The Intention Progression Problem

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Research Question

How can the Gwendolen language be extended to reason about intention selection?

Background

A key problem for an agent with multiple, possibly inconsistent, goals is: 'what should I do next'?

What to do next can be formalised as the Intention Progression Problem(IPP): what means (course of action) to use to achieve a given (sub)goal, and which course of action (intention) to progress at the current moment. This problem is both central to agent reasoning and complex in nature, as the agent's intentions may conflict with each other given the resources available.

The International Intention Progression Competition (IIPC) maintains a list of challenging problems for intention selection and progression [2].

Approach

The Gwendolen programming language (part of the MCAPL Framework [3]) is a Beliefs-Desires-Intentions programming language with an explicit representation of intentions and an adaptable intention selection mechanism. The object of this project would be representation the IIPC examples in Gwendolen either by translating them manually or creating a parser from the problem format to Gwendolen's input format. Gwendolen's default intention selection procedure is simply to examine intentions in first in first out order. The performance of this process should be assessed on the challenge

problems as a base line. Then the project should develop alternative progression algorithms (e.g., [4]), potentially utilising machine learning (e.g., as in [1]).

Milestones

1. A set of examples for evaluating intention selection strategies (possibly drawn from the intention progression competition) represented as programs in Gwendolen.

2. Design and implementation of an intention progression mechanism.

3. Evaluation of the new mechanism against FIFO.

References

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[2] Castle-Green, S., Dewfall, A., and Logan, B. The intention progression competition. In *Engineering Multi-Agent Systems* (Cham, 2020), C. Baroglio, J. F. Hubner, and M. Winikoff, Eds., Springer International Publishing, pp. 144–151.

[3] Dennis, L. A. The MCAPL framework including the Agent Infrastructure Layer and Agent Java Pathfinder. *The Journal of Open Source Software 3*, 24 (2018).

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