Morphological Processing:
In Morphological processing of an images, the objects are processed in the input image, based on the characteristics of object structure and shape. It has two parts:

- Boundary
- Region

Parts of image:
Images has two parts:

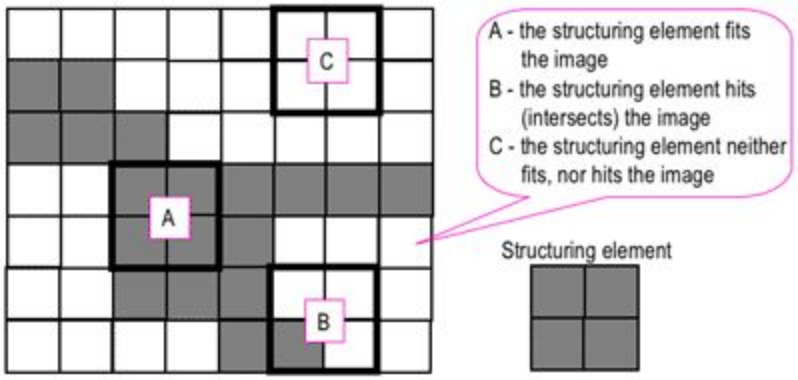
- Foreground(1 value): is an interesting object in the image or a moving part.
- Background(0 value): is not an interesting region of the image or a static part.

Some operations test whether the element "fits" within the neighbourhood, while others test whether it "hits" or intersects the neighbourhood:

Structuring Element:
Is the morphological technique to probe (find all possible locations in the image and it is compared with the corresponding neighbourhood of pixels) an image. Structuring elements in the image filter the foreground, so that object could be easily detected.

Operation Used for Structuring elements:
Following three features/operations are used for structuring elements.

- Fit (check whether elements/pixels **fit** within the input image/neighbourhood.)
- Hit (check whether some values of the pixels are missing)
- Miss (neither fit nor hit the image)



Fundamental Operation for Structuring Elements:
Two operations are used for structuring element:

1. Erosion
2. Dilation

Erosion:
Is the removal (zoom out)of the pixels to the boundaries of objects in an image.

Formula:

$$g(x,y) = \{1, \ if\ hit$$
$$0, \ otherwise\}$$

Use of Erosion operation:
It is used for the following purpose:

- Image Smoothening
- For Noise Removal
- Shrinking Object (sharpening the boundaries)
- Overlapping images can be separated by using erosion.

Dilation:

Is the addition (zoom in) of the pixels to the boundaries of objects in an image.

Formula:

$$f + s = \{1, \ if \ fit$$
$$0, \ otherwise\}$$

Uses/ Advantages of Dilation Operation:

- It is used for feature exploration (like text in an image)
- It increases the size of an image
- Used for repairing breaks (by expanding the boundary, edges can be smoothen) in the image
- For the smoothning (expanding the boundary, edges can be smoothen) of the corner of the image

Compound operation:

Compound operation is the combinations of erosion and dilation.It basically gives the **complement** of a binary image.

It also has two operations:

1. Closing:
   In closing operation first the image is dilated and then erosion is applied.
2. Opening:In opening operation first the boundaries are removed (erosion) then image is expand (using dilation operation)

Applications of compound operation (erosion+dilation):

- It is use for boundary extraction
- Region filling