Automomous Control of Communications Aircraft During Combat: The Promises of Recent Artifical Intelligence Literature

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Abstract

We pose a novel problem in autonomous control of communications aircraft and provide pointers to the literature offering an approximately optimal solution in many diverse scenarios. The problem lies within the field adversarial Multi-Agent Reinforcement Learning (MARL) and Active Sensing. Two factions (labeled "blue" and "red") exist within this zero-sum game. The blue side tries to keep ground-based assets in communication with the headquarters via a fleet of comms (Unmanned Aerial Vehicles, or UAVs fitted for communication); whereas the red side tries to jam this network with a fleet of jammers (also UAV's). Each faction lacks full access to the state of the opposing side, and must infer this state through positioning its fleet for best sensory performance (active sensing) while simultaneously achieving the objective of keeping units on the ground in communication. Within each faction, different units/UAVs can fall out of communication making each of the blue and red factions a multiagent collection, fully cooperating among themselves but with different information, to fight its adversary (the other side). Our contribution poses the problem while pointing to literature for possible ideas for implementation.

1 Introduction

If unfortunate circumstances compel orders from above for our armed forces to take a city from an adversary, the command center on the ground benefits from constant two-way communication with all its units. In the fog of war, our forces cannot rely on cell phones: two way radios, connected by a network of Comms (Unmanned Arial Vehicles UAVs) allow friendly units to keep in touch. But a problem arises from the fact the fact that our adversary would prefer that we not speak to each other, and they may send up jammers

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