

TITLE:

Multi UAV collision free path planning and coordination for multiple targets in 3-D environment using Nature Inspired Algorithms.

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Problem Statement:

Finding optimal solution for paths of multiple UAVs in obstacle rich 3D environment using NIA and comparing the simulation results of the two NIA.

Methodology:

.Problem design:

The environment is three dimensional in nature and consists of a number of obstacles of different sizes that are randomly placed. There are n target goals which have to be reached by n UAVs.

An optimal path needs to be planned from each UAV to a target goal such that there is no collision with obstacles or with other UAVs.

To solve this problem two Nature Inspired Algorithms will be used and their performance will be compared with existing literature.

.Assign each UAV a target goal to reach:

Euclidean distance is calculated for each (UAV, target) combination and then a UAV to zone assignment is performed based on a cost function that sums up the Euclidean distances for the different (UAV, target) assignments.

We have tried different assignment algorithm for goal assignment that reduces complexity of this problem from $O(N!)$ to **polynomial time**.

.Use of nature inspired algorithms to figure out an optimal path:

Two Nature Inspired Algorithms will be used and their performance will be compared.

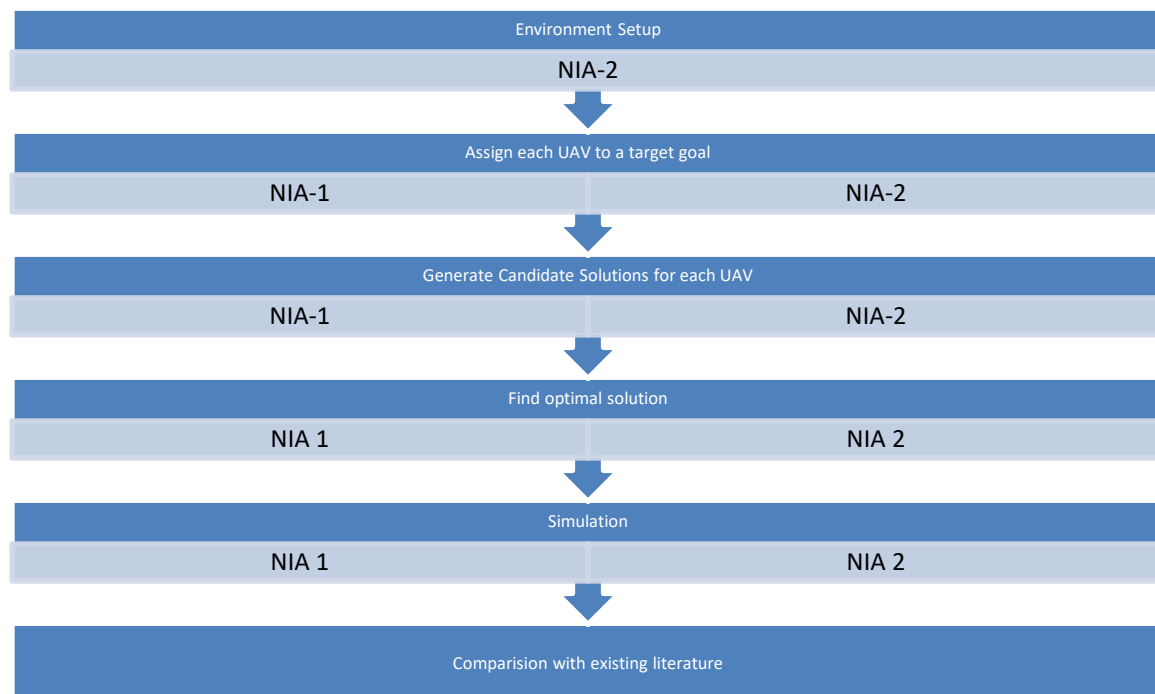
The algorithms will figure out an optimal path for each UAV to its target by creating different candidate solutions and eliminating them one by one to find an optimal solution. The algorithms will figure out an optimal path that avoids all the obstacles that are present in the environment.

.Comparison of performance:

Both the algorithms will be tried for the created environment setup and their performance will be compared

Performance comparison will take into account time complexities as well as other aspects with existing literature in order to figure out the advantages and drawbacks of the algorithms for the created scenario.

.Block Diagram:



.Experimental Setup:

Maps of 3D environment with obstacles.

Mat lab R2018a for simulation.

ASUS R541U Laptop with Intel Core i5 -7200 CPU and 8 GB RAM.