CS 182: Final Project Proposal

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November 2, 2017

Project Description

Problem Statement

For our final project, we will be using the OpenAI Gym platform to create generalized and some specialized Atari agents, which will employ classical/adversarial search, MDPs, and (advanced) RL. Ultimately, we are striving to compare the performance of generalized and specialized agents, determine if generalized parameters truly exist, and discover the factors of a game of which the optimal parameters are a function.

Approach

Our strategy will be to complete the following, in order of priority:

1. Implement and test classical/adversarial search, MDPs, RL agents for the Atlantis game.
2. Generalize our agents to be transferable to a handful of other Atari games.
3. Create fine-tuned agents to those specific games, and contrast them in order to determine the underlying game mechanics that dictate optimal parameters.
4. Draw conclusions about the degree to which parameters can be generalized, based on their effectiveness and versatility.
5. **[Stretch]** Implement a deep RL agent using neural networks, and compare performance with that of the traditional algorithms.

In general, what we refer to as "parameters" extend beyond learning and discount rates to include reward and punishment systems. Additionally, as we progress through the project, we will have a better sense of how many a "handful" of other games can reasonably be.

Resources And References

We will certainly be using the OpenAI documentation and forums to help us become accustomed to unfamiliar environments, and we will be referring to AIMA and class notes when implementing standard algorithms. If we reach our stretch goal, we will use Kevin P. Murphy's *Machine Learning: A Probabilistic Perspective* and most likely a few other online resources that we find along the way.

Collaboration Plan

We plan on collaborating throughout each part of the process rather than having individual implementation, but we will assign a point-person to each goal: Michelle for general agents, Daniel for specialized agents, and Andrew for overall algorithmic implementation and stretch goals.