1 Introduction

My intention for this project is to explore game theory and/or Bayesian games using intelligent agents. Specifically, I want to analyze/explore how different agents interact and make decisions in games of incomplete information. However, I am yet to decide which specific game I wish to explore. One game I have looked at that illustrates my idea is Kuhn poker (`https://en.wikipedia.org/wiki/Kuhn_poker`), though I may not implement this specific game.

In this case of Kuhn poker, the problem is choosing when to bet, check or fold when dealt any specific card in order to maximize your expected winnings.

2 Methods from Artificial Intelligence

The methods that I use for this project will depend on the game(s) I ultimately decide to implement. I do suspect however, that I will be making use of at least one of:

- Expectiminimax Search
- Bayes Theorem/Bayesian Inference
- Reinforcement Learning

3 Datasets

I do not think this section will be applicable in my case.

4 Proposed Validation Strategy

This too will vary depending on the game(s) I ultimately choose to implement. For the Kuhn poker example given above I would likely implement multiple agents. The first/base-case would be an agent that simply implements some expectiminimax search given the specific card they have been dealt. The win rate of this agent playing against itself (in thousands of games) would then serve as the base rate. Any subsequent agent that I implement would then play against the same base-case agent, and their win rate would be compared to this base rate to indicate the ingenuity (or lack thereof) of the new agent's strategy.

5 Expected Deliverables

- One or more economic/game theoretic systems
- One or more agents that interact in each of these systems
- Graphs of agents' performance over time with a given strategy