Project Proposal : Undergraduate Research

Hierarchical Management of Multi-Agent Teams

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This a proposal of my project for Undergraduate Research in MSOE. This proposal gives a rough idea of what I hope to acomplish.

1 Goals

The main goal of this project is to get a deeper understading of reinforcement learning and how to use it effectively. Subgoals of this project is to create an exceptional reinforcement learning project which stands out on a resume. Additionally I want to create something novel and publish some research on the topic.

2 Motivation

I chose to do this project due to my interest in many reinforcement learning project that I have seen in the past and on the internet. I also know that I do not have much experience in this area of the field and wanted to expand my knowledge to this part of the field.

3 Topic

This topic of this paper is too see how reinforcement agents interact with each other in multi-agent teams. I want to directly compare the difference between using a seperate agent which can influence the other agents creating this Hierarchy. The idea is that this coach will act as a leader/manager of the agents creating stronger collaborations than otherwise.

I also want to experiment with different reinforcement learning algorithms to see which one is the most effective in this scenario. And what combination of algorithms is the most effective.

I am also intrested in implemnting the use "StarCraft II: A New Challenge for Reinforcement Learning" papers ideas create a more robust agent.

4 Enviroment

For the choice of Enviroment I wanted to chose a fairly simple enviroment to start with. I chose the idea of Footbal/Soccer as the enviroment where two teams of agents will play against each other attempting to move a single ball into two set of oposing goals. The number of agents on each team will could be something to experiment where I see that the effect of Hierarchical Management being more effective on bigger teams.

5 (super rough) Timeline

- Week 1 - 4 : Research & Building enviroment.
- Week 5 - 8 : Integrating and Implmenting basic Reinforcement Learning Algorithm.
- Week 9 - 12 : Implementing Hierarchical Management and Experiment with different algorithms.
- Week 13 - 16 : Implementing StarCraft II ideas and develop progress reports.
- Week 16 - 20 : Continue to experiment with different parameters and algorithms and record main results.
- Week 21 - 30 : Finalize paper, presentation and reprodcution of results.