"Convex Hull Polygon Calculator with Visualization"

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Problem Statement:

For given set of user-defined 2D points, calculate the smallest convex polygon (Convex Hull) enclosing all points and computation of :Area, Perimeter, Inradius, Circumradius .

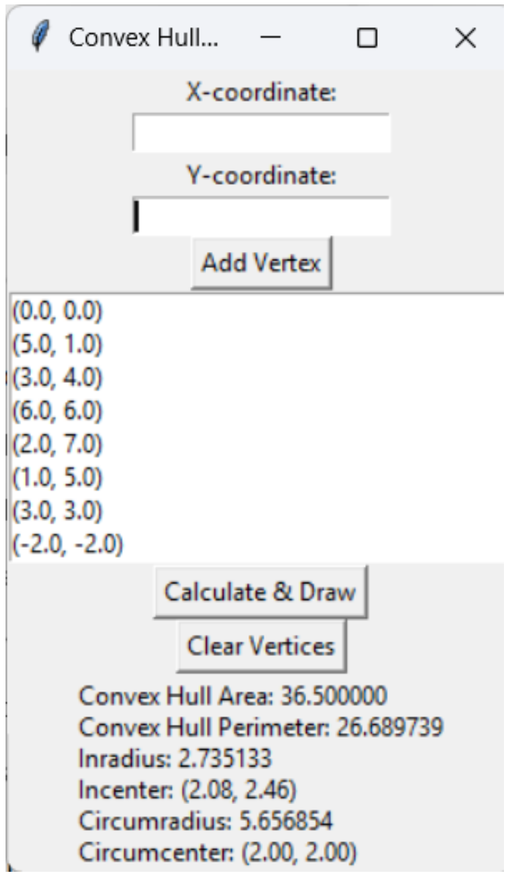
Approach

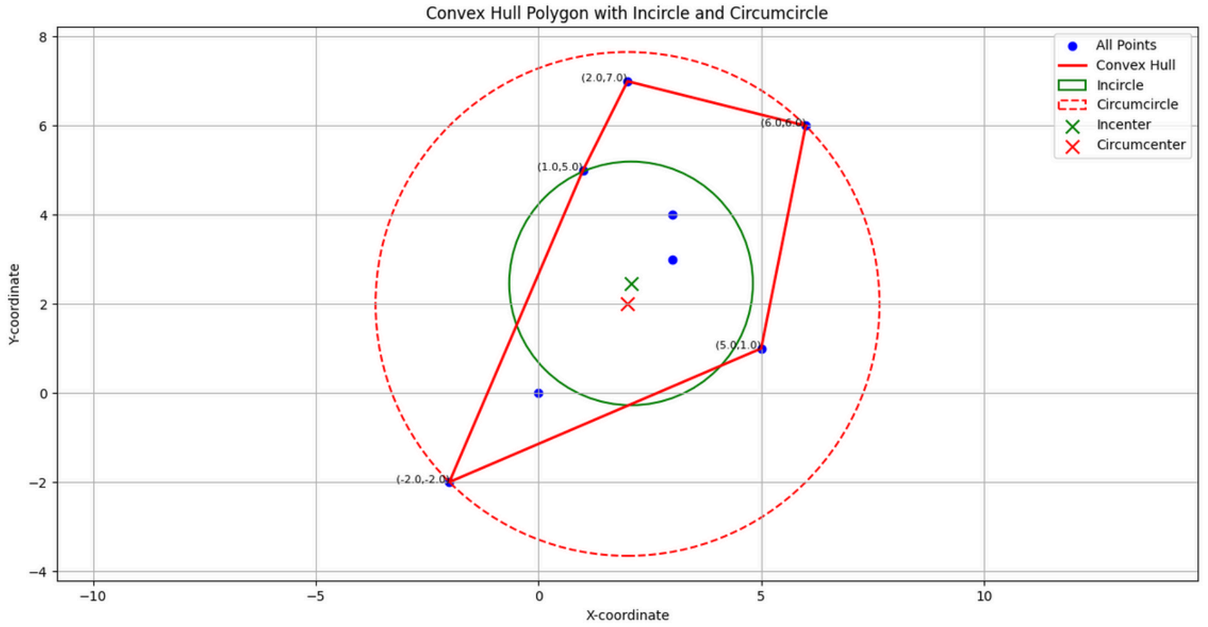
It takes user inputs through a simple graphical interface (Tkinter) and apply Convex Hull algorithm using scipy.spatial.ConvexHull to compute the outer boundary.

I used Matplotlib to visualize:

- Convex polygon (hull)
- Incircle
- Circumcircle
- Incenter & Circumcenter

Results:


Convex Hull...
X-coordinate:
Y-coordinate:
Add Vertex
(0.0, 0.0)
(5.0, 1.0)
(3.0, 4.0)
(6.0, 6.0)
(2.0, 7.0)
(1.0, 5.0)
(3.0, 3.0)
(-2.0, -2.0)
Calculate & Draw
Clear Vertices
Convex Hull Area: 36.500000
Convex Hull Perimeter: 26.689739
Inradius: 2.735133
Incenter: (2.08, 2.46)
Circumradius: 5.656854
Circumcenter: (2.00, 2.00)


Convex Hull Polygon with Incircle and Circumcircle
All Points
Convex Hull
Incircle
Circumcircle
Incenter
Circumcenter
(2.0,7.0)
(6.0,6.0)
(1.0,5.0)
(5.0,1.0)
(-2.0,-2.0)
Y-coordinate
X-coordinate
8
6
4
2
0
−2
−4
−10
−5
0
5
10

Thanku.