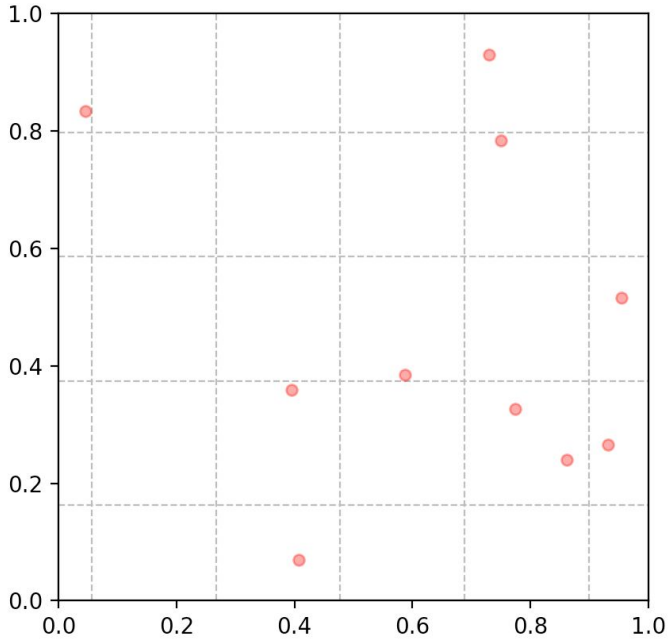
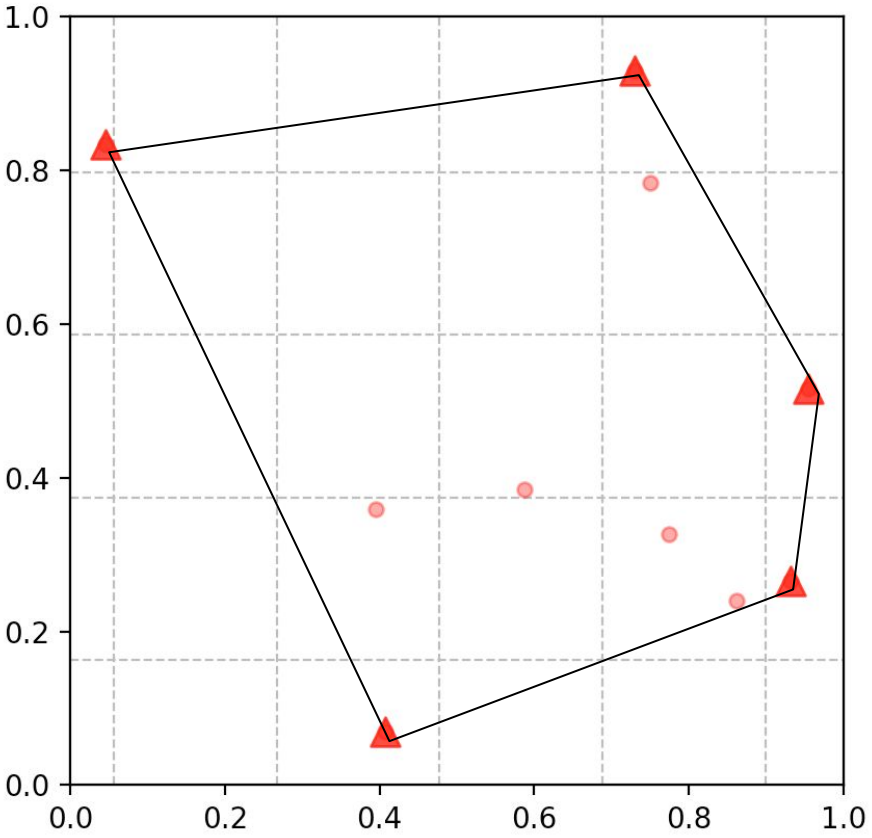
Position of UAVs over ground nodes

- First deployment
  - A set of drones is chosen based on the locations of points of interest, the communication range and corresponding altitude.
    - The altitude and communication range must be known previously



