Learning to Play no Texas Holdem Using Reinforcement Learning

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Abstract

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In this section I will introduce the subject area of this Final year Project (FYP). I will then go on to establish some of the objectives for the project, give an overview of the report along with some of the motivations for choosing this subject area.

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1.2.1 Primary Objectives

Leverage Deep Reinforcement Learning to Develop a Poker Playing Agent

In the past, methods such as counterfactual regret minimization (CFR) have been used to develop agents that can play no-limit texas holdem to a superhuman level. There have also been attempts to solve the limit version of the game using reinforcement learning (RL). In this report we will explore the possibility of using reinforcement learning to tackle the larger problem of no-limit texas holdem.

Experiment with Different Reinforcement Learning Methodologies

Although all RL algorithms share certain core properties, there are a number of distinct approaches that we can take. In this project we will attempt

to determine, through statistical analysis, which approach yields the most favourable results.

Develop a Web Interface For Users to Play Against the Agent

The focus of this report will largely be research. However it is also my goal to create a product that will be fun and useful for the general public. As such another objective will be to create a website that will allow users to play heads-up against the final product.

Utilise Statistical Techniques to Prove the Efficacy of the AI Agent Produced

1.2.2 Secondary Objectives

Understanding Reinforcement Learning

As this project is very specific and academic, one of the larger challenges will be to gain a strong knowledge of the domain. This means learning the history of RL, the types of problems that it has been used to solve and the specific details of different RL algorithms.

Understand the Existing Literature on Artificial Intelligence and Imperfect Information Games

A successful project will require a high degree of knowledge from the broader domain of RL. However, it is also the case that I must become closely familiar with the existing academic literature in the area of RL with respect to imperfect information games. This will allow me to avoid taking approaches that have previously shown to fail and also allow me to contribute to the existing literature without simply replicating what has already been done.

Learn about Different Approaches to Implementing Poker Agents

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