 255

[0] Represents absence of light, dark.

[255] Represent presence of light.

Application.

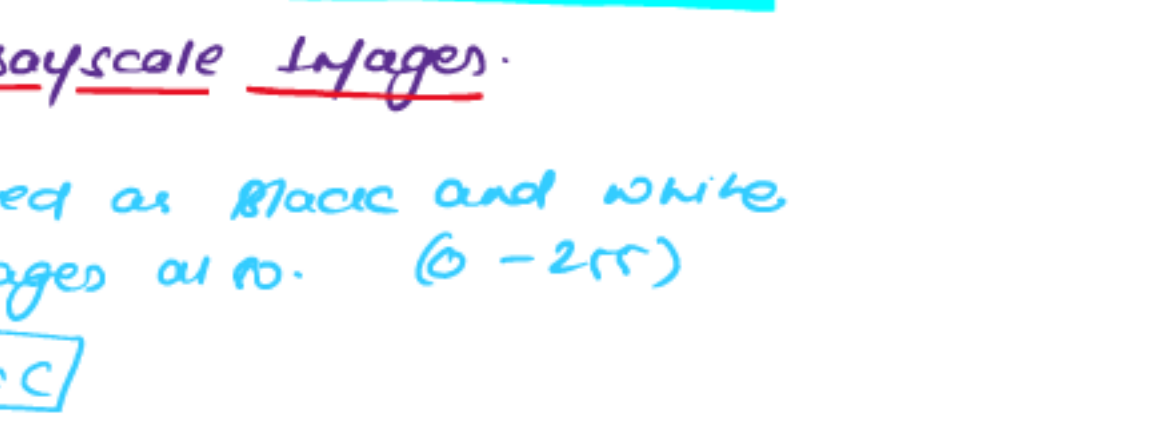
1. Image processing
2. blurr image.
3. sharpen image.
4. enhance image
5. object detection.

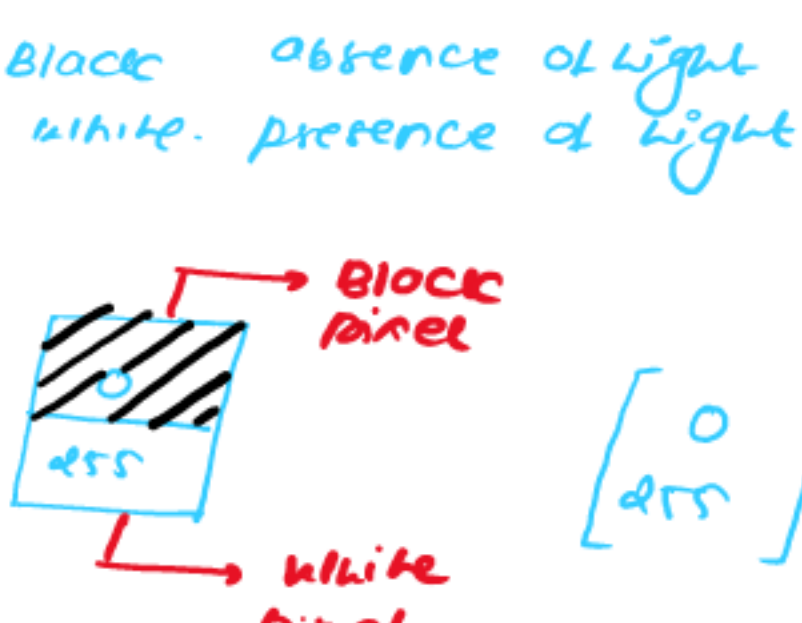
grayscale images.

