

Automatable Evaluation Method Oriented toward Behaviour Believability for Video Games

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Believable Agents

Believable agent

Computer program which plays like a human player.

Important point:

- Believability is subjective

Interest:

- Suspension of disbelief [Bates 92]



Evaluation of Believability

Lot of research on the topic [Mac Namee 04, Livingstone 06, Gorman 06]

Based on humans to judge agents:

- Best way to evaluate believability
- Time-consuming

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Our objective:

- Automate the evaluation
 - ⇒ Reduce human intervention

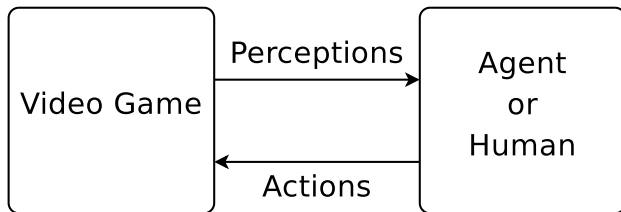
Outline

- 1 Proposed Evaluation Method
- 2 Sample Experiment
- 3 Conclusion

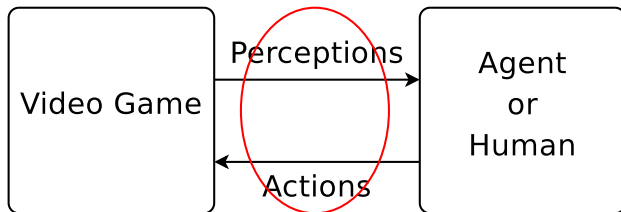
Plan

- 1 Proposed Evaluation Method
- 2 Sample Experiment
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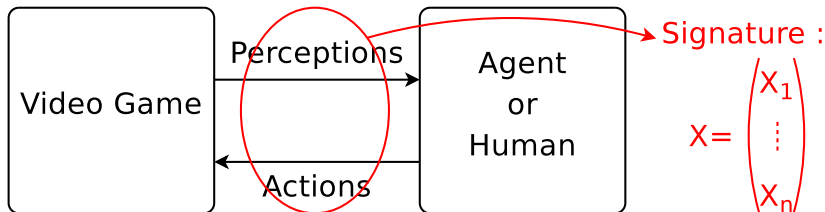
Principle: Monitoring



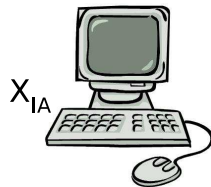
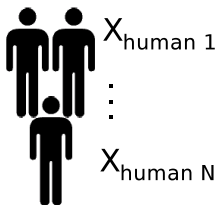
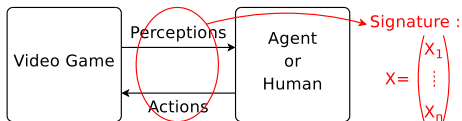
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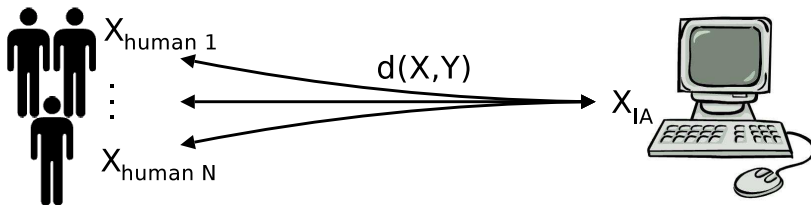
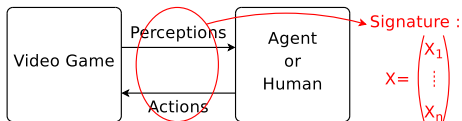
Principle: Monitoring



Principle: Distances



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Objective and signature

Goal:

- Evaluate the believability of UT2004 agents' move

Objective and signature

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Only one simple signature:

