

Introduction

As artificial intelligence (AI) plays a more prominent role in our everyday lives, it becomes increasingly important to introduce basic AI concepts to K-12 students. To help do this, we combined the physical (LEGO robotics) and the virtual (AR Interface) worlds for helping students learn some of the fundamental concepts of reinforcement learning (RL).

Motivation

Why we choose RL?

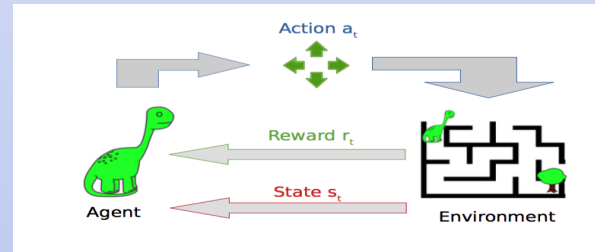
- Similar with our cognition of nature of learning
- Contributed to many fields but received less attention
- Easy to be demonstrated with games on robots

Why we want to combine AR and Robot?

- Robot could provide a more interactive and engaging experience
- AR could easily demonstrate different game environment in real world
- AR can make up for the shortcomings of robots in displaying information

RL Background

RL is training of machine learning models to make a sequence of actions that could maximize environmental reward.



System Overview

Students would use a mobile device to view the AR interface which allows them to interact with the robot and visualize the training process. The LEGO robot and the tablet are communicating through ThingWorx.

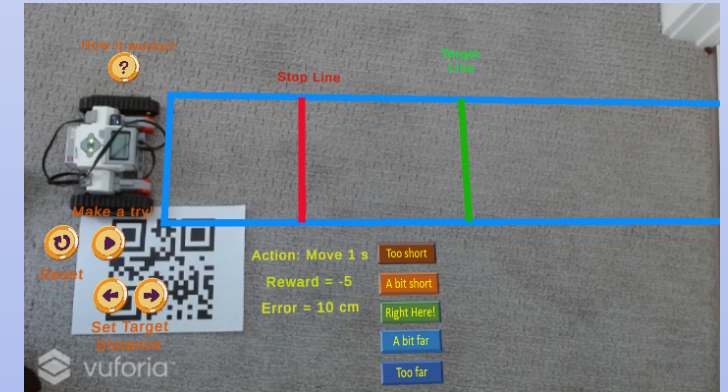


Activity Design

Students would train the robot car to learn a linear model that predicts how long the motors should move to drive the car to a target position.

Learning Objective

- General understanding of what RL is
- How human could manually train an agent with RL method



Future Work

- Add a sequence of different RL activities to introduce various RL concepts (policy, action, etc.)
- More functionalities like showing the graph of training data
- Test the system with students