Called as black and white images also. (0 - 255)

[R×C]

0 = Black absence of light
255 = white. presence of light



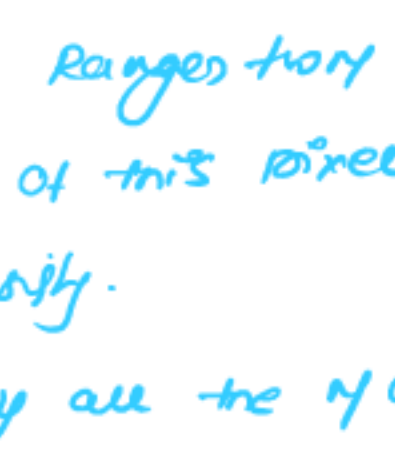


grayscale image = [Channel 1]

RGB Images.

Image consist of many colours and almost all colours can be generated from 3 primary colours

R G B
R → Red
G → green
B → Blue.



RGB Images [Channels = 3]

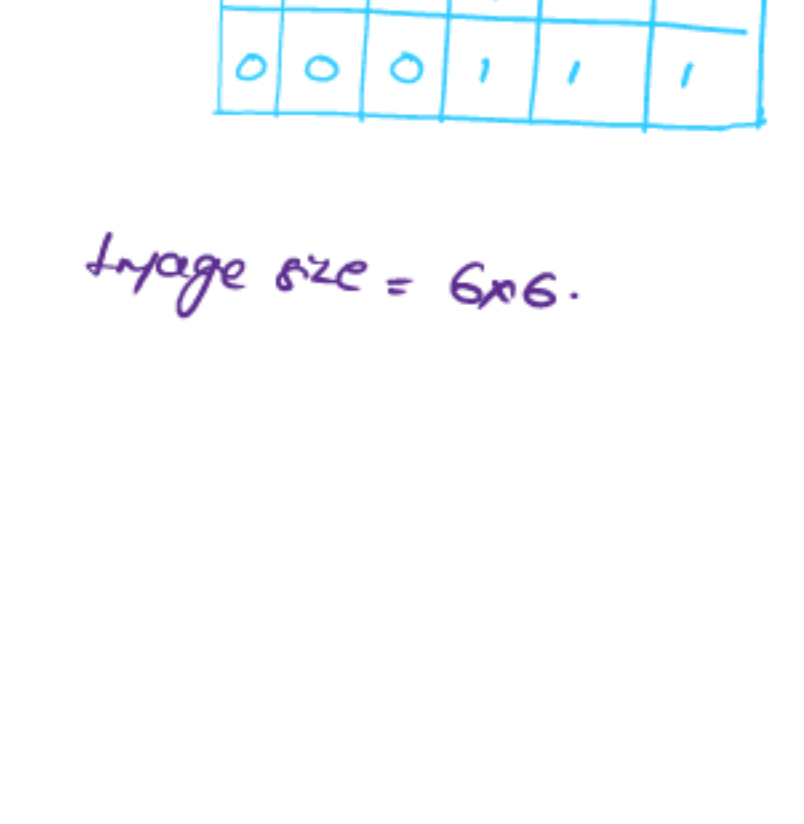
now each of this matrix has value ranges from 0 to 255
each of this pixel represent intensity.
finally all the matrices are super imposed.

	R	G	B
Red.	255	0	0
Blue	0	0	255
green.	0	255	0
magenta.	70	120	210
pink	120	40	160

[2×2]
$$\begin{bmatrix} 0 & 255 \\ 0 & 255 \end{bmatrix}$$

[2×2]
$$\begin{bmatrix} 255,0,0 & 0,255,0 \\ 0,0,255 & 120,40,160 \end{bmatrix}$$

Convolution.



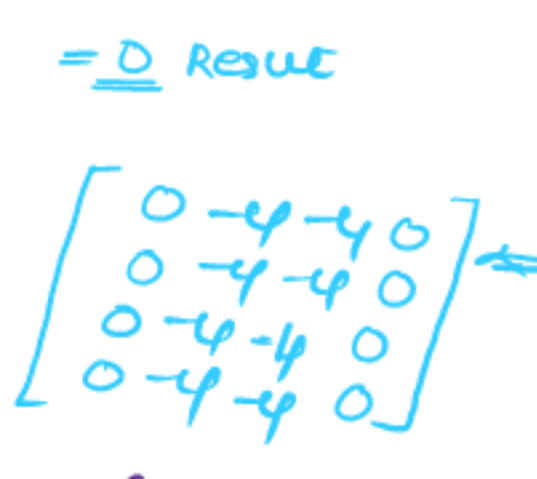


Image size = 6×6.

