Wingman Path Planning

A path planning problem on a search task of a human robot team, in which the robot wingman cooperates with human and is constrained by shared mental model.

We model the path planning problem of an agent in a search task as a sequential maximum coverage problem under motion constraint. Particularly in a teamwork scenario with human involved, the motion constraint contains a temporal-spatial wingman relationship with human.

Due to the submodularity of a sequential maximum coverage problem, a step made in path planning does not only determine the available future decision space but also has an influence on the available future rewards can be collected. In this path-dependent optimization problem, we imported an expanding tree to track explored solution space and a multi-partite structure shaped from wingman constraint to estimate future rewards as search heuristic. In the proposed anytime algorithm framework , we gave theoretic proof and experimental analysis to show it gives near optimal solution at first iteration and converges to optimal with efficiency by iterations.