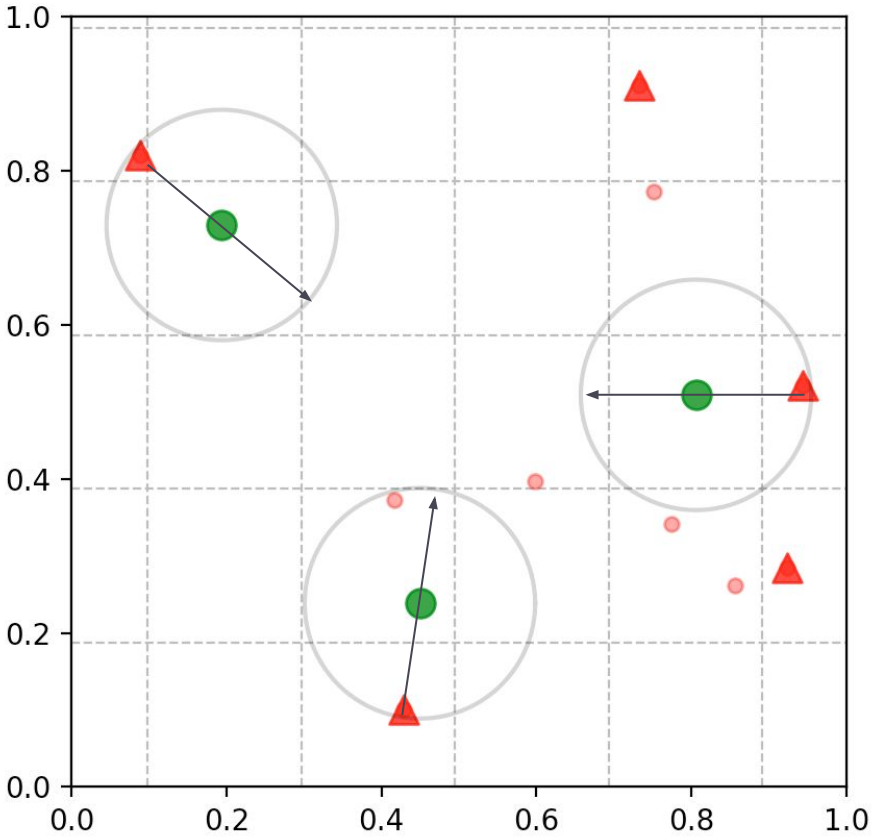
Deployment steps

- Build a convex hull



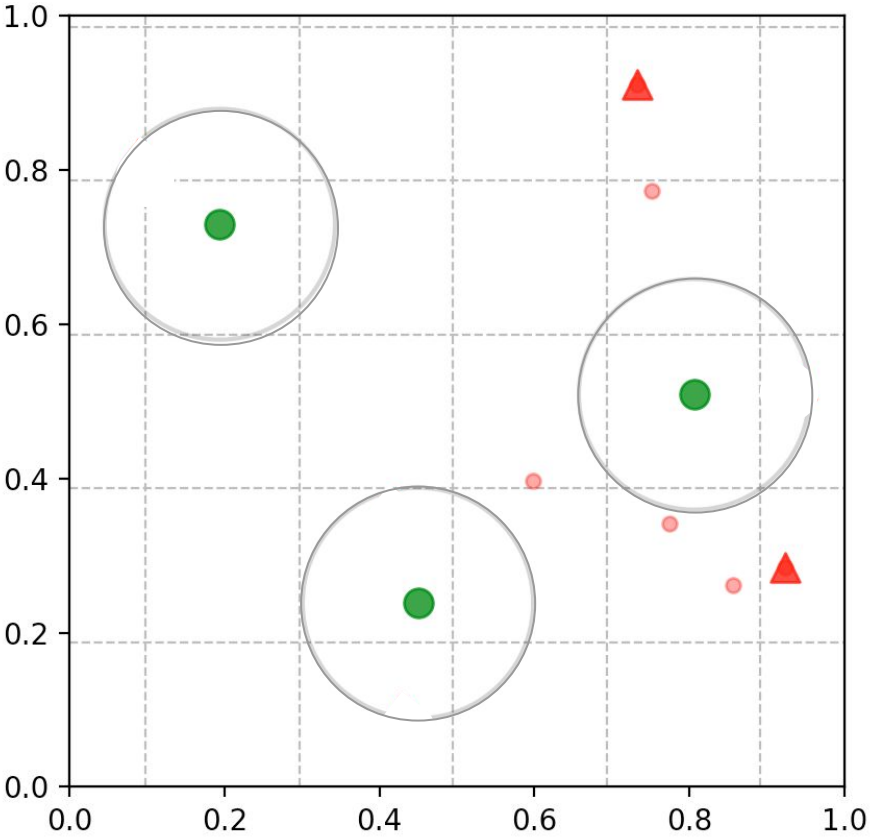
Deployment steps

- Choose the three points of interest away from each other from the convex hull
- Place 3 drones pointing to each other



