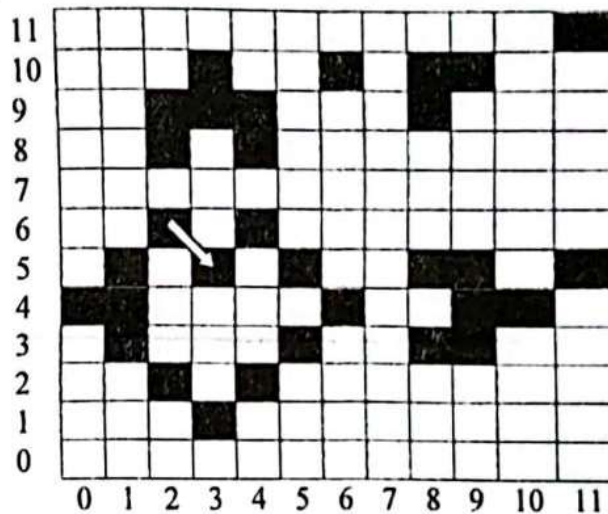# Chapter 11: Image Representation (Boundary-Chain Code)

Origin42

b) i. Suppose we have a 3x3 image with values as [(3, 7, 6), (2, 5, 8), (3, 4, 7)]. Using [8] Sobel operator on the image illustrate the gradient magnitude image. Also, find the edge direction of central pixel. [4]

ii. Consider the following image where each black square denotes a point and the numbers are the coordinates.

Find the Chain Code of the above image that is invariant in starting point and rotation. An arrow marks the reference pixel and the direction. Use 8-neighbor relationship. [4]

6.b.ii Solution:
Swarna(061)
Chain Code: 7177555333021
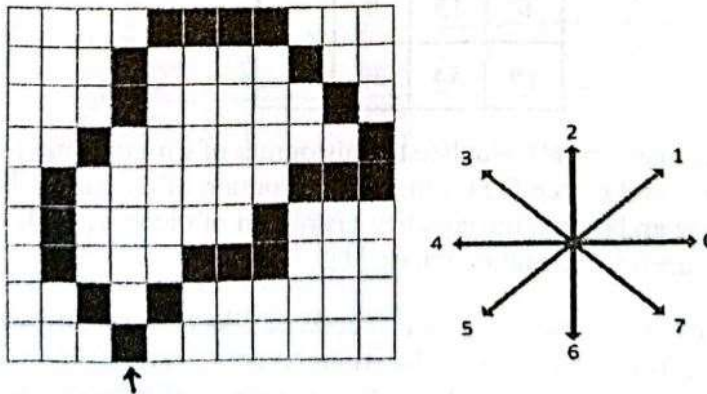**Circular First Difference (CFD):** 3606006005276
Normalized CFD: 0060052763606

Enigma41

1.

b) Consider the following boundary (in anticlockwise direction): [6]

i. What is Chain Code? Describe the Problems in Chain Code Representation. [3]
ii. Compute the Chain Code that is invariant to both starting point and rotation. [3]
[Use 8-neighbor relationship]

1.b. .i. Solution: 024
Chain Code: A technique to represent the region or object by describing its contour.

Problems in chain code:
1. Long distance of code
2. Easily disturbed by noise and sidetrack
3. Start number selection

1.b. .ii. Solution: 024, Correction: 015
Chain Code: 33221121000777644564455
Circular First Difference (CFD): 07070177007007601160106
Normalized CFD: 00700760116010607070177

This is the invariant chain code.
CFD and NCFD same hobe nah ? as CFD er surute 0 ache?

Question 4. [Marks: 14]

a) The following image shows a 3-bit 4x4 image (left) and a Laplacian filter (right). Now, **[8]** Find the followings:

	0	1	2	3
0	7	1	0	5
1	6	3	6	2
2	6	4	4	1
3	1	5	7	0

0	1	0
1	-4	1
0	1	0

 i. the output of 3x3 mean filter at point (2,2). [2] → 4
 ii. the output of 3x3 median filter at point (0,0). [2] → 0
 iii. the output of Laplacian filter at point (1,1). [2] → 5, 2
[Use zero padding for edge pixels]

 iv. Explain why the output of applying a median filter preserves more edge sharpness in compared to that of applying a mean filter. [2]

4.a. Solution: chapter 3

Recursive40

Question 7. [Marks: 14]

a) What is image representation? What information we can use to represent an image? What is **[8]** Chain Code? Describe the Problems in Chain Code Representation. Find the Chain Code of the following image. An arrow marks the reference pixel and the direction. [Use 8-neighbor relationship].

