

EXPLORE AI 1.0 Hackathon **Team:**

Algo-Unlock

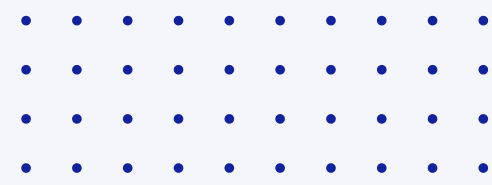
Problem Statement: Curve/No Curve Detection

Members: Syna (Leader)

Ashwin Kumar, Bhavik Singla

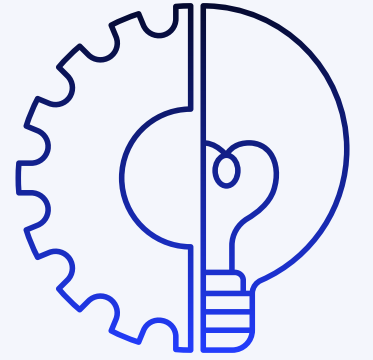
Contact us at: +91 96717 78900




syna2386.be21@chitkara.edu.in

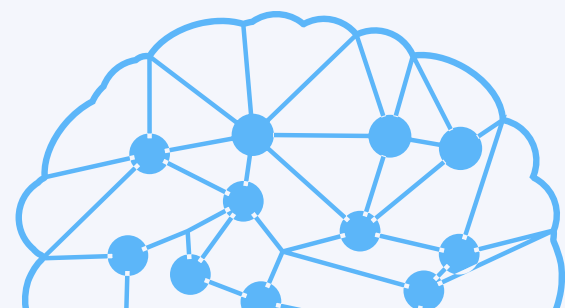




Our Approach

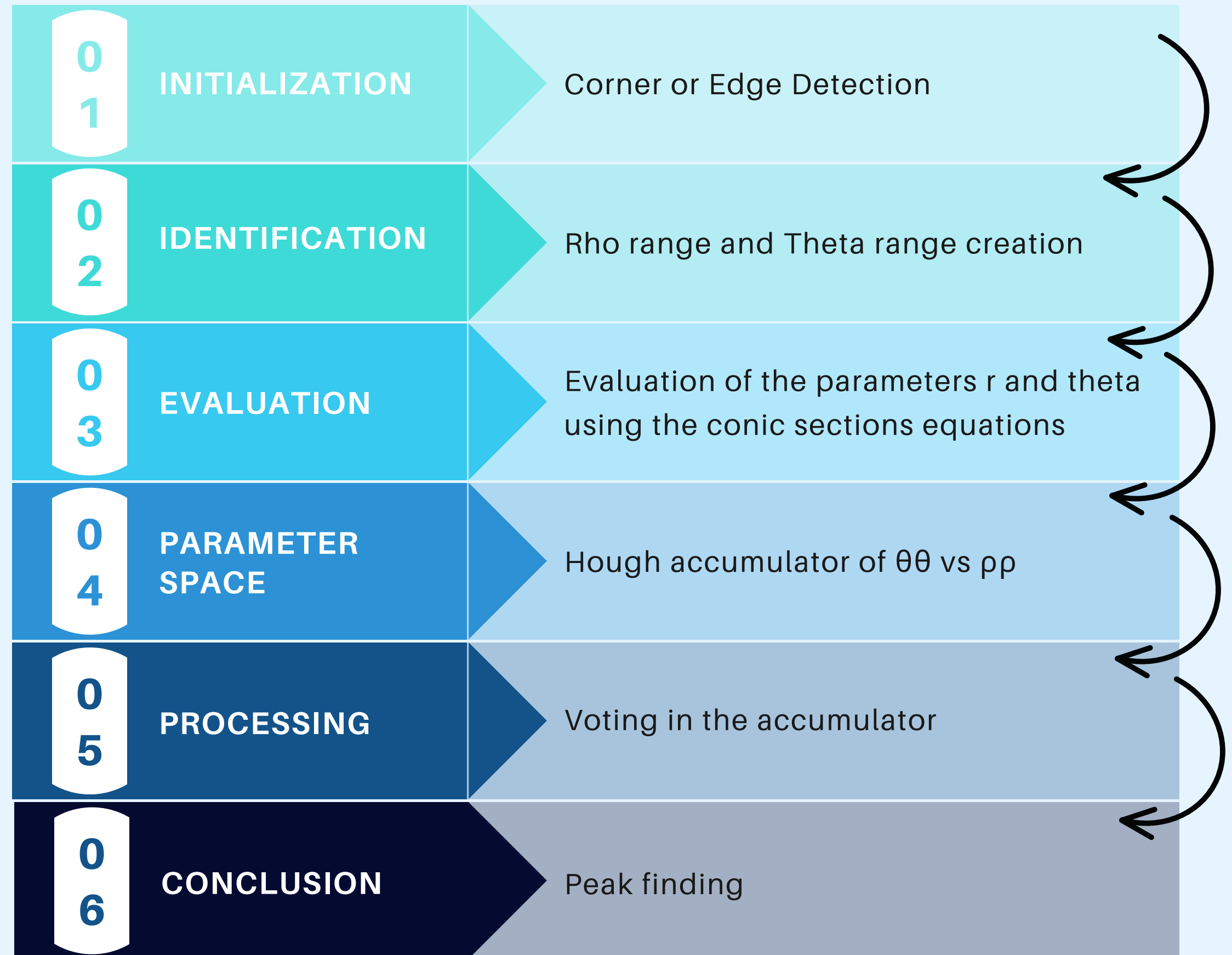


-  Hough transform is commonly used to detect linear features in images. Lines are mapped to vertices in parameter space that match the line parameters. Arbitrary (nonparametric) curves can also be detected or analyzed using the Rein-Hough transform by analyzing the shape or location of peaks in parameter space.
-  There is a one-to-one relationship between the curve in image space and the vertex position in parameter space, and the full curve can be reconstructed from the peak points. It is shown that the shape of the curve can be simplified by ignoring which is part of the vertex region.
-  One such simplification is to derive the convex hull of the shape directly from the representation within the Hough transform. It is also shown that the drop parameters of ellipse can be measured directly from the Hough transform.





Technical Architecture



Algorithm

Extract edges of the image

- 01 Initialize parameter space r, θ
- 02 Create an accumulator array and initialize it to zero
- 03 for each edge pixel
- 04 for each θ
- 05 Calculate $r = x \cos(\theta) + y \sin(\theta)$
- 06 Increment accumulator at r, θ
- 07 Find Maximum values in the accumulator (lines)
- 08 Check, whether the line detected, is a tangent to a curve in conic sections or not, using the following equations:-
 - $xx_1 + yy_1 + g(x+x_1) + f(y+y_1) + c = 0$ (Circle)
 - $a \sin^2 \theta + p \cos \theta = 0$ (Parabola)
 - $[x/a] \cos \theta + [y/b] \sin \theta$ (Ellipse)
 - $(x \sec \theta)/a - (y \tan \theta)/b = 1$ (Hyperbola)
 - $(y-y_0) f'(x_0) + (x-x_0) = 0$ (Generalized)
- 09 Extract related r, θ
If, the equation is satisfied return 1, else 0