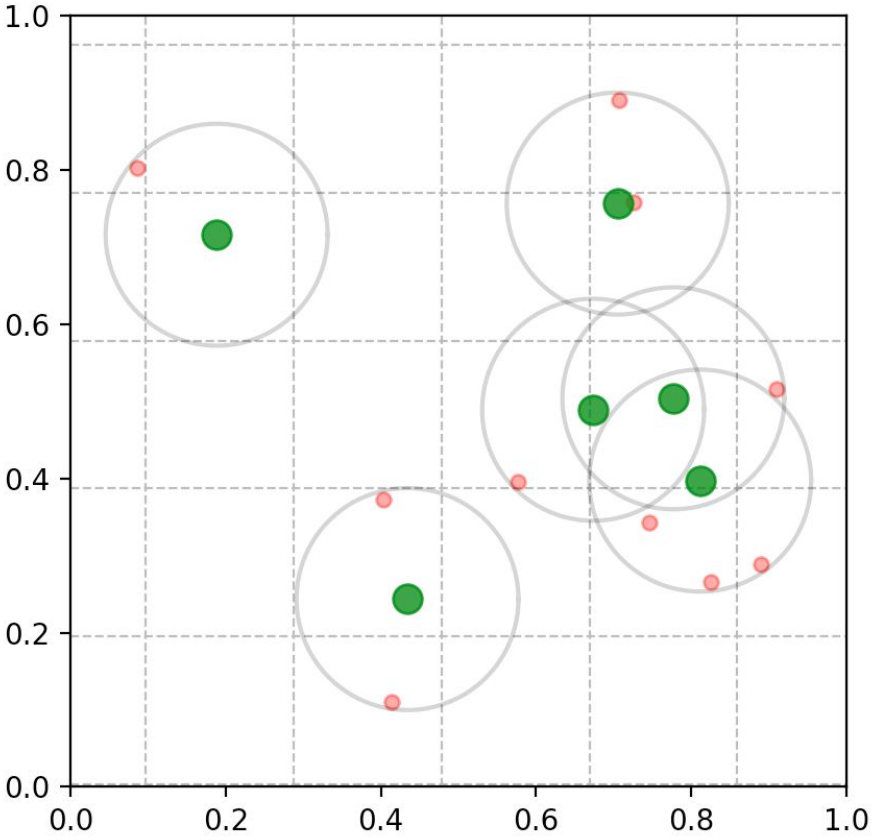
Deployment steps

- Remove the covered points of interest



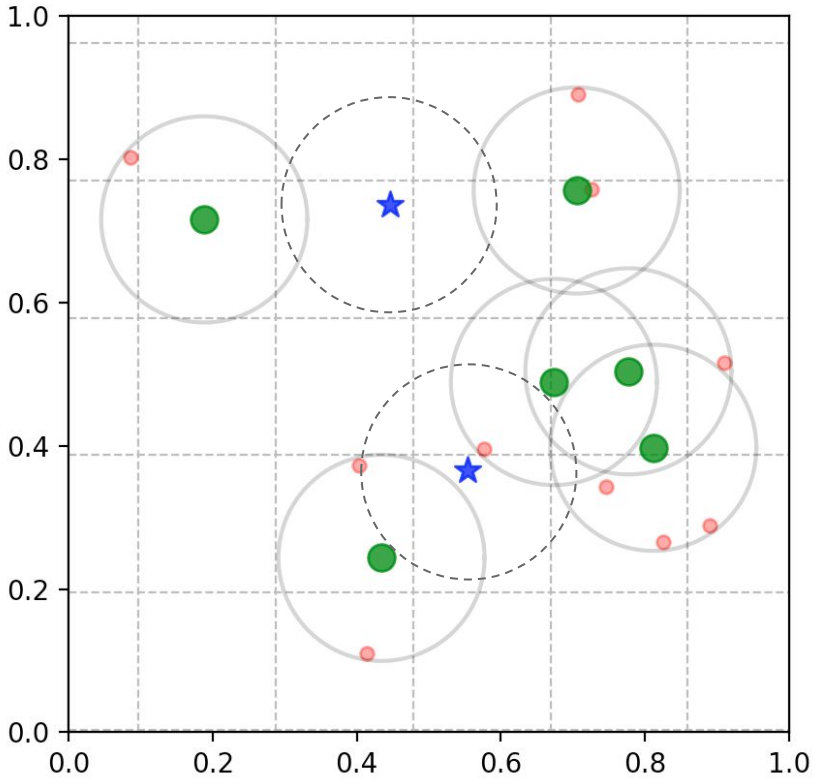
Deployment steps

- Repeat the steps until all points of interest are covered.



