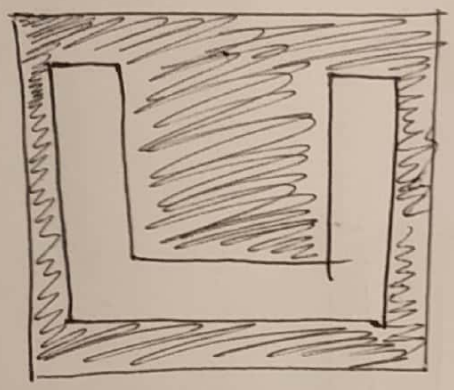
Computer Vision &
Image Processing (HW 3)
CSE 573

Pranav Vij
50290588

on I

A -

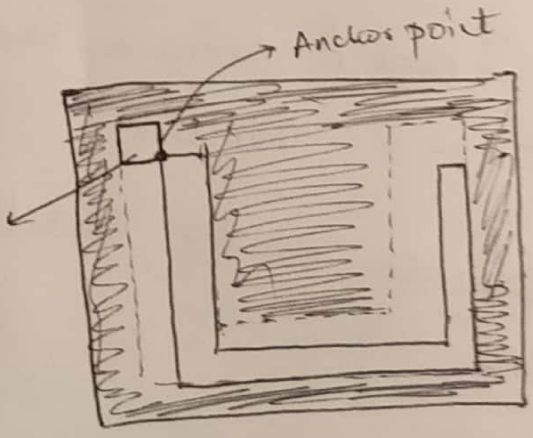


a) for shrinking the image, we will use following step

1.) Erosion with a square structuring element (B)