= 1×0 + 0×0 + (-1)×0
+ 2×0 + 0×0 + (-2)×0
+ 1×0 + 0×0 + -1×0

= 0 Result

$$\begin{bmatrix} 0 & -4 & -4 & 0 \\ 0 & -4 & -4 & 0 \\ 0 & -4 & -4 & 0 \\ 0 & -4 & -4 & 0 \end{bmatrix}$$ ⟸ Result

feature map

filters

Road Building car man. | man. skin feet | specs face | nose eyes hairs →

primitive features. → complex features.
4L1 → 420

cat / dog / size

whenever intensity of light changes is called as edge.

Image blurr
Image sharpen
Horizontal edge
vertical edge
Diagonal

Each value of filter are being learnt during the training process.

filter Represent the kind of feature that we are looking for in an image.

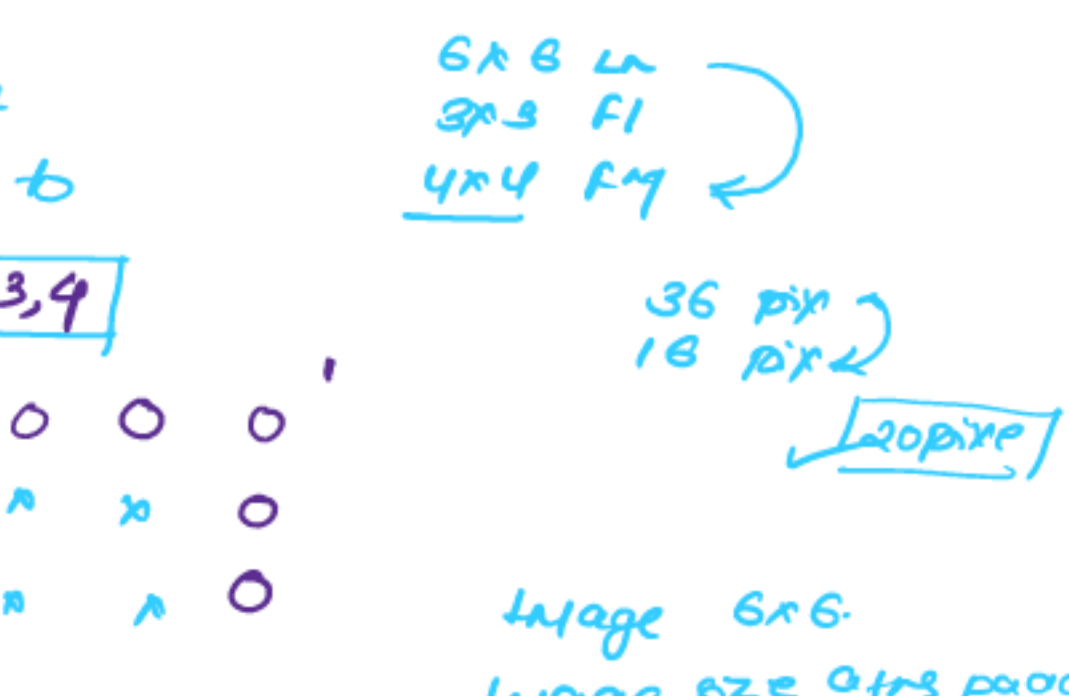
6×6 Image. 3×3 filter. 4×4 feature map.

