Structuring element

- Morphological techniques probe an image with small shape or template.

- is positioned at all possible locations in the image and it is compared with corresponding neighbourhood of pixels.

- is small binary image, (i.e) a small matrix of pixels, each with a value of zero or one.

- Pattern of ones and zeros specifies the shape of structuring element.

- have varying sizes
- Values are 0, 1 and none (!)
- have an origin
- Empty spots are don't care's

Erosion

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Erosion

- is one of two basic operations in the area of mathematical morphology and dilation.

- It is typically applied to binary images, but there are versions that work on grayscale images.

- The basic effect of the operator on a binary image is to erode away the boundaries of regions of foreground pixels.

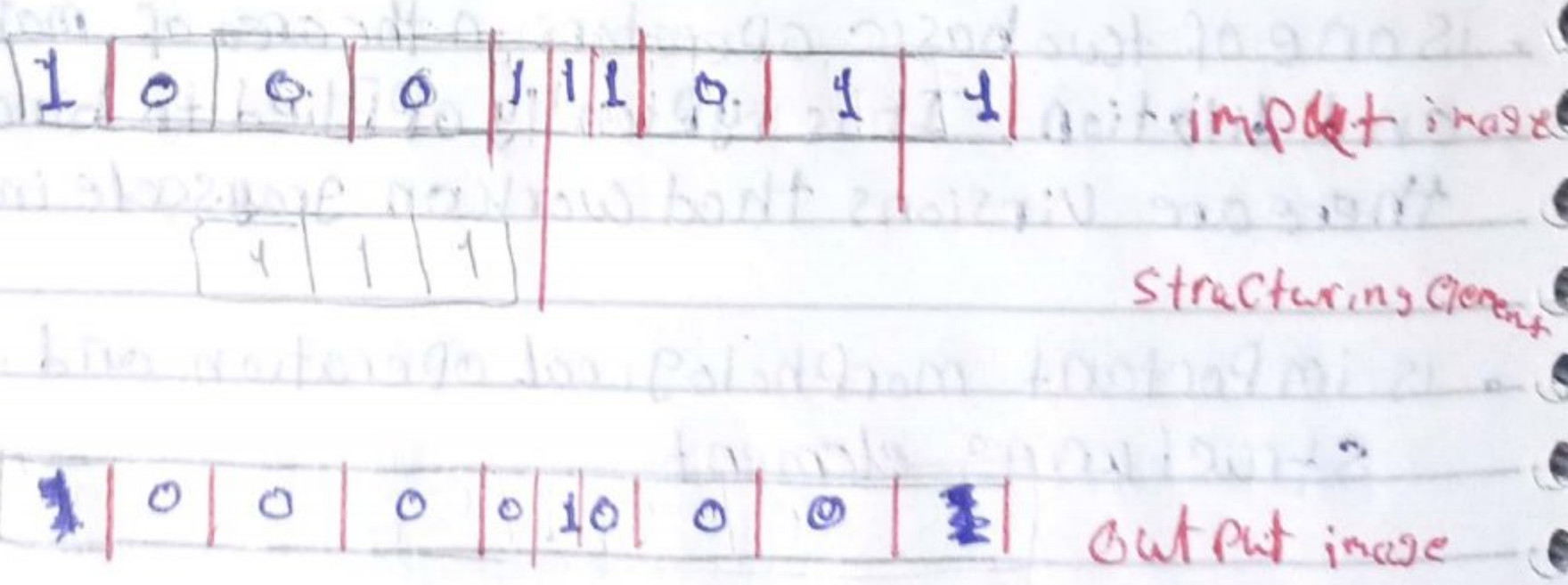
- The areas of foreground pixels shrink in size, while holes within those regions become larger

- is important morphological operation

- Applied Structing Element

- is the set of all points in the images, where structuring elements "fits into"

example:



- Erosion shrink foreground, enlarge background

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Dilation.

- is one of two basic operators in the area of mathematical morphology and erosion.

- It is typically applied to binary images, but there are versions that work on grayscale images.

- The basic effect of operator on a binary images is to gradually enlarge the boundaries of regions of forgrand pixels