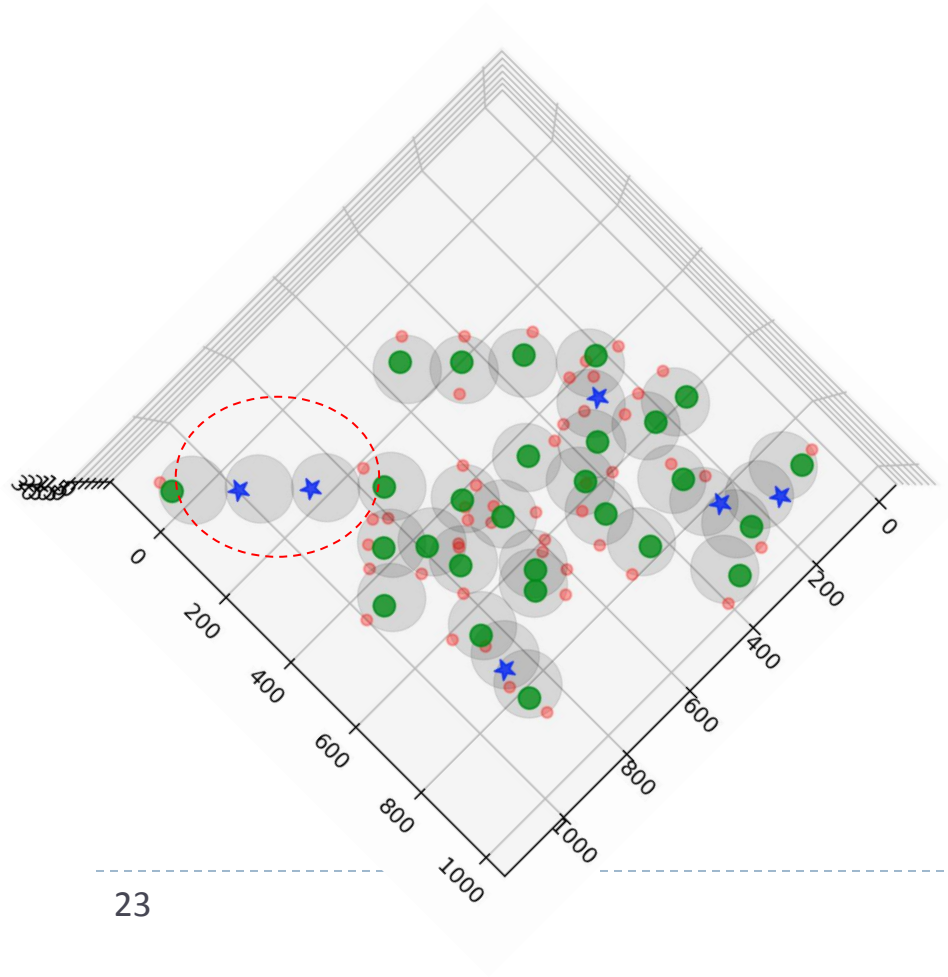
Deployment steps

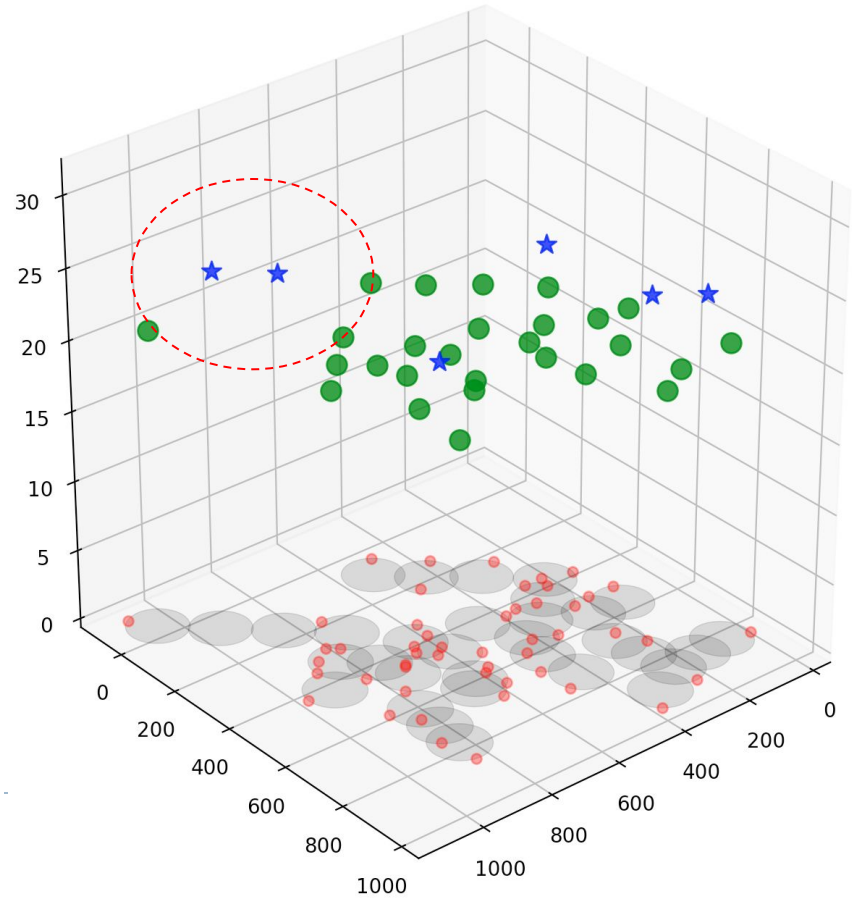
- The current solution does not guarantee the communication among all the nodes.
- Solution: connect the subgraphs, joining them by placing new nodes (blue star) between the closest nodes among the subgraphs.

