AI Nanodegree Project 2: Build a Game-Playing Agent

Research Review

Social Learning Methods in Board Games

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Introduction

The paper **Social Learning Methods in Board Games** reasons and evaluates the benefits of training an agent/agents using ‘non-stationary opponents’. Where ‘non-stationary opponents’ is intended to capture the dynamics of how people learn from each other, taking inspiration from traditional person to person board game clubs where juniors are paired with mentors to accelerate learning. The authors argue that the existing approach, especially playing against itself, doesn’t expose the agent to enough experience (game states).

Reinforcement learning

Reinforcement learning is used in this paper, a machine learning technique that is said to model how humans learn, through trial and error. Simply put, given the state of an environment, an action is performed and feedback used to update a matrix used for decision making.

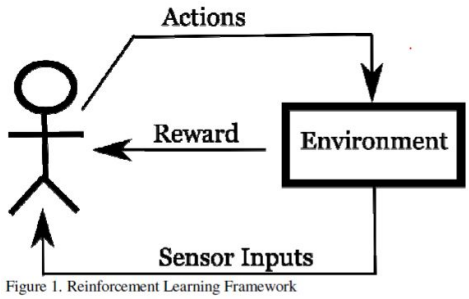

Figure 1. Reinforcement Learning Framework

Social Learning and Technique

As mentioned above; the motivation behind this paper is to evaluate the effectiveness of using Social Learning to increase the effectiveness of the agents learning. This is inspired by how humans learn from each other, when playing someone better we observe and learn from them.

To test this the authors created an experiment with groups of agents and compared how well they performed. The groups consisted of agents trained by themselves (a traditional approach) and populations where ‘experience’ is shared through playing stronger agents against weaker agents.

Technique

Two *general* groups of agents are trained, one to simulate social learning and the other used as a control group. The authors used the game of Tic Tac Toe where each player is designated noughts or crosses and the winner is the player who sets three in a row (horizontally, vertically, or diagonally).

Results

Through a series of play-tests and a league, the results presented showed a slight increase in performance for those agents trained ‘socially’ (non-stationary). The authors do acknowledge that all agents played at a beginner level but have shown that introducing non-stationary increases their effectiveness (independent of training cycles) and suggest using larger population sizes is likely to result in supervisor agents.