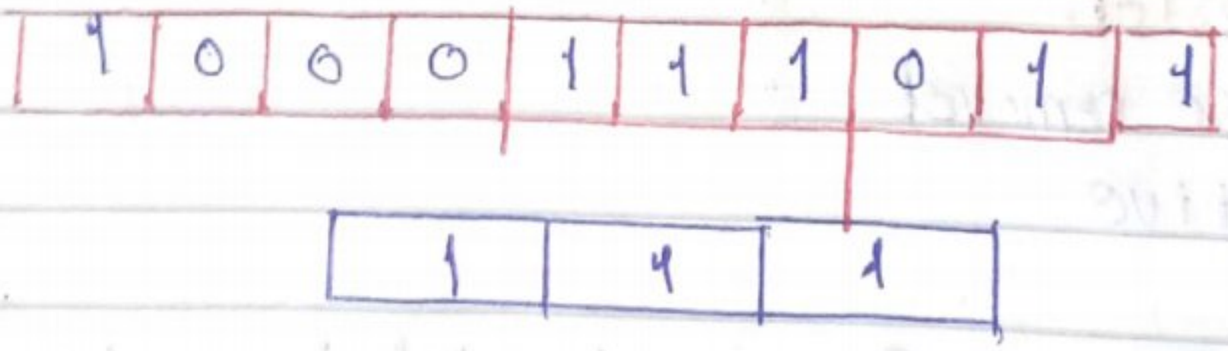
- The areas of forground pixels grow in size, while holes within those regions become smaller.

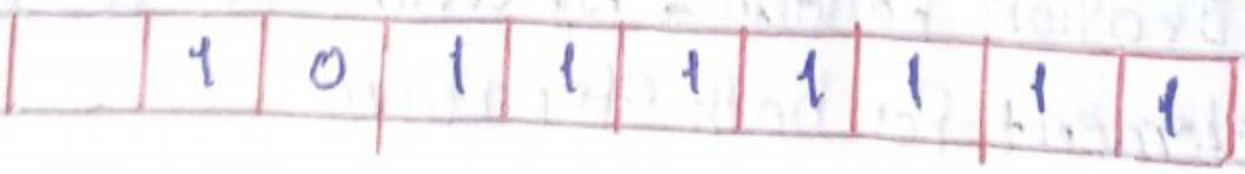
- is important morphological operation

- is Applied structuring elements

- is the set of all points in the images, where structuring elements "touches" foreground.

example:





- Dilation enlarge foreground, shrink bachgroung.

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opening

- is an important operator from the field of mathematical morphology.

- it can be derived from fundamental operations of erosion and dilation

- it is normally applied to binary images, although they are graylevel versions.

*- opening is similar in some ways to erosion. That tends to remove some of foreground pixels from edges of regions of foreground pixels.

*- it is less destructive than erosion in general.

*- The exact operation is determined by a structuring element.

*- The effect of the operator is to preserve foreground regions that have similar shape to this structurig element

*- Similar to erosion
  - spot and noise removel
  - less destructive

*- is defined as Erosion followed by dilation using same structuring element for both operations.

*- Take the (SE) and slide it around inside each foreground region

Opening

- All pixels which can be covered by SE with the SE being entirely within the foreground region will be preserved.

- All foreground pixels which can not be reached by the structuring element without lapping over edge of the foreground object will be eroded away.

- opening the foreground pixels with particular SE

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Closing

- is an important operator from the field of mathematical morphology

- it can be derived from fundemental operations of erosion and dilation.

- it is normally applied to binary images, although they are graylevel versions.

- Closing is similar in some way to dilation, that tends to enlarge boundaries of foreground regions in image and shrink background color holes in regions.

- it is less destructive than origical boundary shape.

- the exact operation is determined by SE.

- The effect of the operator is to preserve background regions that have similer shape to this SE

- Similar to Dilation
  - Removel of holes
  - tends to enlarge regions, shrink background.

- is defined as Dilation followed by an Erosion using same SE for both operations

* Take SE and slide it around outside each forground region.

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Closing

- All pixels which can be covered by SE with SE being entirely within background region will be preserved.

- All background pixels which can not be reached by the SE without lapping over edge of the foreground object will be turned into a foreground

- Closing the background pixels with particular SE.

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Thining

- Thining is a morphological operation that is used to remove selected foreground pixels from binary images, like erosion or opening.
- it has several applications, but usfel for Skeletonization.
- Thining is normally only applied to binary images, and produces another binary image as output.
- Used to remove selected foreground pixels.
- If foreground and background Fit exactly the SE, then set the pixel at it's origin to 0!
- The value of SE at the origin is 1 or don't care

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Thinking

- Thinking is a morphological operation that is used to grow selected foreground pixels from binary images, like dilation or closing.

- it has several applications, including:
  - determing approximate convex hull of shape
  - determing skeleton by zone of influence.

- Thinking in normally only applied to binary images, and produces another binary image as output.

- used to grow selected foreground pixels.

- If foreground and background fit exactly the SE, the set the pixels at it's origin to 1!

- The value of SE at orgin is 0 or don't care.

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Hit-and-miss transform

- is a general binary morphological operation that can be used to look for particular patterns of foreground and background pixels in image.

- ~~It is actually~~
- It is actually the basic operation of binary morphology since almost all other binary morphological operators can be derived from it.

- It takes as input a binary image and a structuring element and produces another binary image as output

- very simple object recognition

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