CS294 Project: Reinforcement Learning with Auxiliary Tasks Milestone Report

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Current Progress

1.1. Main Progress

Up till milestone one, we've done literature review on paper focusing on Reinforcement training with auxiliary tasks to improve the training and performance of the agent. The paper conducted experiment with different auxiliary tasks for multiple environment in Atari and Unreal agent. We found that the auxiliary tasks proposed by the paper provided great insight and directions for our project. We also reviewed the realization of the paper in python to understand how to apply multiple auxiliary tasks to our training.

1.2. Code Implementation and Experiment

Based on the information we got from the paper and realization, we have implemented an modularized UNREAL Agent Model with pixel change and/or value replay and/or reward prediction. We are able to train the agent in various Atari game including PongNoFrameskip and others. Now, we are in the middle of integrating our UNREAL Agent module with 3D games in DeepMind lab. Due to the time constraint, by far, we cannot finish running all the tests in Atari and 3D games. (Maybe one big problem of us is that we have very limited computation resources, CPUs, GPUs, and the program takes longer time than expected).

Revision to project statement

2.1. Project Goal

After we review the feedback from the peer review on our project proposal, we made some changes to our project proposal.

In our revised project goal, we aim to achieve three main task. First, we will try to implement Reinforcement Learning algorithm with auxiliary tasks suggested in the paper we review and evaluate the training and performance of our agent in gym environment and Atari game. Then we will explore other possible auxiliary task and investigate how effective are those tasks for training and the overall performance of our agent. And last but not least, we will investigate the relationship between the number of auxiliary tasks that we included and the performance of our agent during and after training.

2.2. Investigate the number of auxiliary tasks and performance

We believe that by investigating how the performance is related to the number of auxiliary tasks being deployed, we can provide valuable insight and suggestion to make choosing auxiliary task more effective.