MOTH ERADICATION

Md.Zaheer Unnisa:20B01A05B2:CSE
Md.Shama: 20B01A05B1: CSE
K.Pravallika: 21B05A0108:CIVIL
N.Surekha: 20B01A04A1: ECE
N.Divya Prasanthi: 20B01A04A2:ECE

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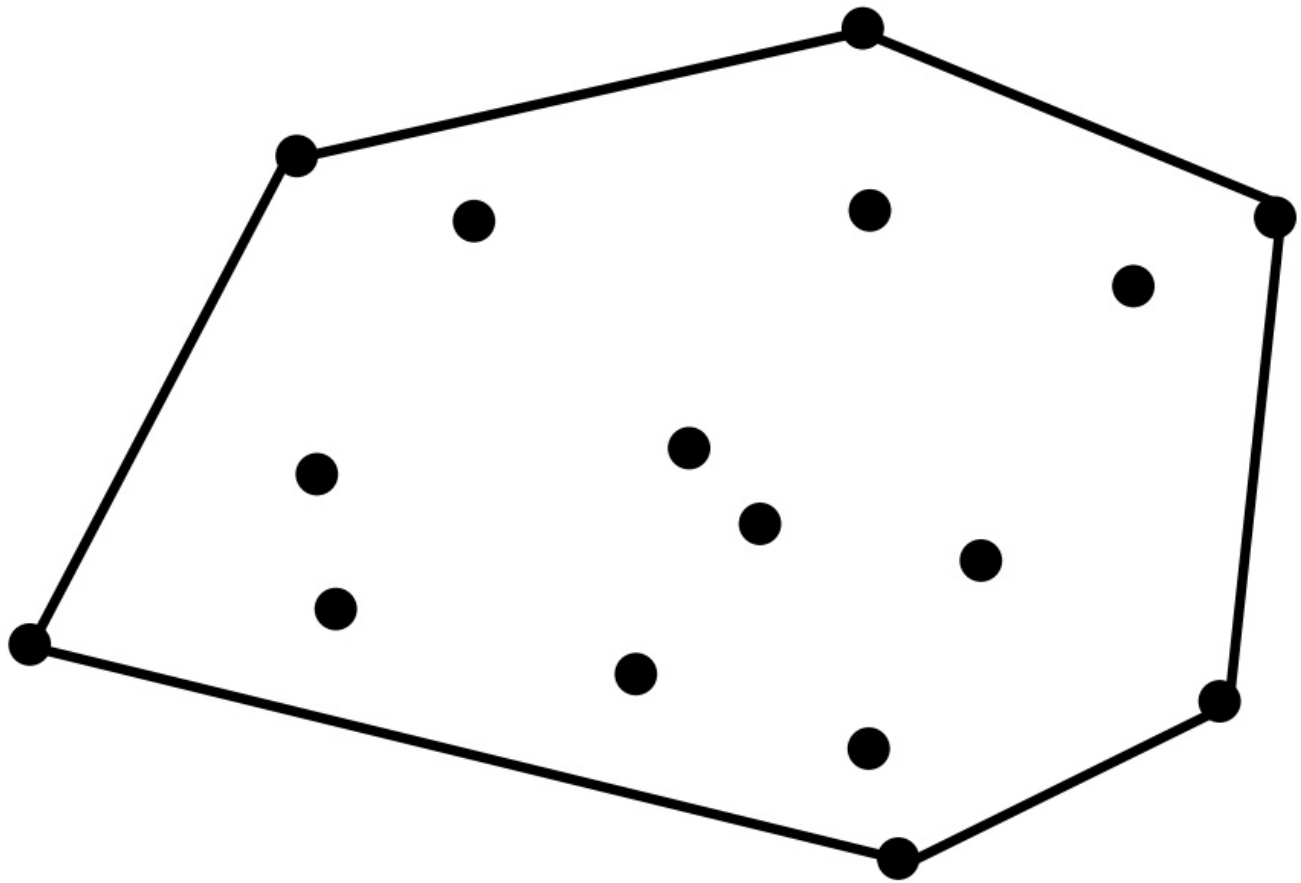
INTRODUCTION

- You must write a program that can take as input the locations of traps in a region and output the locations of traps that lie on the perimeter of the region as well as the length of the perimeter.

GRAPH



DESCRIPTION

- Input:
  The first line of each record contains the number (an integer) of traps for that region. Subsequent lines of the record contain 2 real numbers that are the x- and y-coordinates of the trap locations.