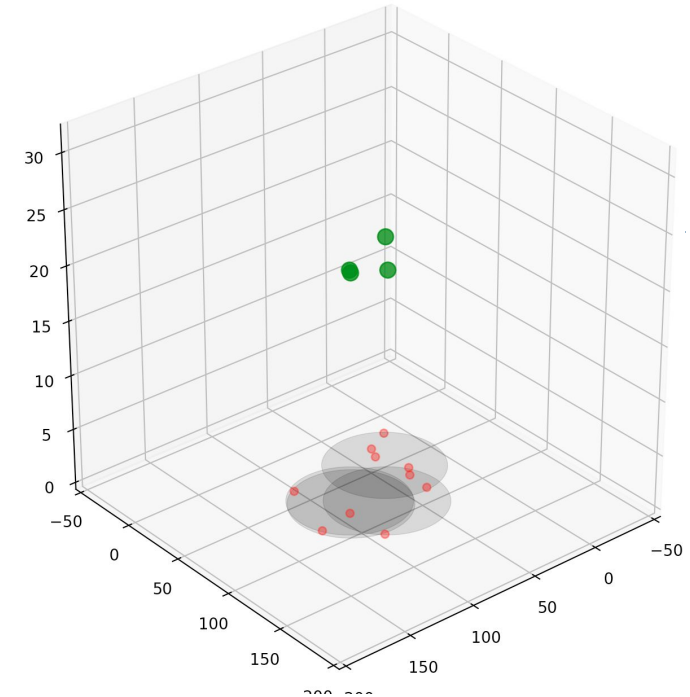


Deployment steps

- The communication range limitation might require more than 1 node to join the subgraphs



