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A Multiagent Coordination Algorithm for Weapon Assignment in Ship Self Defense

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Topics

Track 1: C^2 Concepts, Theory, and Policy
Track 3: Modeling and Simulation
Track 4: Cognitive and Social Issues

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Abstract

Many defensive weapons have been developed in recent years to counter Anti-ship missiles that nowadays are the most dangerous threat to naval platforms. These defense systems are conventionally divided into hardkill and softkill types. Hardkill encompasses the classical kinematic kill which destroys the threat while softkill is aimed at the control and guidance subsystems of the threats and diverts it away from the ship with a significantly lower cost.

This paper reports a policy development methodology of a softkill reflex planning agent and its enhancement by a hardkill one. This methodology mainly consists in first learning softkill policies using Monte-Carlo methods and then to choose the adequate policy depending on the tactical situation. The hardkill agent is a rule-based planner that engages as many threats as possible depending on their dangerousness. Coordination is finally made by using the approach proposed by Huang and Kar [1] which aims to adjust the dangerousness of the threats so that the hardkill agent engage them in a better way.

These self-synchronized agents have then been implemented and evaluated in an engagement simulation tool. Results show that this coordination improves the overall survivability of the ship while minimizing the engagement cost.

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Outline

Introduction

Subject introduction, problem relevance, approach introduction.

Context & Environnment

Context of the study, simulation environment, and C^2 problem.

Related Work

Existing approaches description and evaluation.

Softkill Planning

Softkill policy learning methodology,abilities of the softkill agent and description of its algorithm.

Hardkill Planning

Abilities of the hardkill agent and description of its algorithm.

Hardkill & Softkill Coordination

Self-synchronization algorithm description.

Results

Experimental setup and conditions. Numerical results.

Discussion

Discussion of results, advantages, drawbacks and future work.

Bibliography

[1] P. Huang and P. Kar, "An autonomous optimal weapon assignment algorithm for ship self defense", in *Proceedings of the IEEE International Conference on Systems, Man, and Cybernetics*, 1994, vol. 3, pp. 25442549.