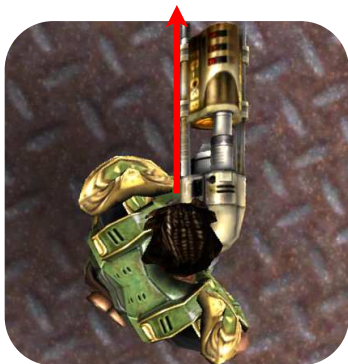


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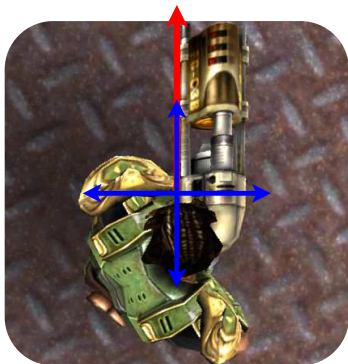


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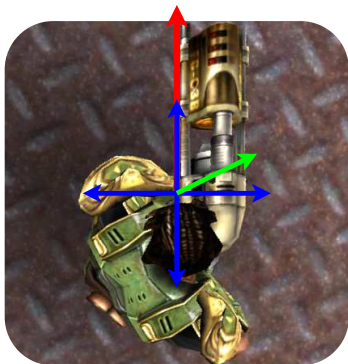


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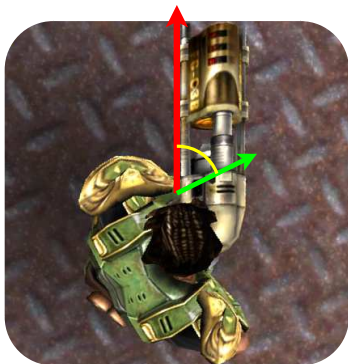


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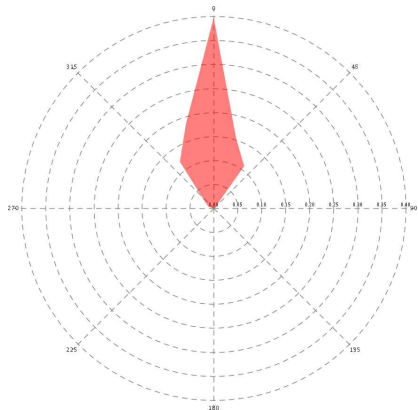
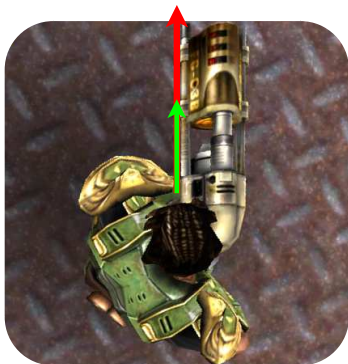


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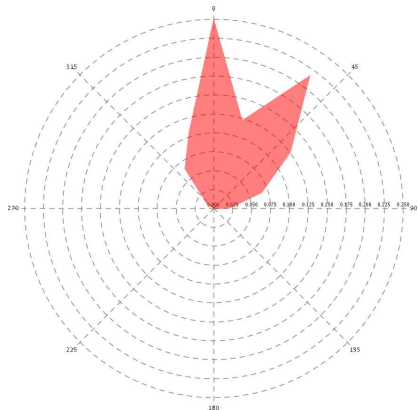
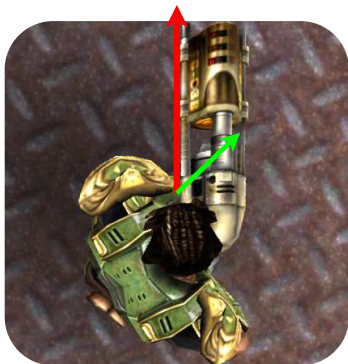


Objective and signature

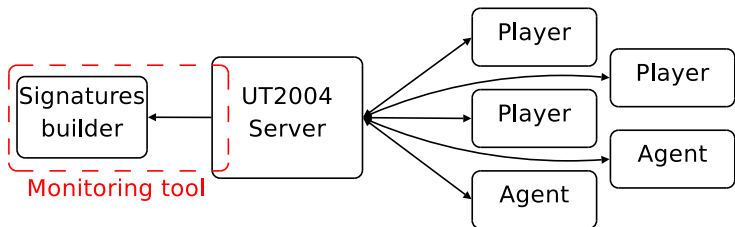
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Technical Details



