

Self-organized Generation of Air Corridors

Objective:

Build a multi-agent simulation based on the concept of Social Force Model trail formation to create air corridors. Based on source and destination (aka, landing spots). (Unmanned) air vehicles take-off and land at designated spots. There is a given number of flights between each of the spots. Air vehicles may encounter restriction about where they can fly, include no-fly zones or zones with altitude restrictions. Based on the traffic patterns and geographics constraints. The multi-agent simulation should create a network of corridors that is optimized with respect to travel distance (including ascending and descending) and total length of the corridors. The optimization should account for the traffic pattern, the number of air vehicles between landing spots.

Approach:

1. Use the Social Force Model to simulate air traffic in a 3D space. Impose constraints such as no-fly zones, zones with maximum or minimum altitude. Use the trail-formation approach to generate trails.
2. When simulations converge, use a method like Hough Transform for lines to create a network of corridors.

Implementation:

A suitable implementation is the [Agents.jl](#) framework for the programming language [Julia](#).

The framework supports the simulation of air vehicles in a continuous space representation, and a grid representation for the trail formation. Julia is a popular choice for implementing simulation programs due to its simplicity and computational effectiveness.