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FACULTY OF ENGINEERING

Digital Image Processing LECTURE-28

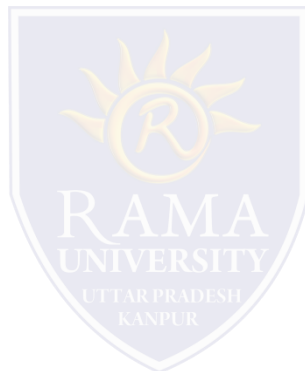
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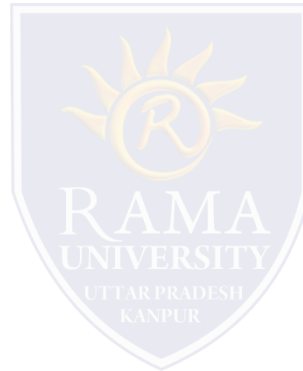
OUTLINE

- ❖ **Extraction of Connected Components**
- ❖ **Boundary Extraction**
- ❖ **Convex Hull**
- ❖ **MCQ**
- ❖ **References**



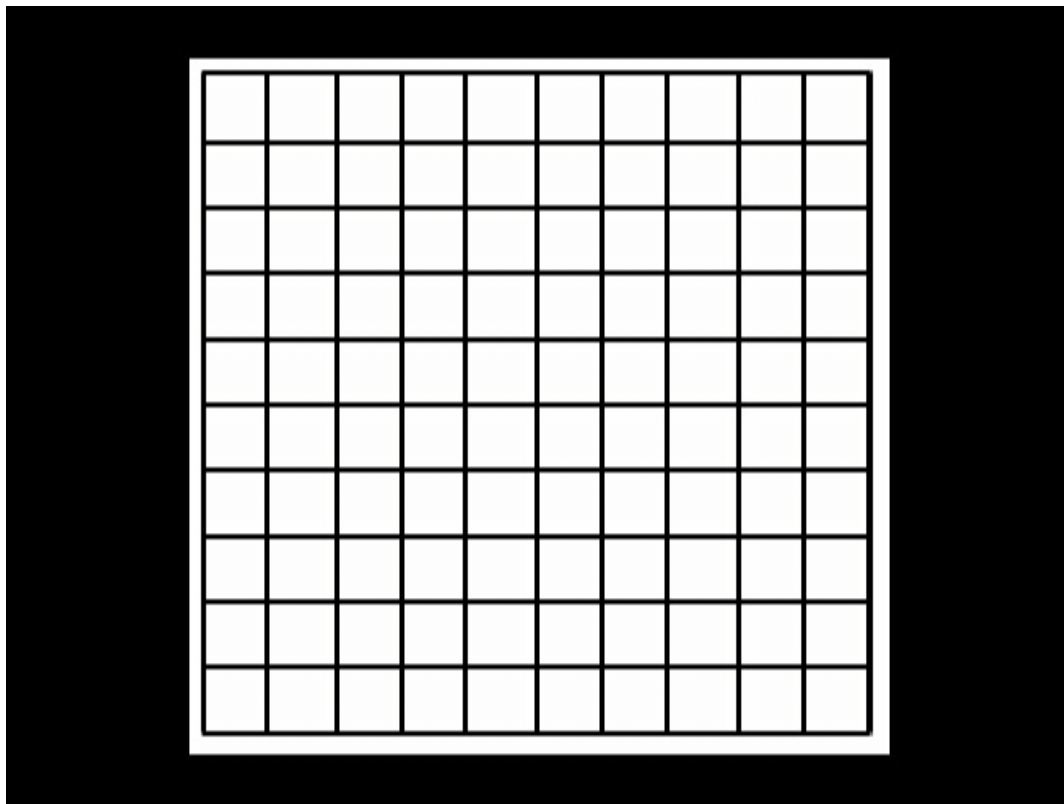
Extraction of Connected Components

- This algorithm extracts a component by selecting a point on a binary object A
- Works similar to region filling, but this time we use in the conjunction the object A, instead of it's complement



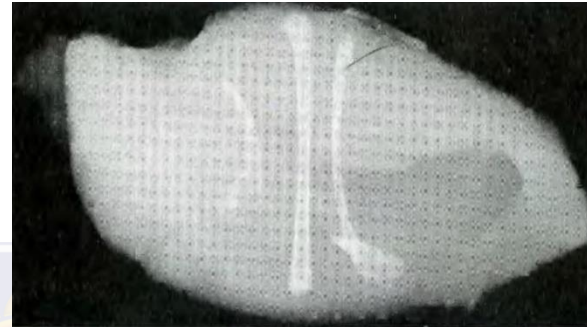
Extraction of Connected Components

$$X_k = (X_{k-1} \oplus B) \cap A$$



Boundary Extraction

- This shows automated inspection of chicken-breast, that contains bone fragment



- The original image is thresholded



- We can get by using this algorithm the number of pixels in each of the connected components

- Now we could know if this food contains big enough bones and prevent hazards



Connected component	No. of pixels in connected comp
01	11
02	9
03	9
04	39
05	133
06	1
07	1
08	743
09	7
10	11
11	11
12	9
13	9
14	674
15	85

