

Fall 2018 CS7180 Final Project Report

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Peter Bernstein and Giorgio Severi

Abstract

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Introduction

Reinforcement learning has been widely used to successfully solve a variety of games. Doom is a classic First-Person Shooter (FPS) game from 1993 created by Id Software with the following components: a player is a marine in the central point of an invasion of demons. The agent can be placed in a variety of scenarios with a multitude of differently behaving demons. At any time the agent can navigate or shoot his weapon. Doom offers a variety of settings with varying difficulties, which makes it natural for training an AI.

In this project we restrict the setting to where the agent can only move left or right

The objective of the agent is to kill as many monsters as possible - he receives rewards for killing

As one of the first FPS games to market, it is simple in its gameplay in comparison to anything modern, but is still significantly more complex than many other Atari games, such as Pong. In Doom, the user can move, attack, and pick up items and the game state may not be completely visible at all times and obstacles often partially obscure the display. These complexities make Doom an interesting study for reinforcement learning while in this project we focus on the simple case of the user encountering a single adversary in a match.

Background

Related Work

Reinforcement learning and deep reinforcement learning in particular have a history of success on fully observable games for Atari, such as Pong or Space Invaders [al13]. Most of the best performing AI solvers were trained using deep recurrent Q-learning, weighted replay, or dueling. Google DeepMind recently developed an Asynchronous Advantage Actor-Critic (A3C) model that has also been used to train

AI solvers for Atari games with success as well. The victory of AlphaGo over the best human player received wide media attention as a landmark. While we restrict our focus in this project to deep-Q learning and SARSA, more complicated models have proven to be more successful especially running on more advanced architectures.

Doom in particular has a history with using deep-Q networks to train solvers.

Project Description

We chose a very simple setting of the Doom game to train our agent. The setting for our project AI allows for the agent at any time step to do one of only three things: move left, right, or shoot. For each game episode, there is a stationary demon that does not attack the agent. Thus the goal for the

Experiments

Conclusion

References

- [al13] Mnih et al. "Playing Atari with Deep Reinforcement Learning". In: *ArXiv preprint arxiv:1312.5602* (2013).