SIH-2020 Idea Document

Problem Statement: Drone Route Planning

Organisation: Indian Space Research Organization(ISRO)

Category: Software

Domain: Security & Surveillance

Problem Statement Number: NM383

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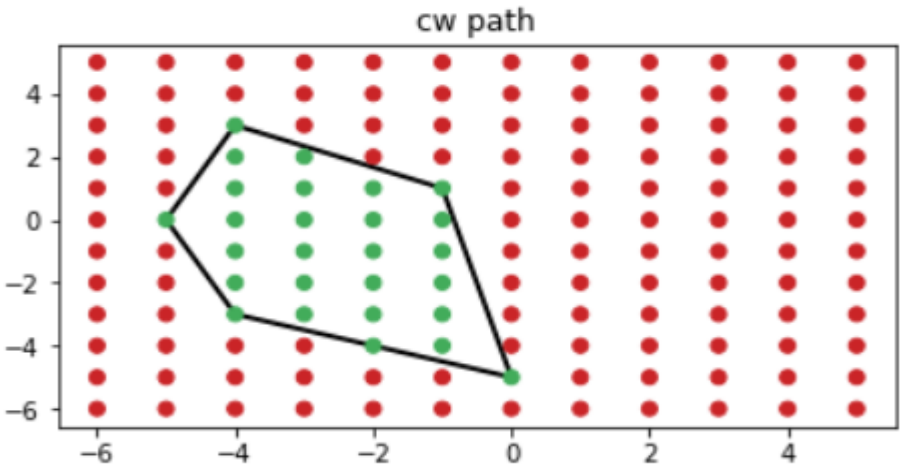
IDEA:

Our drone route planning system uses PyShp library to read the shape file and outputs polygon by using matplotlib. We plot the points all across the graph which are distanced by √2 times the radius of the drone coverage.




```
[<matplotlib.lines.Line2D at 0x25e15898508>]
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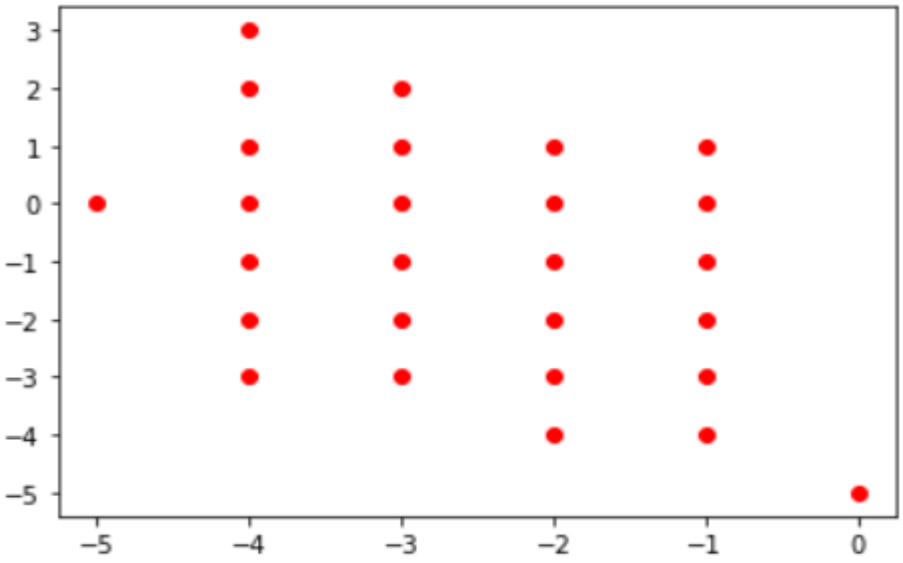
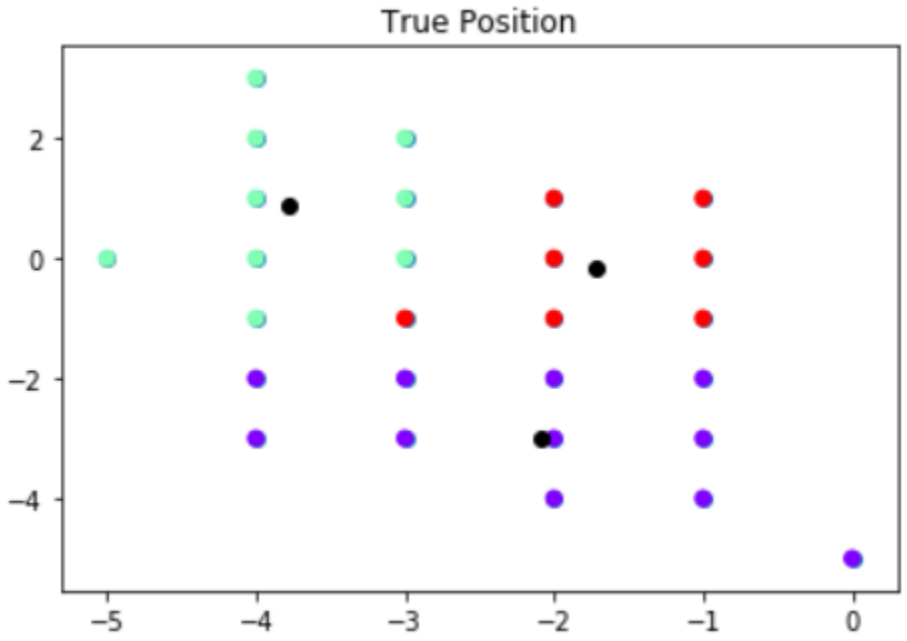


By using K-means Clustering we make n-clusters from points (n=number of drones). Now drones take in their course such that each cluster corresponds to a particular drone.

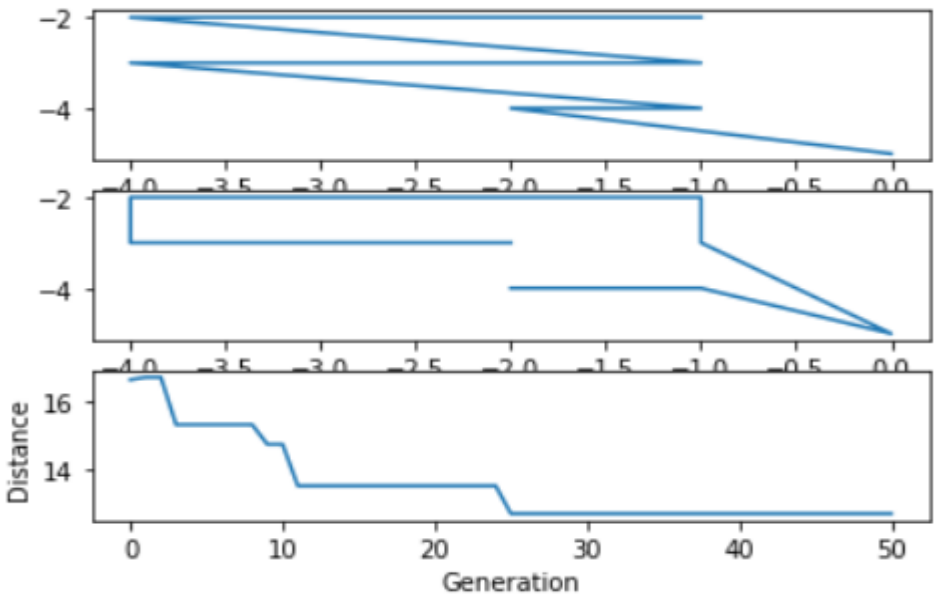


Travelling Salesman Problem will map the shortest possible route a drone can take to cover all the points in its corresponding cluster. The drone would have an initial capacity which would be decreased due to weight of the path taken by the drone. A condition that the capacity of the drone must never reach negative is applied.