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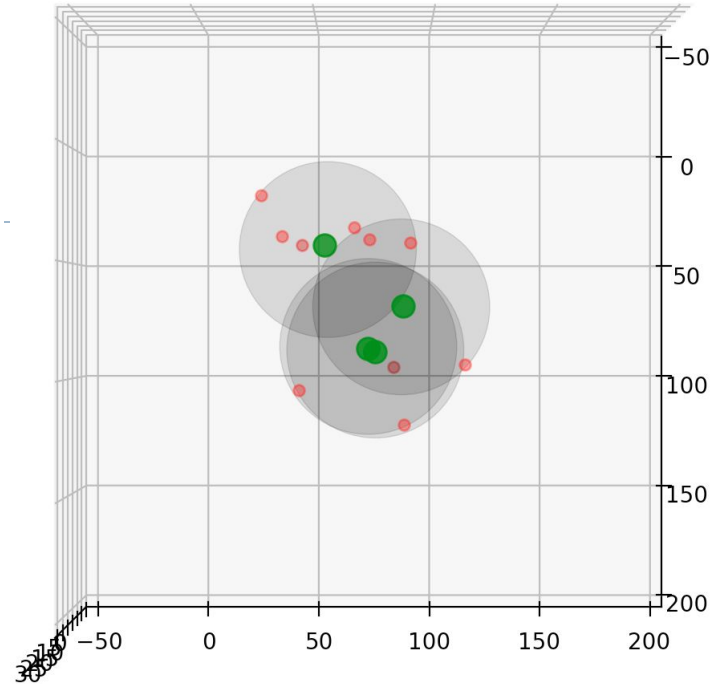
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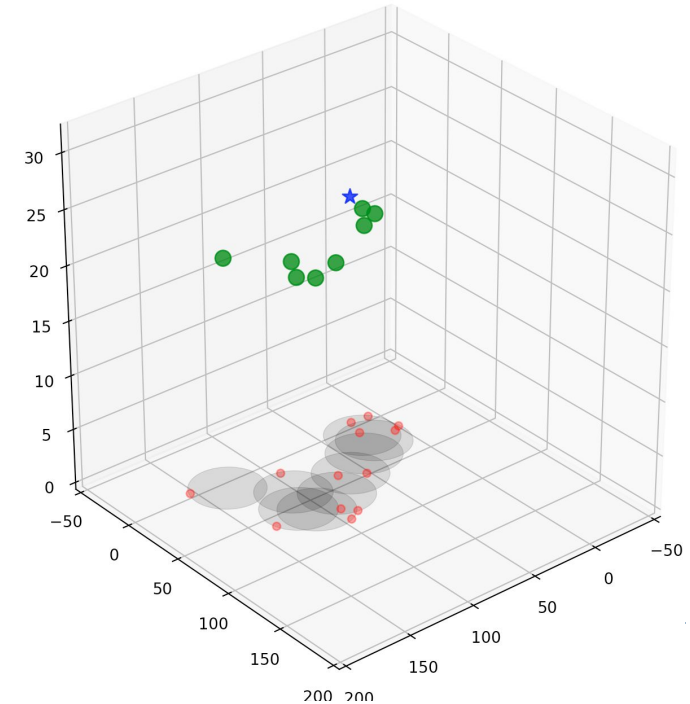
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