7.a. Solution:45

Image Representation

Objective:

To represent and describe information embedded in an image in other forms that are more suitable than the image itself.
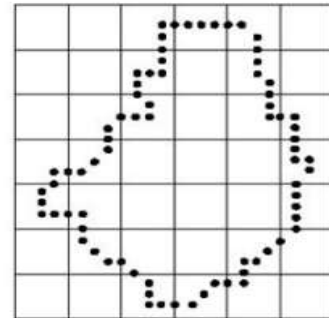
Benefits:

- Easier to understand
- Require fewer memory, faster to be processed
- More "ready to be used"

What kind of information we can use?

- Boundary, shape
- Region
- Texture
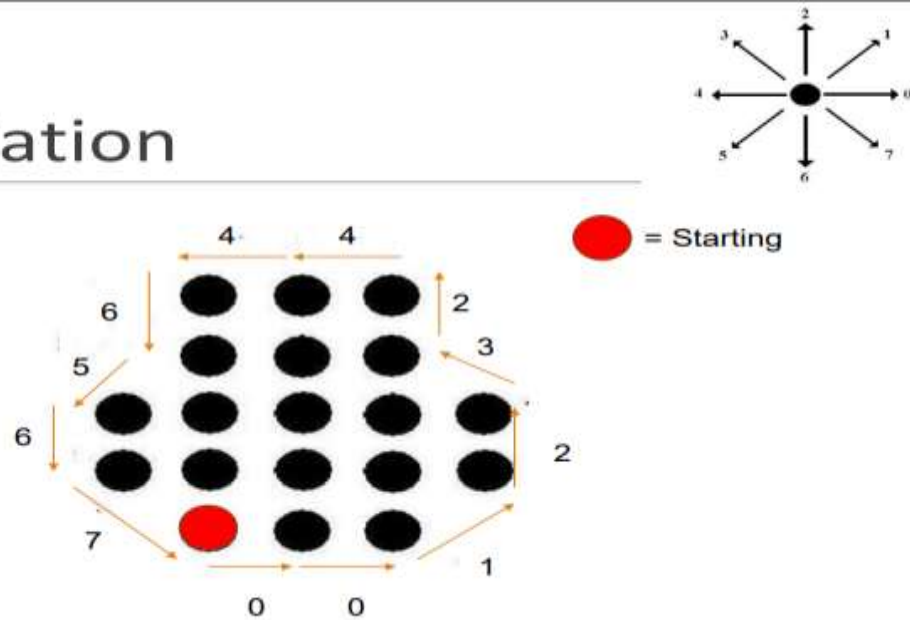- Relation between regions

Problem#1:

- Long chains of codes

- No invariance to Rotation and Scale

- Sensitive to Noise

Solution:

- Re-sample the image to a lower resolution before calculating the code
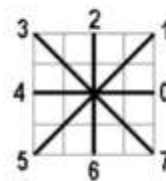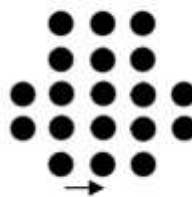
Simulation

= Starting

Return38

6.

a) Consider the following image: **[2]**

11

Compute the chain code that is:
  i.   Invariant to starting point.
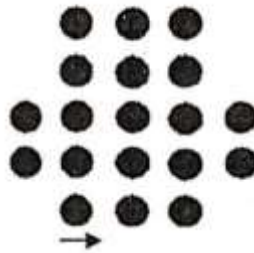 ii. Invariant to both starting point and rotation.

[The reference pixel and the direction are marked by an arrow, use 8-neighbor relationship.]

Solution: starting point ta ki last row 2nd point theke start hobe? Kew confirm kor..
(Last row first point theke start hobe.. Direction right side e) Bindu-126

2.

b) What is Chain Code? Find the Chain Code of the following image. The [4] reference pixel and the direction are marked by an arrow. [Use 8-neighbor relationship].

Solution:

⊘ **Part B**