Vrije Universiteit Brussel

Proposal bachelor thesis

Title: How to advise agents well

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Includes preparation course: Yes

Context

Reinforcement learning (RL) is a framework, where an autonomous agent learns from the interaction with its environment via performing *actions,* and receiving *rewards*. The goal is to find an optimal way of acting (or a *policy*), that yields maximum cumulative rewards. RL is a powerful paradigm, as it is capable to learn from a blank slate, but it often requires long learning times. The human designer may possess knowledge that can help speed up learning significantly. *What* forms of knowledge are the most helpful, and *how* to integrate them, are active areas of research. This thesis will focus on that former question.

Proposal bachelor thesis

Evaluate different ways of providing human feedback to an RL agent. In particular, we will consider the following feedback strategies:

1) Encourage perceived good actions (single green button feedback)
2) Discourage perceived bad actions (single red button feedback)
3) Encourage *and* discourage actions (both green and red buttons)
4) Encourage actions with varying enthusiasm (on a scale from 'ok' to 'great')

The domain will be one or multiple of the Atari 2600 games available via the existing Arcade Learning Environment framework.

This thesis will require:

- **developing a smartphone application that allows the user to interact with the game;** the student will utilize available implementations whenever possible (e.g. of the RL algorithms involved, etc), but will have to implement the interface, and the communication of feedback between the smartphone and the device running the game.
- **conducting experiments that compare the feedback strategies**

Preparatory course bachelor thesis

- Read relevant chapters of “Reinforcement Learning: an Introduction” by R.S. Sutton and A.G. Barto
- Perform literature review of the relevant research