

Faculty of Engineering

Summer Research Program 2022-2023

Project Title: Human-in-the-loop Reinforcement Learning

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Objective

Explore human-in-the-loop reinforcement learning algorithms for long-term, adaptive human-robot interactions

Project Details

The capability to interactively learn from human feedback (through a combination of task demonstrations, interventions, corrections, and evaluations) would enable robots to be deployed in more complex, social settings. The field of Human-in-the-loop Reinforcement Learning (HRL) aims to integrate the human into the learning process of the RL agent, allowing the agent to learn directly from the human. This integration of humans into the training process not only allows non-experts to train or modify a robot's behaviour in a natural way but also helps robots to continuously adapt their behaviour to individual users.

This project aims at exploring how existing HRL algorithms can be used and adapted to support long-term, continuous human-robot interactions. As a potential use case, we consider the setting in which a socially assistive robot tracks a user's posture and prompts the user to make changes whenever it detects the user has sustained a poor, risky posture for a long period of time. The idea is that by using HRL approaches, the robot will incrementally learn to adapt its prompts so as to maximise user compliance.

Prerequisites

Good programming skills; experience with Python and deep learning/deep reinforcement learning libraries (Pytorch, TensorFlow, RLib, etc.); good communication skills; experience implementing and using deep reinforcement learning algorithms.

Additional Information

Applicants may be required to attend an interview