SAMPLE INPUT

- 3
  1 2
  4 10
  5 12.3
- 6
  0 0
  1 1
  3.1 1.3
  3 4.5
  6 2.1
  2 -3.2

SAMPLE INPUT CONTD

- 7
  1 0.5
  5 0
  4 1.5
  3 -0.2
  2.5 -1.5
  0 0
  2 2
  0

SAMPLE OUTPUT

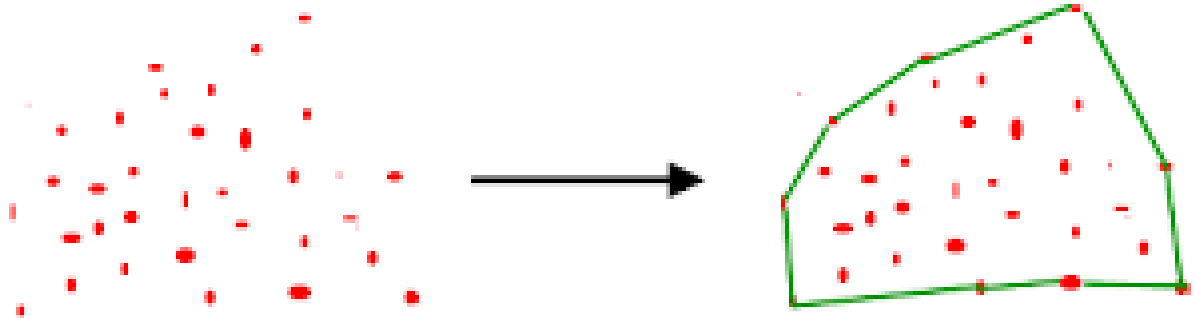
- Region 1:
  (1.0,2.0)-(4.0,10.0)-(5.0,12.3)-(1.0,2.0)
  Perimeter length = 22.10
  Region2:
  (0.0,0.0)-(3.0,4.5)-(6.0,2.1)-(2.0,-3.2)-
  (0.0,0.0)
  Perimeter length = 19.66
  Region 3:
  (0.0,0.0)-(2.0,2.0)-(4.0,1.5
)-(5.0,0.0)-(2.5,-1.5)-(0.0,0.0)
  Perimeter length = 12.52

PROBLEM UNDERSTANDING

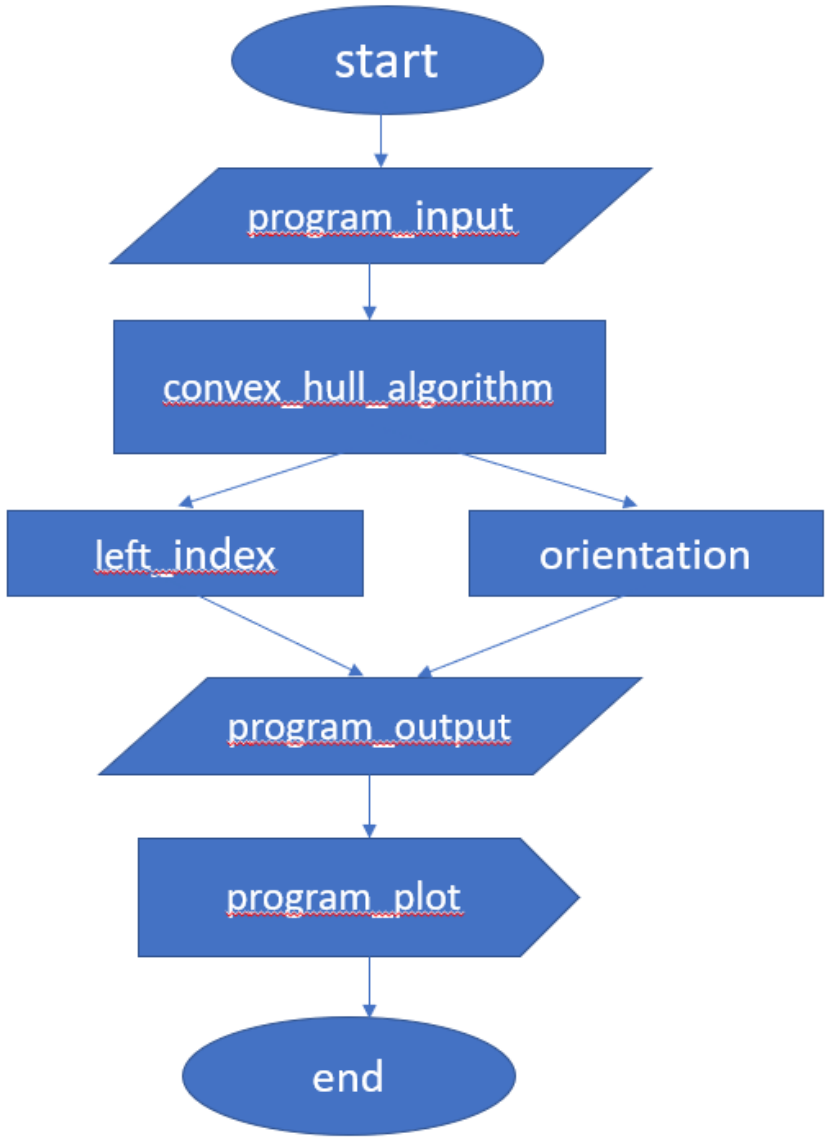
- We have to find a polygon(region) that should have all traps inside the polygon or on the outline of the polygon
- To find a polygon of minimum perimeter length and enclose all the traps we need to use Convex Hull Algorithm.