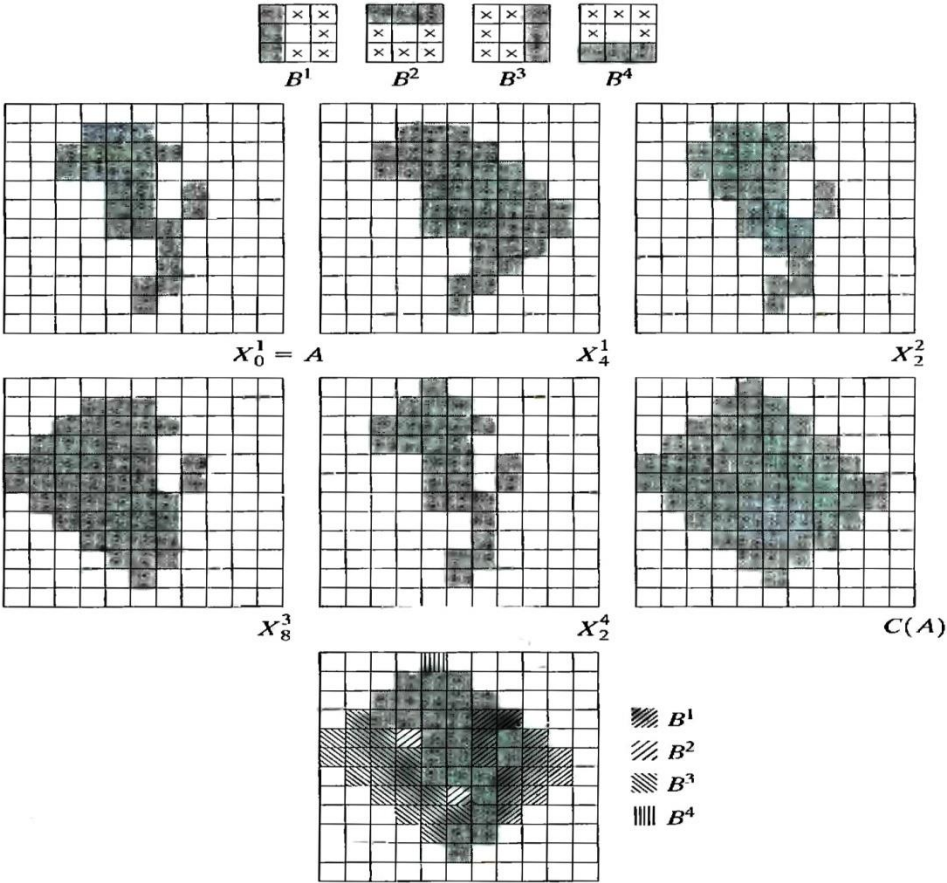
Convex Hull

- A is said to be convex if a straight line segment joining any two points in A lies entirely within A
- The convex hull H of set S is the smallest convex set containing S
- Convex deficiency is the set difference H-S
- Useful for object description
- This algorithm iteratively applying the hit-or-miss transform to A with the first of B element, unions it with A, and repeated with second element of B

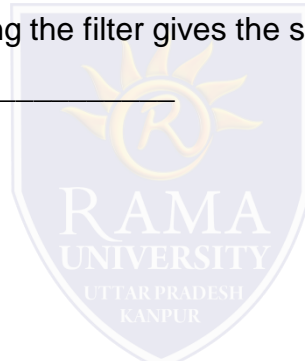


$$X_k^i = (X_{k-1} \otimes B^i) \cup A$$

Convex Hull



1. What is the Second Derivative of Image Sharpening called?
 - a) Gaussian
 - b) Laplacian
 - c) Canny
 - d) None of the mentioned
2. The ability that rotating the image and applying the filter gives the same result, as applying the filter to the image first, and then rotating it, is called _____
 - a) Isotropic filtering
 - b) Laplacian
 - c) Rotation Invariant
 - d) None of the mentioned
3. For a function $f(x,y)$, the gradient of 'f' at coordinates (x,y) is defined as a _____
 - a) 3-D row vector
 - b) 3-D column vector
 - c) 2-D row vector
 - d) 2-D column vector



4. Where do you find frequent use of Gradient?

- a) Industrial inspection
- b) MRI Imaging
- c) PET Scan
- d) None of the mentioned

5. Which of the following occurs in Unsharp Masking?

- a) Blurring original image
- b) Adding a mask to original image
- c) Subtracting blurred image from original
- d) All of the mentioned



References

- <https://www.javatpoint.com/digital-image-processing-tutorial>
- Henry Sambrooke Leigh, Carols of Cockayne, The Twins Morphological Image Processing (Digital Image Processing – Gonzalez/Woods)
- <https://www.geeksforgeeks.org/>
- Digital Image Processing 2nd Edition, Rafael C. Gonzalvez and Richard E. Woods. Published by: Pearson Education.
- Digital Image Processing and Computer Vision, R.J. Schalkoff. Published by: JohnWiley and Sons, NY.
- Fundamentals of Digital Image Processing, A.K. Jain. Published by Prentice Hall,Upper Saddle River, NJ.

