Improving meIRL-based motion modelling in video games using general player classification

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Introduction

- Research topics in game AI
  - adaptive
  - fair
    - using imperfect information

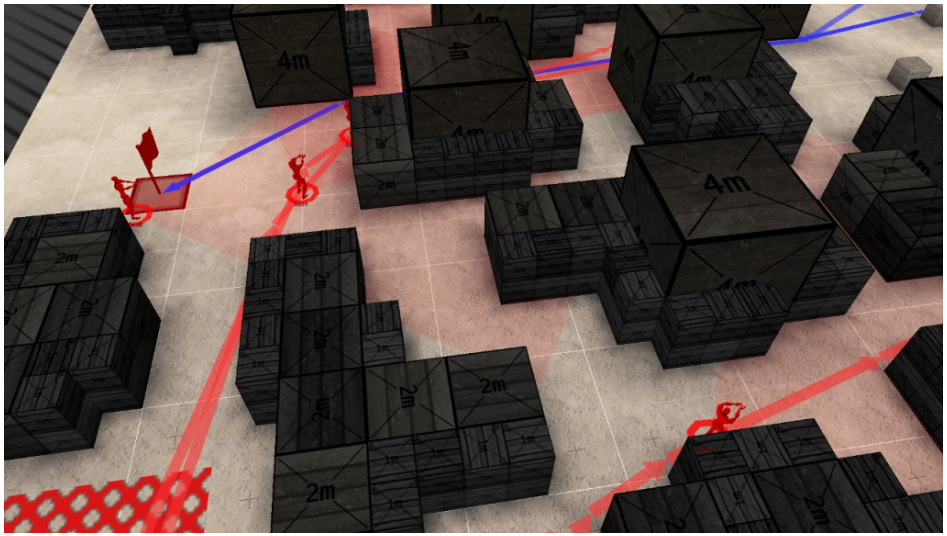
Problem statement

To what extent can general player classification improve meIRL-based motion modelling in video-games?

- Multiple aspects to this research

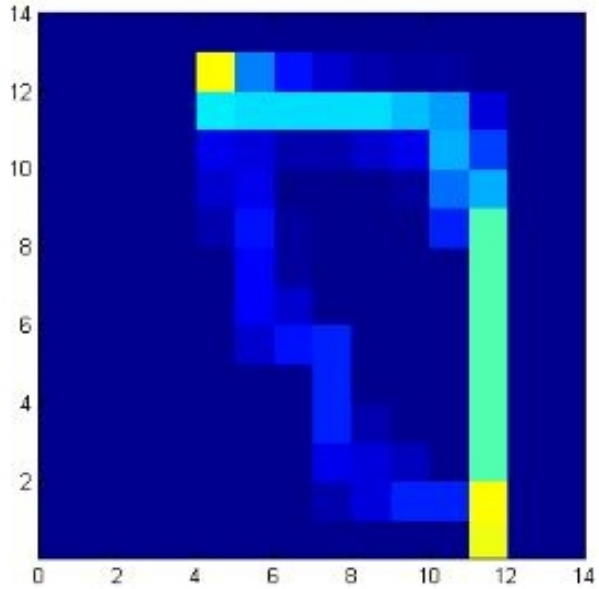
Tools

- Capture the Flag (CTF)
  - Team multi-agent environment
  - Straightforward game objective
- AISandbox
  - CTF AI development environment
  - Used for competitions
- Use existing AI
  - Terminator: 3^{rd} place in competition
  - naive opponent response reasoner
  - adding of own motion modeller



Background Motion Modeling

- Maximum Entropy Inverse Reinforcement Learning (meIRL)
  - Position expressed in terms of features
  - Construct reward function
  - Offline modelling
  - Distribution grid
- Has been done (Tastan et al., 2012), but:
  - No general modelling
  - No examination of map invariance
  - Different domain
- General classes of specific behaviours



Approach Player Classification

- Prediction depends on classification
- Different behaviours, e.g.
  - flag defensive
  - flag attacking
  - patrolling
  - flag running defender
  - flag retriever
- Classification Features,
  - history of opponent spotting
    - orientation
    - position (expressed in features)
  - game state, e.g.
    - Both flags at base
    - Both flags gone
    - Enemy flag intercepted
    - Own flag intercepted
- Classification method not yet decided

Approach Reasoner

- Current Terminator motion model: Only reasons on where enemy is seen
- Add enemy position prediction to Terminator
- Further improvements:
  - Ambushing enemy
  - Avoiding enemy
  - Anticipating actions

Evaluation

Problem statement (again)

To what extent can general player classification improve meIRL-based motion modelling in video-games?

- How well can behaviour be classified?
  - Needs labeled data to test with
  - Better than random
- Does general player classification successfully predict position?
  - Absolute error comparison with (Tastan et al., 2012)
- Improvement of Terminator?
  - Create Competition
  - Compare performance by win-rate

Plan

Week No.	Research Planning	Report planning
18	Implement IRL motion model	
19	Implement IRL motion model	
20	Create classifier	
21	Implement into Terminator AI	
22		Preparation midpresentation and assignment 8
23	Evaluation of classifier, possible adaption	
24	Evaluation of AI performance	Assignment 9
25	Finishing paper	
26	Finishing paper	Preparing final presentation and logbook

References

Tastan, B., Chang, Y., and Sukthankar, G. (2012). Learning to intercept opponents in first person shooter games. In *Computational Intelligence and Games (CIG), 2012 IEEE Conference on*, pages 100–107.