APPROACH

- Convex Hull:Given a set of points in the plane. the convex hull of the set is the smallest convex polygon that contains all the points of it.
- Graham Scan:Graham's Scan Algorithm will find the corner points of the convex hull. The time complexity is O(nlogn).



PROJECT FLOW DIAGRAM



TEAMMEMBER CONTRIBUTION

- 108-
  Worked on 1 modules and helped in LaTeX presentation
  5B1-
  Worked on 1 module and LaTeX presentation
  5B2-
  Worked on 3 modules and debugging and testing
  4A1-
  Worked on 1 module and collecting resources
  4A2-
  Worked on 1 module

LEARNINGS

- GitLab
- matplotlib library
- Convex Hull Method
- Graham Scan Algorithm
- LaTex

CHALLENGES

- Framing the logic
- Convex hull Algorithm
- Graham Scan Method
- Visualisation of the polygon

TO OVERCOME THE CHALLENGES

- We referred internet and understood the necessary algorithms to be used.
- It is difficult to develop the entire code at once so we divided them into modules.
- Debugging helped us to overcome errors in the problem.

ALGORITHM

- int ymin = points[0].y
- min = 0
- for i i range(1,n) .int y = points[i].y pick the bottom-most or choose the left most the point in case of tie
  if ((y i ymin)-(ymin == y points[i].x i points [min].x))
  ymin = points[i].y
  min = i

TECHNICAL STACK:

- PROGRAMMING LANGUAGE: python 3
- EDITOR: Google Colaboratory
- SITE: LaTex
- REPOSITORY: GitLab

STATISTICS

- Functions in the code: program input, convex hull, left index, orientation, perimeter length, program output, program plot.
- Class in the code: Point
- Methods used: Methods in matplotlib
- Number of Lines of code:115

CODE STATUS

- Day Wise code implementation
  26-03-2022: Problem Understanding
  28-03-2022: Algorithmic Approach for solving the problem statement
  29-03-2022: Solving Modules of the problem
  30-03-2022: Testing and Debugging the Modules
  31-03-2022: Review of the Project

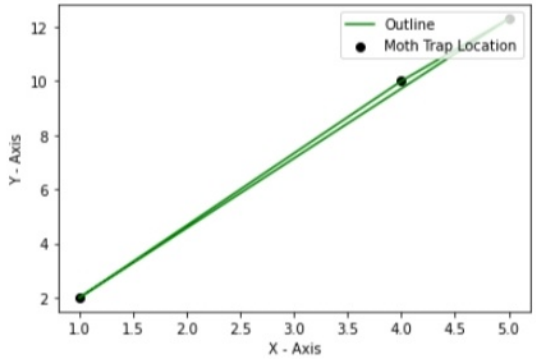
SCREEN SHOT

- Screen Shot of the Project

```
[ ]  no_of_traps=1
     while(no_of_traps!=0) :
       for region in range(1,1000):
         no_of_traps = int(input())
         if (no_of_traps == 0):
           break
         poly_vertices,x_points,y_points = program_input(no_of_traps)
         print()
         print("Region #",region,":")
         program_output(poly_vertices)
         print("Perimeter Length = ",perimeter_length(poly_vertices))
         program_plot(x_points,y_points,poly_vertices)
```

```
3
1 2
4 10
5 12.3

Region # 1 :
(1.0, 2.0)-(4.0, 10.0)-(5.0, 12.3)-(1.0, 2
Perimeter Length =  22.1
```



REPOSITORY

- https://gitlab.com/Azzu78699/moth eradication.git

THANK YOU!