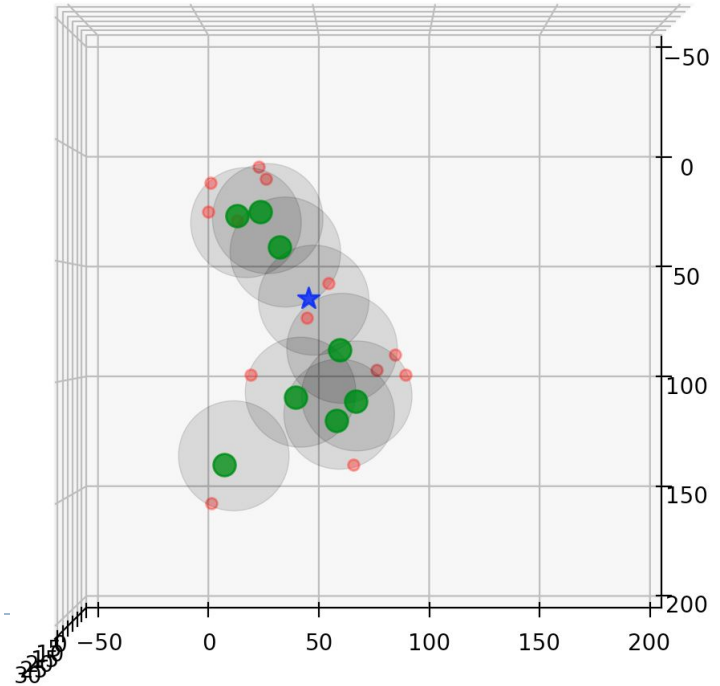
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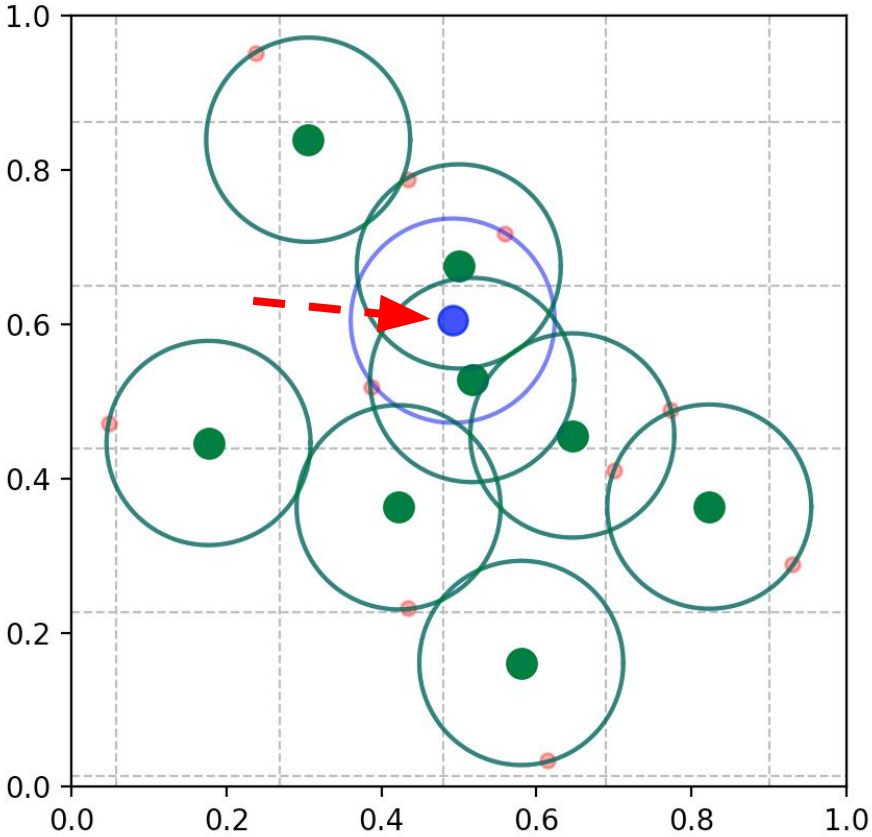
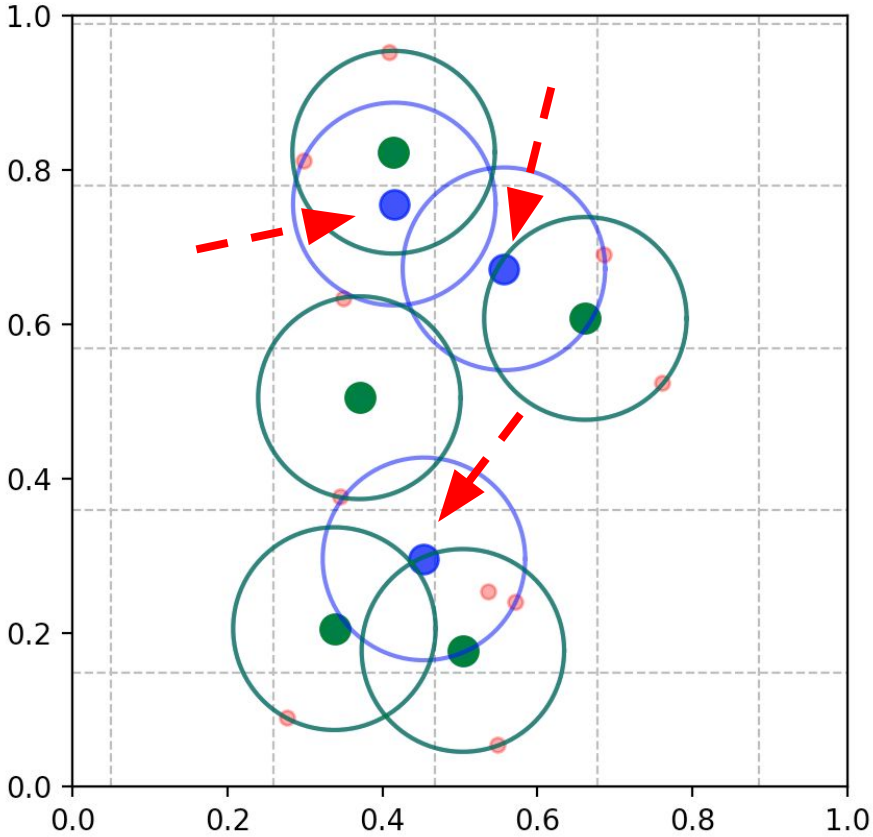
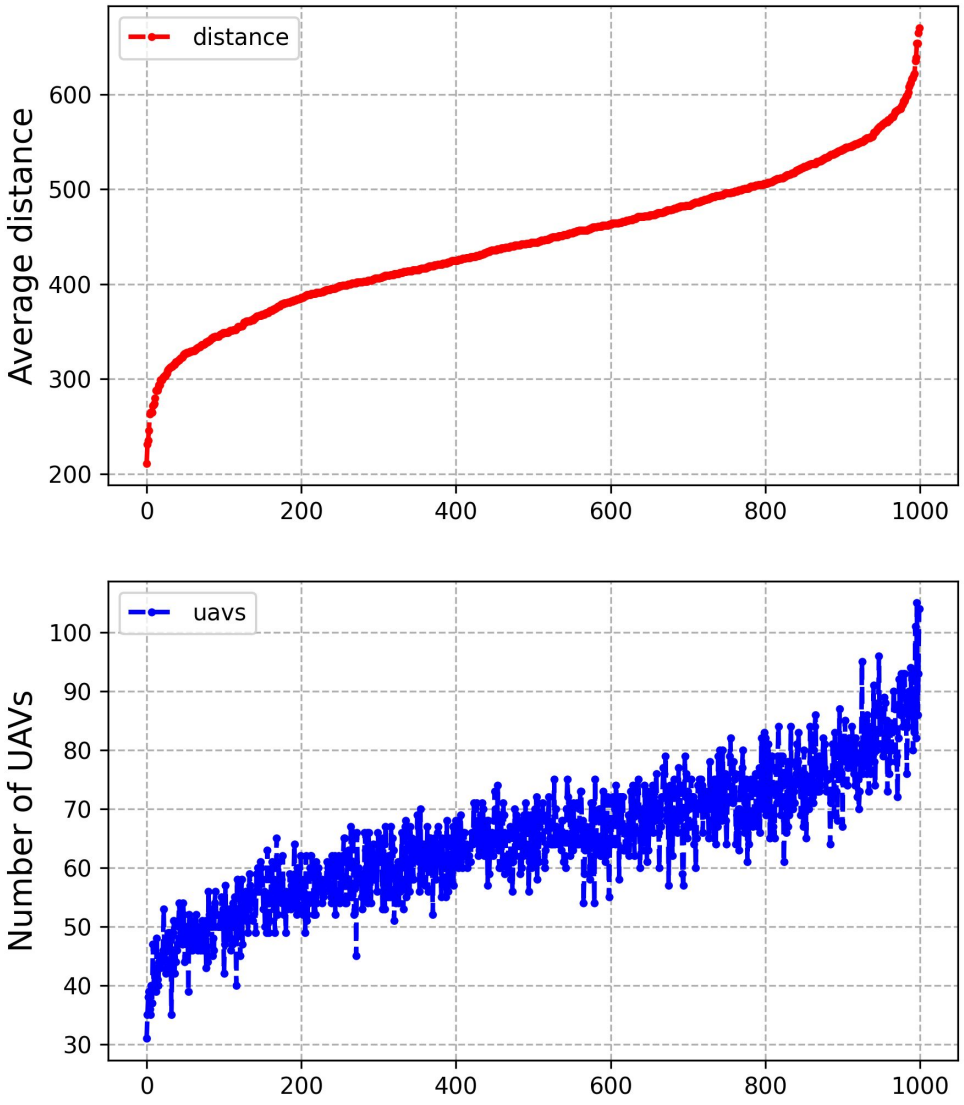
Special case