If the drone finds its capacity to be reaching a negative value by taking a path it immediately searches for the nearest recharge station and get recharged to continue the current course. We run these multiple times to ensure Success.

This Travelling Salesman problem can be solved optimally using the Genetic Algorithm.

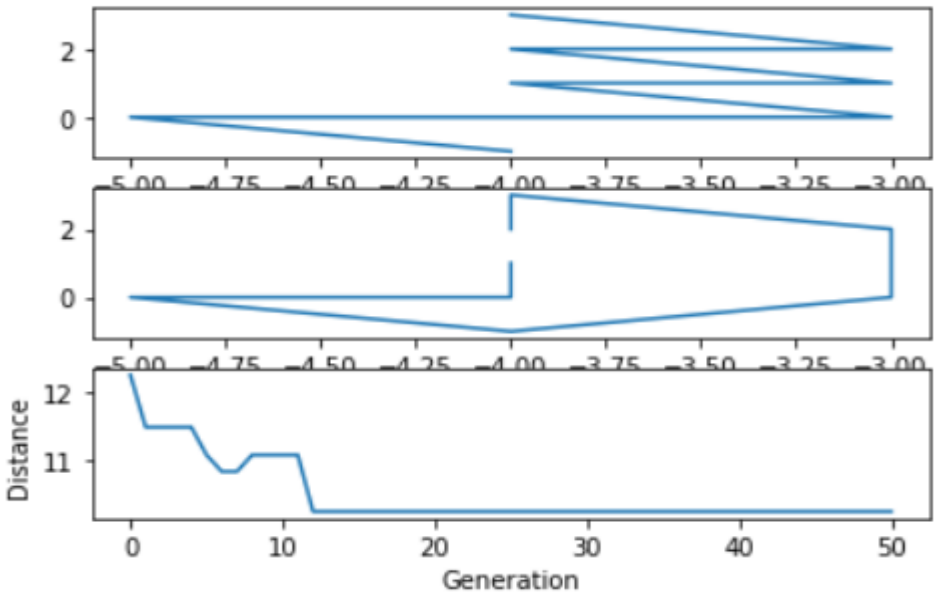
```
Initial distance: 16.640986324787455
Final distance: 12.650281539872887
```



Initial Path of cluster 1

Shortest Path of cluster 1

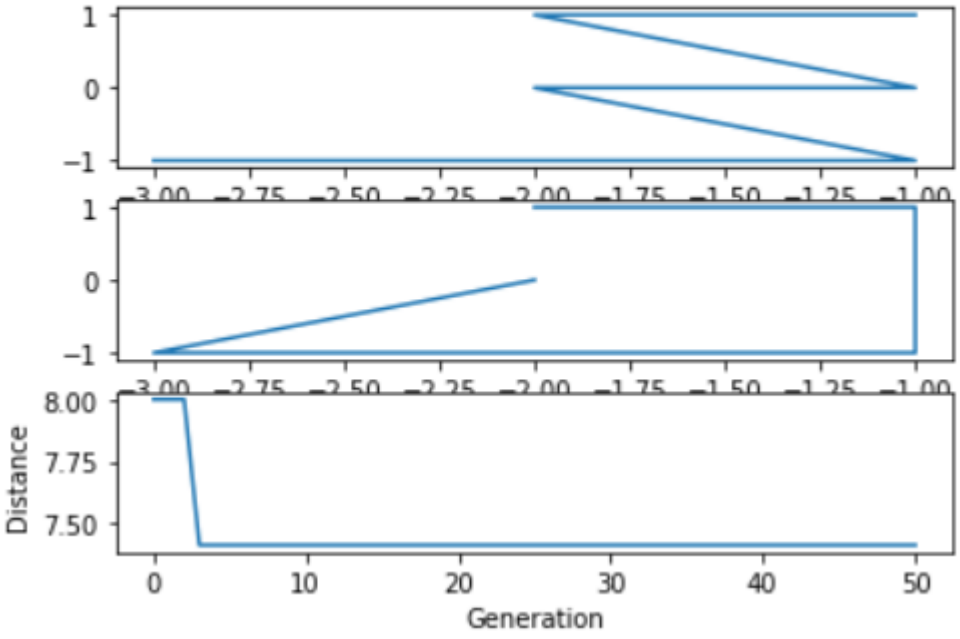
```
Initial distance: 12.242640687119286
Final distance: 10.242640687119284
```



Initial Path of cluster 2

Shortest Path of cluster 2

```
Initial distance: 8.0
Final distance: 7.414213562373095
```



Initial Path of cluster 3

Shortest Path of cluster 3