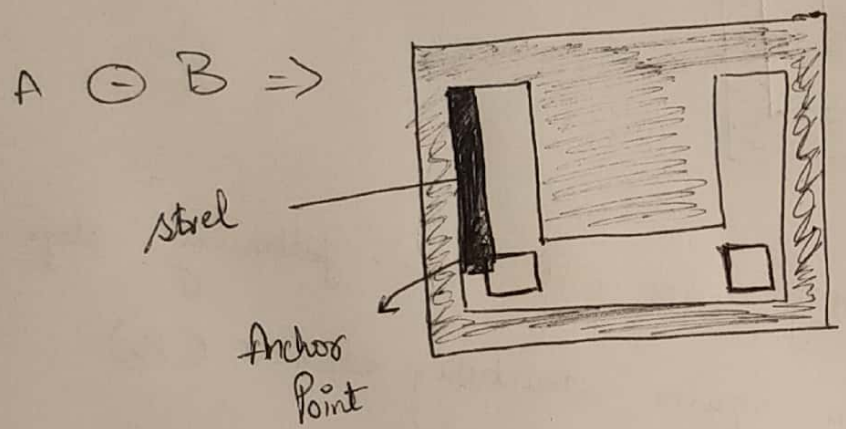
2) Translate the new image by 1

A ⊖ B ⇒



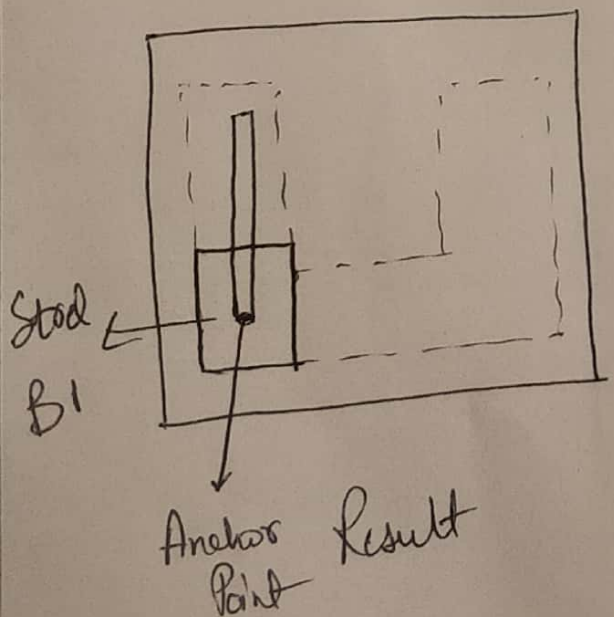
structuring element

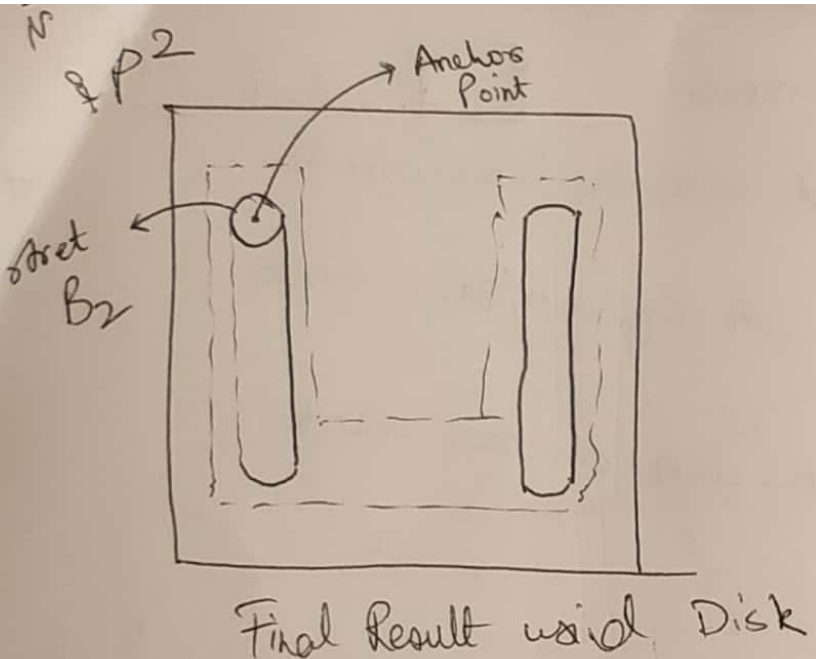
b) Choosing a structural element such that the middle /horizontal part is removed and anchor of the steel is at the bottom. After that we perform erosion



c) ① Erosion on Image A using a Rectangular Steel (B1) to squeze it in a thin line

② using Dilation on the result from 1



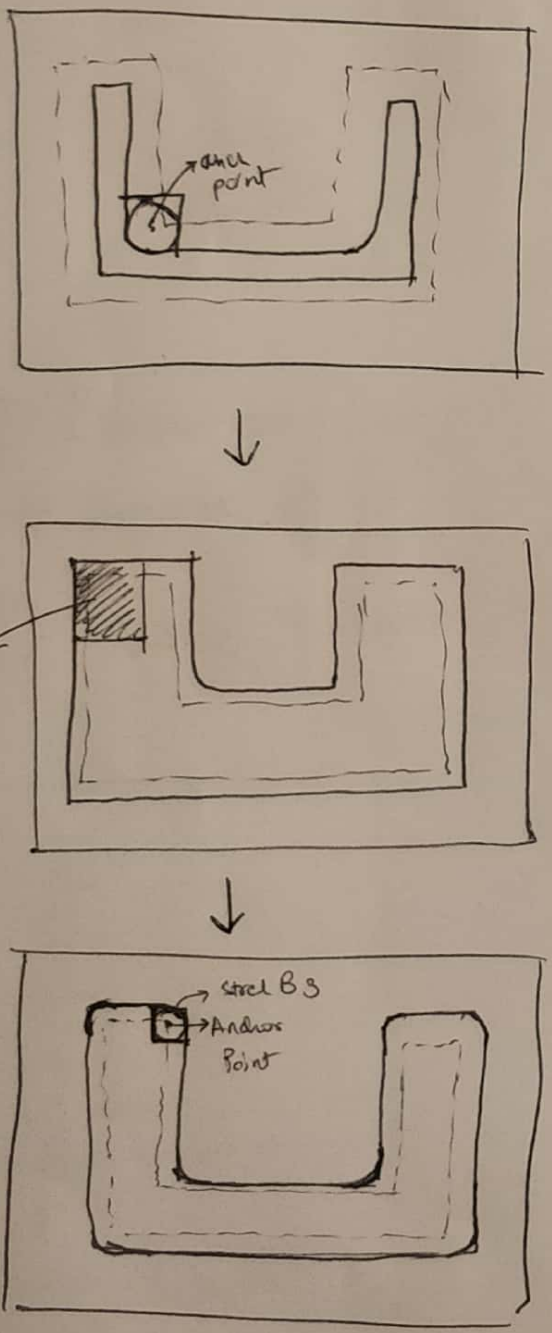


Final Result using Disk

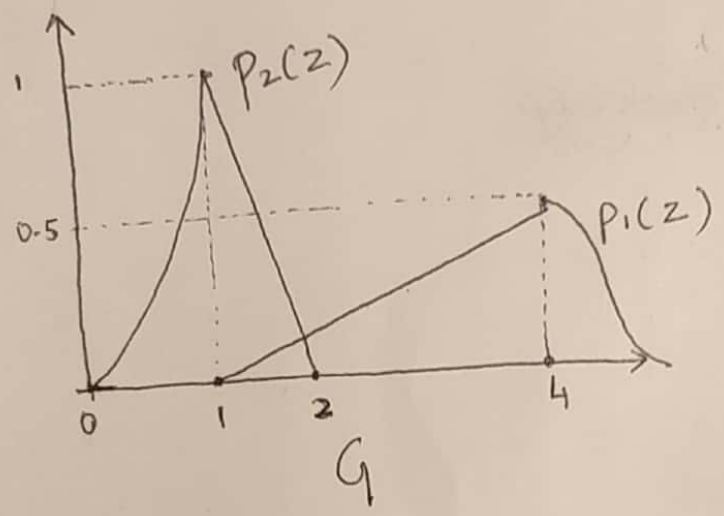
d) 1.) Erode the image with circle  which will shrink the image and make the inner portion curved.