- In some cases there will be redundant nodes (blue) that are removed solving the *Set Cover problem*.

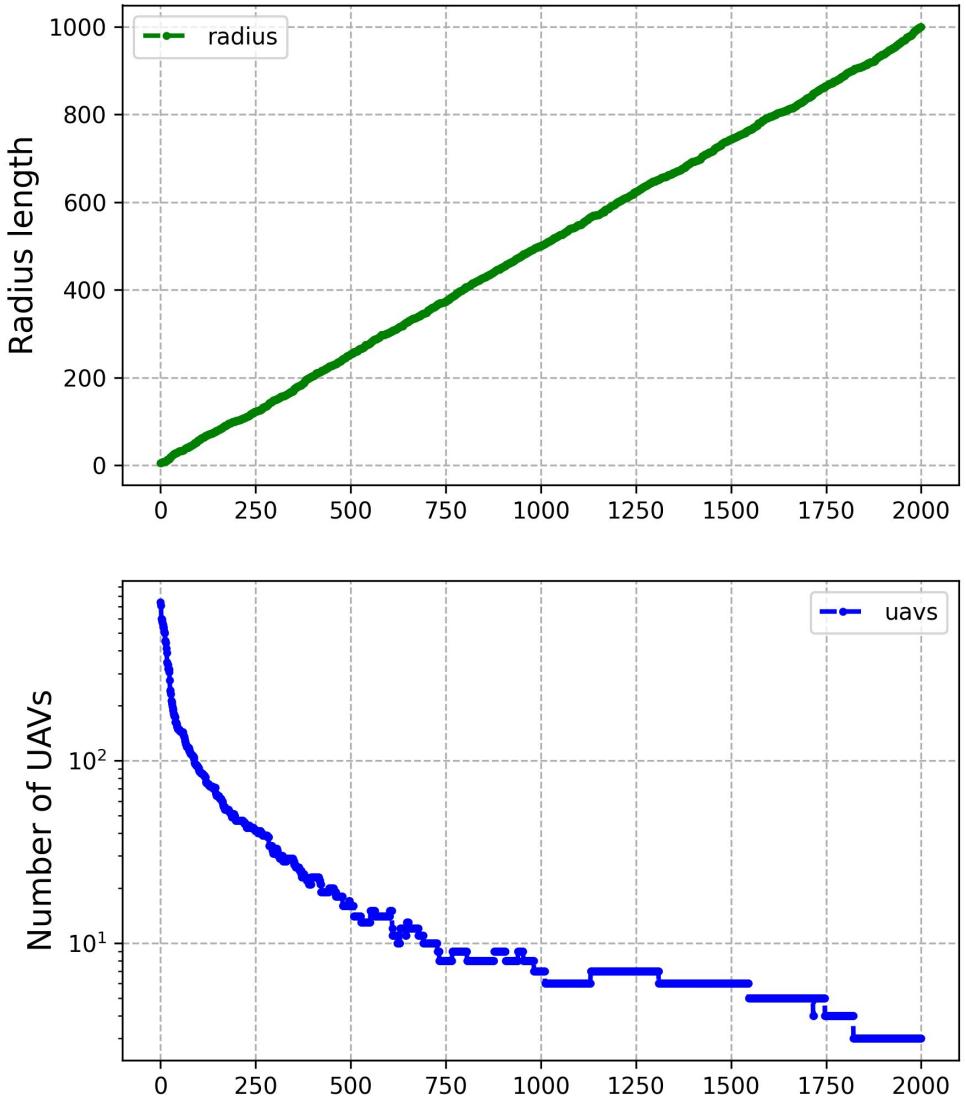




Varying the average distance among the point of interest



Varying radius length



Limitations

- Diretamente proporcional à distância média entre os pontos de interesse.
- In the current algorithms, the communication range relies only on the euclidean distance.
- It can be used for the first UAV deployment.
- It is not feasible in a dynamic scenario as it returns the number of required UAVs according to how far are the points of interest in the environment at a specific moment.
  - The more spread, the greater will be the number of UAVs required using the same altitude and communication range.