

STELaRLab



The Utility of Reinforcement Learning to Enhance Decision Support in Air Battle Management

Kevin McDonald^{1,2}, Adrian R. Pearce¹, Michelle Blom¹, & Michael Papasimeon³

¹ School of Computing and Information Systems, The University of Melbourne

² STELaRLab, Lockheed Martin Australia

³ Joint and Operations Analysis Division, Defence Science and Technology Group

The Problem

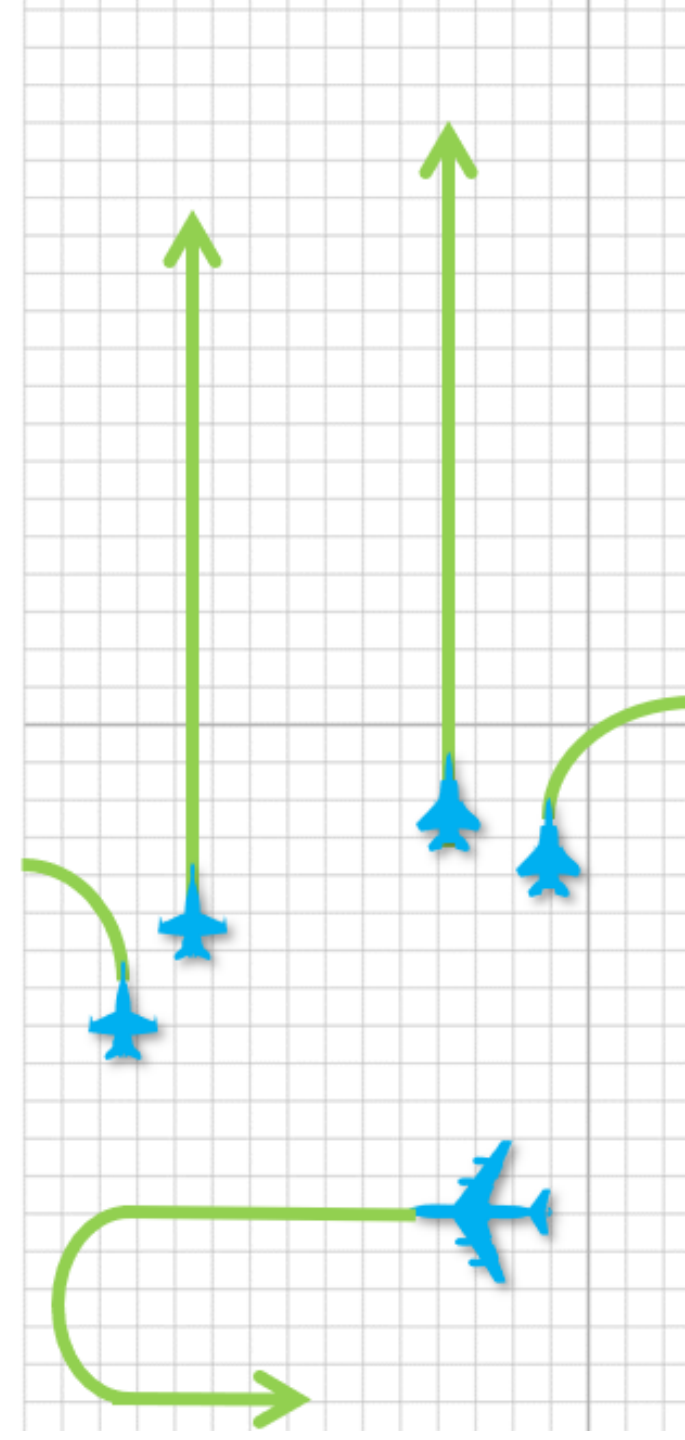
- Air and Space Battle Management (ASBM) is the process of planning, directing, coordinating and controlling air and space assets in operations
- ASBM is NOT EASY!
- Air Battle Managers (ABMs) have traditionally relied on their knowledge and intuition
- Evolving challenges are placing greater stress on ABMs



Leading Aircraftman Lachlan Jones from No. 3 Control and Reporting Unit monitors the airspace during exercise Virtual Pitch Black 20 from RAAF Base Williamtown (<https://images.airforce.gov.au>)

Research Objectives

- ABMs will need to make faster and more informed decisions
- Decision support algorithms will be a critical capability
- These algorithms could potentially support a wide range of ASBM problems
- ***Proposal: Conduct new research exploring the utility of Reinforcement Learning (RL) to enhance the ABM decision making process.***
- Recent research has started to explore related areas, but there is minimal work leveraging RL to enhance ABM decision making



Challenges and Opportunity

- Many complex challenges exist, including:
 - Appropriately capturing the complexity of the Air and Space domains;
 - Handling battlespace scale;
 - Ensuring stability and robustness; and
 - Generating actionable outcomes.
- However, many enticing features:
 - Provide long term planning;
 - Identify hidden relationships;
 - Support for large action and observation spaces
 - Perform near real-time actions

For more information, please contact:
Kevin McDonald
(E) kevin.mcdonald@student.unimelb.edu.au