1 → 1, n
2 → 1, 2, 3, 4

n − f + 1 = FM
(n → image, f → filter)

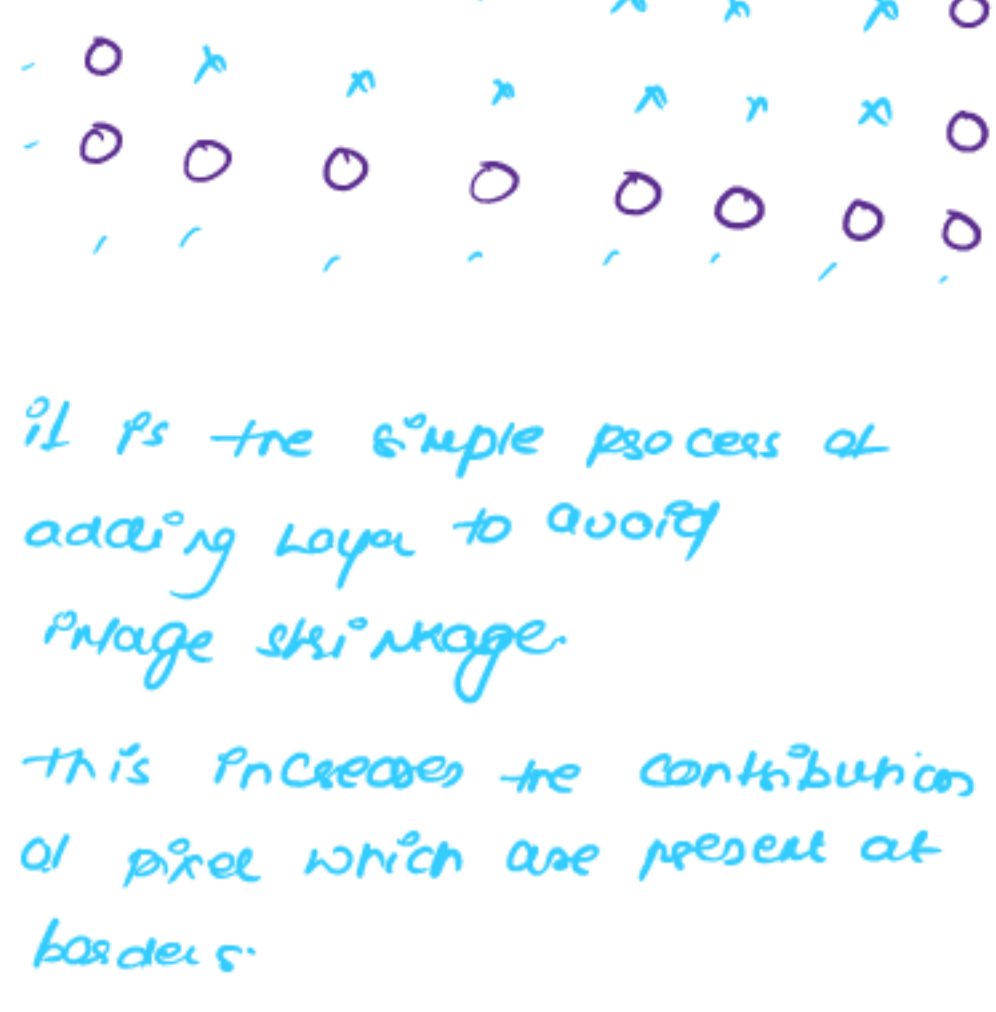
6 − 3 + 1 = [4×4]

[16] [36] [20 pix]



padding

padding is nothing but adding a image layer to avoid shrinkage. [1,2,3,4]



6×6 in
3×3 f
4×4 fm

36 pix
16 pix
[20 pixel]

Image 6×6.
Image size after padding = 8×8

n + 2p − f + 1 = FM
(p → padding, f → filter, n → Image)

8 + 2×1 − 3 + 1
= [8×8] 64
[8×8] 64
(No) data loss

it is the simple process of adding layer to avoid image shrinkage.

this increases the contribution of pixel which are present at borders.

Strides.

generally speaking smaller the steps you take when sliding the filter on our image, more the details you capture as reflected in feature map.

stride jump [↑]   feature capture [↓]