Based on Pogamut 2 [Burkert 07]

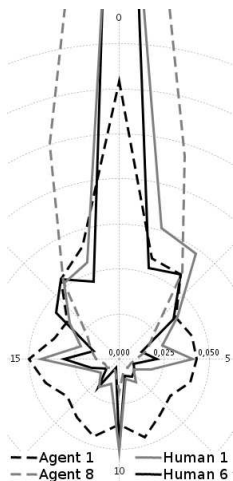
Source available at:

svn://artemis.ms.mff.cuni.cz/pogamut/branches/fabien_tence

Protocol

Protocol

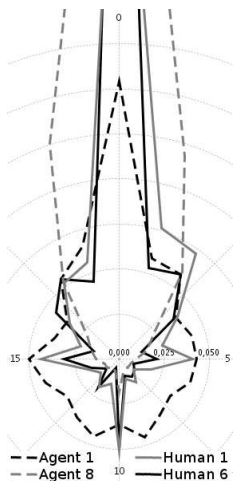
Results



14 signatures:

- 6 humans
- 8 agents

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2 data visualisation methods:

- 1 Reveal the differences between signatures
- 2 Compare signatures' global shape

Principal Components Analysis

Objective:

- Reveal the differences between signatures

Method:

- 1 Principal components analysis on the 14 signatures
- 2 Chart using the 2 principal components

Principal Components Analysis

Objective:

- Reveal the differences between signatures

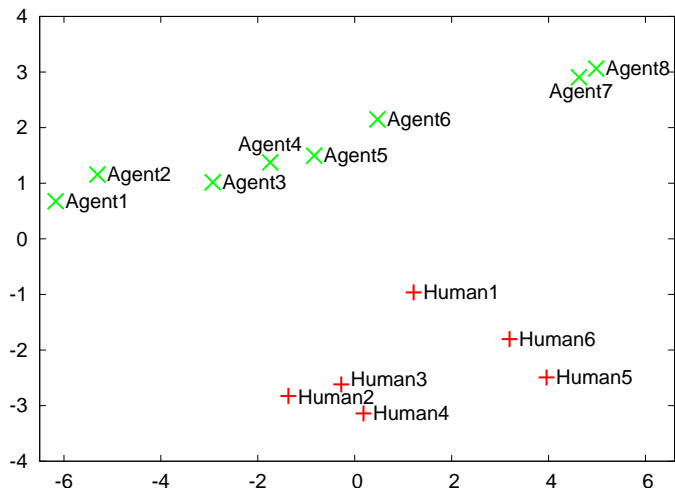
Method:

- 1 Principal components analysis on the 14 signatures
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To make it simple:

- Taking the plan on which the projected data is the most dispersed

Principal Components Analysis



Earth Mover's Distance and MultiDimensional Scaling

Objective:

- Compare signatures' global shape

Method:

- 1 Compute Earth Mover's Distance [Rubner 00] between the signature
- 2 Visualise these distances with MultiDimensional Scaling [Kruskal 64]

Earth Mover's Distance and MultiDimensional Scaling

Objective:

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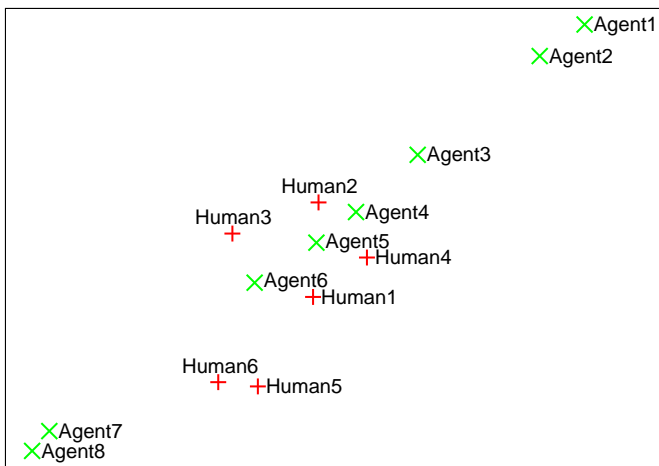
Method:

- 1 Compute Earth Mover's Distance [Rubner 00] between the signature
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To make it simple:

- Distance on the chart \approx distance between signatures' global shape

Earth Mover's Distance and MultiDimensional Scaling



Analysis of the Results

2 analysis:

- Differences between agents and humans
 - Can be caused by players' input devices
- Few differences between signatures' global shape
 - Are signatures too simple?

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2 analysis:

- Differences between agents and humans
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Conclusion:

- There are difference but it is not sure that humans can notice them

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Summary

Strengths of the method:

- Can evaluate a large number of agents
- Simple experiments reveal differences between agents and humans

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- Can evaluate a large number of agents
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Remark:

- Signatures do not have the same sensitivity as human
 - ⇒ Is this really a problem if signatures are too sensitive?

Openings

Next steps:

- ① Design more complex signatures
 - ⇒ Studies with human subjects
- ② Use these signatures in a behaviour modelling project

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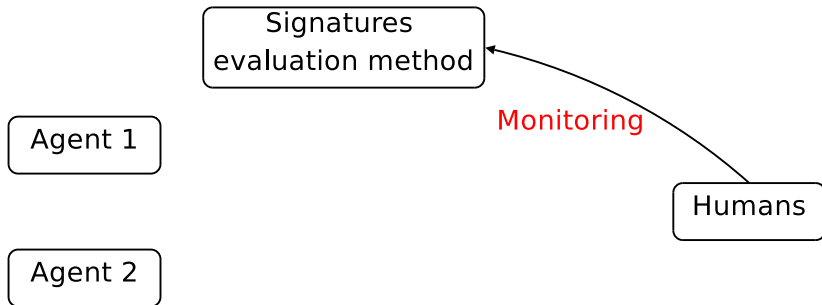
Agent 1

Agent 2

Openings

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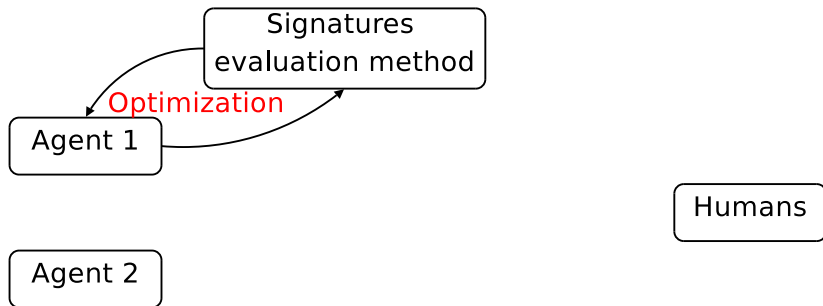
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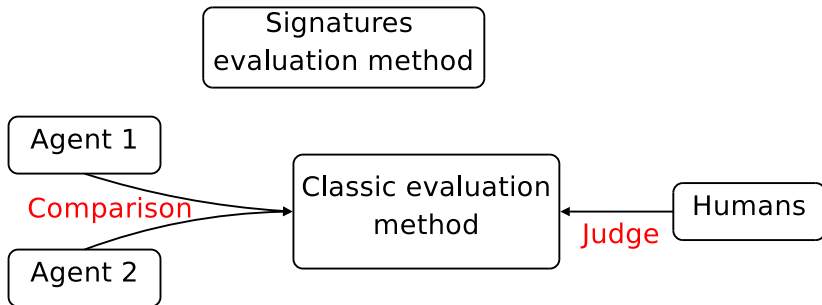
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