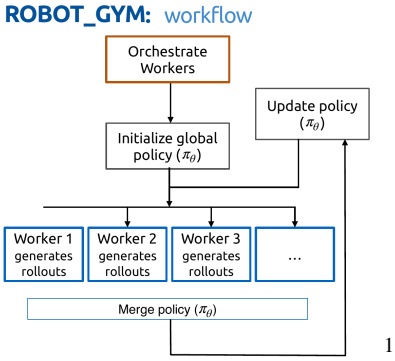
LUND UNIVERSITY

LTH
FACULTY OF ENGINEERING

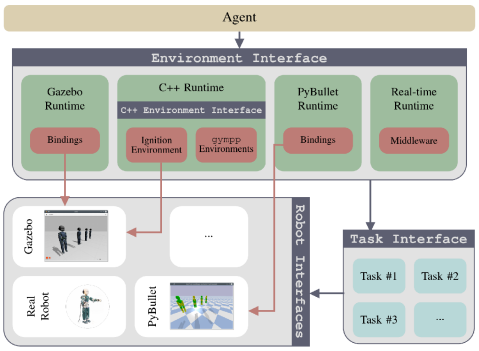
August 12, 2020

Matthias Mayr
Department of Computer Science

Master Thesis: Collection and Weighting of Episodes in distributed, parallelized cloud-based Reinforcement Learning



1



2

When learning complex tasks like rotating a cube in a real robotic hand that was trained in simulation only[3] it takes huge numbers of episodes to generate enough data - especially when applying domain randomization. To scale such a learning process it needs to be highly parallelized. There are multiple frameworks to do so. But while those provide a good foundation to parallelize training, the question remains on how to optimally use the generated episodes to update the policy.

Your Tasks

At first you search and discuss related work on parallelized episode generation and their incorporation into policy updates. Based on that propose different ways to process the collected episodes from different workers that can address the following challenges: (1) on-the-fly updates of local worker policies with the current global policy, (2) respecting different speeds of workers due to more complex environments or different resources and (3) different weighting of episodes based on their importance. The approach will be demonstrated on reinforcement learning task and compared to the existing baseline implementations.

Requirements

- Profound knowledge in Python
- Profound knowledge in Reinforcement Learning (e.g. EDAN95)
- Independent, diligent and structured way of working
- (Optional) Experience with ROS and Linux

Start Date

- Immediately or later

Key Words

- Reinforcement Learning
- Robotics, Simulation
- Parallelized Learning

SARS-CoV-2

Due to the newly discovered coronavirus, the university performs remote education. This project will be conducted remotely on cloud infrastructure and supervision can happen with video calls.

[1] ROSCon 2018 Madrid: Accelerated robot training through simulation with ROS and Gazebo `https://vimeo.com/293299416`

[2] "Gym-Ignition: Reproducible Robotic Simulations for Reinforcement Learning" `https://github.com/robotology/gym-ignition`

[3] "Learning Dexterity" `https://openai.com/blog/learning-dexterity/`

Postal address: *Box 118, 22100 Lund* Visiting address: *Ole Römers väg 3, Lund*
E-mail: *matthias.mayr@cs.lth.se* Website: *http://rss.cs.lth.se*