2.) Dilate the result with Square of same size

3.) then erode with semi circle on the result



ion - 2



G

- for P_2 Calculation

Points Passing through l_2 are (2,0) & (1,1)

Eqn of line $l_2 = 2 = x + y$

- for P_1 Calculation

Points Passing through l_1 are (1,0) & $(4, \frac{1}{2})$

Eqn of line l_1 $\quad 1 = x - 6y$

for find T for $P_1 p_1(T) = P_2 p_2(T)$

$$P_1\left(\frac{T-1}{6}\right) = P_2(2-T)$$

$$\therefore T = \frac{12P_2 + P_1}{P_1 + 6P_2}$$

If $P_1 = P_2$, the optimum threshold is where $P_1(z)$ and $P_2(z)$ intersect the Graph G.

$$T = 13/7$$

Prob 3.

i) $y = x - 2$

$y - x = -2$

$x - y = 2$

$\frac{x}{\sqrt{2}} - \frac{y}{\sqrt{2}} = \sqrt{2}$

$\theta_1 = \sin^{-1} \frac{1}{\sqrt{2}}$ | $\theta_1 = \sin^{-1} \frac{1}{\sqrt{2}}$

$\theta_1 = -\pi/4$ $\quad p = \sqrt{2}$

ii) $y = 1 - x/2$

$\frac{x}{2} + y = 1$

$x + 2y = 2 \Rightarrow \frac{x}{\sqrt{5}} + \frac{2y}{\sqrt{5}} = \frac{2}{\sqrt{5}}$

$\theta_2 = \sin^{-1} \frac{2}{\sqrt{5}}$ $\quad \theta_2 = \cos^{-1} \frac{1}{\sqrt{5}}$

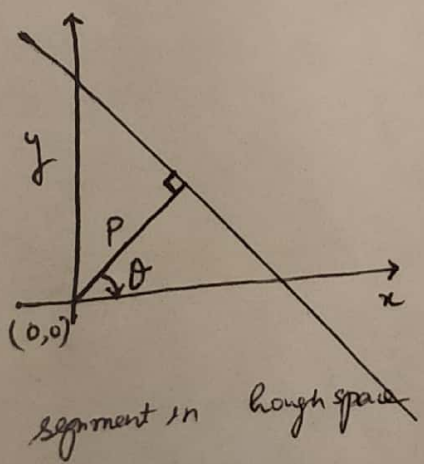
$\theta_2 = \tan^{-1} 2$ $\quad p = 2/\sqrt{5}$

b) The polar representation of a line is represented as

$x \cos\theta + y \sin\theta = p$ — 1

where p is perpendicular distance to the line to origin

θ angle made with x-axis



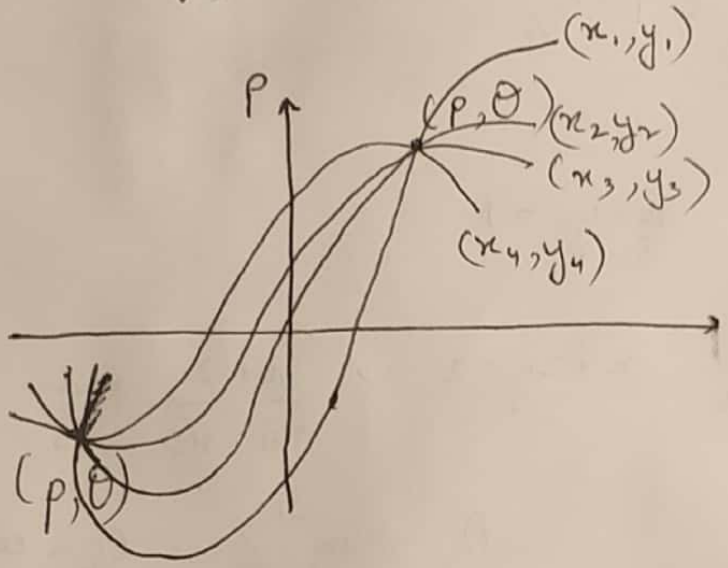
segment in hough space

Considering M points on the ~~polar~~ coordinate system and substituting it to the line equation 1.

The M points generates M curves on the (ρ, θ) plane intersecting same (ρ_i, θ) cell.

The sinusoidal curve intersects at point (ρ, θ) for all M points.

for (x_i, y_i) below graph is created



Therefore, for different points (x_i, y_i) $0 \leq i \leq n$, the polar representation has different sinusoidal curve with varying amplitude & frequency.