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

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Introduction

Problem statement

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

- AI able to anticipate opponent's position
- A more human-like AI
- Tested on game of Capture the Flag
- Adding to existing AI (Terminator)
- Capture the Flag

Motion Models

- One model for every behaviour, 6 total
- learned using maximum entropy IRL(meIRL)
  - Deducing reward for actions from agent
  - Minimizes information loss, more human-like behaviour(Tastan et al., 2012)
- Features for every tile on grid:
  - Shortest distance to flag spawns
  - Shortest distance to bot spawns
  - Shortest distance to flag score
  - Visibility
- Returns probability field
- All works, but computation takes time...

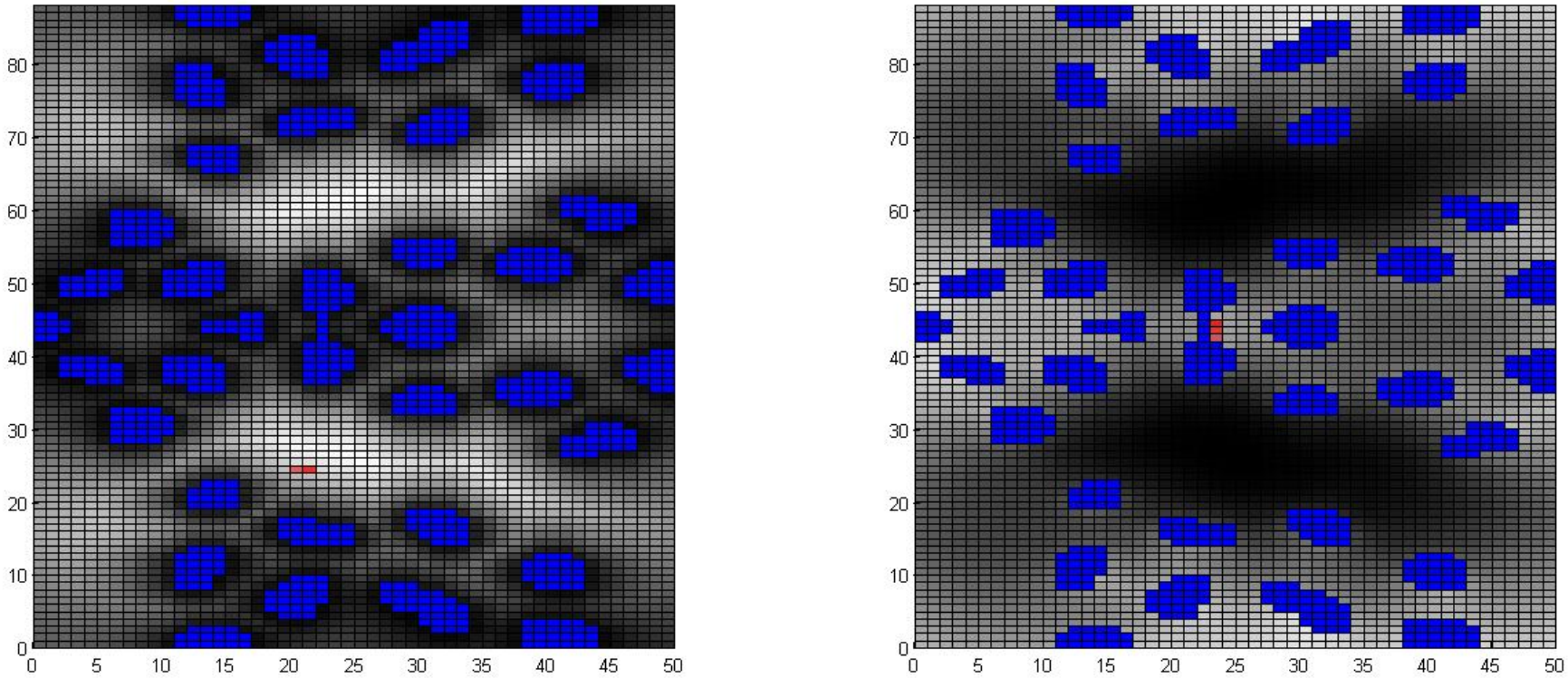

Figure : Two example motion models

Behaviour Classification

- Acquired Behaviour data consists of Terminator's own behaviour data
  - *What would I be doing if I were in the opponent's situation?*
  - Assumes the goal is the same for all players.
- Features extracted (each *game cycle*):
  - bot orientation
  - position expressed in POI distances
  - game state
  - distance to opponent
  - sees opponent

Behaviour Classification Continued

- Approx. 4200 instances of 6 classes
- Random Forest Classifier
  - 79 % correct when only using 2 classes (using cross validation)
  - 72 % correct when classifying all classes (using cross validation)
- Cons
  - Disregards sequential nature of data
  - Limited performance
- Pros
  - Fast enough for online classification
  - Returns Probability of classification

What's Next?

Part	Status
Creating a working Classifier	✓
Creating Motion Models using meIRL	✓
Using Discrete Propability Propagation	Todo
Updating histograms	Todo

What's Next?

- Evaluation of research
  - ✓ Classification Evaluation
  - Mini-competition to test the improvement in performance

vs	
Terminator	Terminator
Terminator	Terminator melRL
Terminator	Terminator melRL w. Classification
Terminator melRL	Terminator melRL w. Classification

  - Look at general improved trends between old and new melRL

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.