

Game of Nim Competitive Agent

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Group Members

I, Kevin Ponting, am the only group member.

Description

This project's main goal is to implement a competitive game playing agent for the Game of Nim that uses an evaluation function to determine its next move. The addition of an evaluation function allows a game with many rows to be played. A graphical user interface (GUI) will also be included.

Programming Language

For this project, Python will be used to implement the agent and GUI.

Existing Code and Extensions

This project will be building off my programming project 2 submission, and will be using standard Python implementations of search algorithms provided in Russell And Norvig's "Artificial Intelligence - A Modern Approach". My contribution to this project will be the evaluation function that calculates the utility value for a non-terminal state, the game logic, and the GUI.

Algorithm/Approach

From the Python implementations of search algorithms in Russell And Norvig's "Artificial Intelligence - A Modern Approach", the alpha-beta cutoff search algorithm will be used in conjunction with my evaluation function. After conducting research regarding the game of nim and combinatorial game theory, the approach for implementing the evaluation function will be based on the nim-sum of a state, which is the XOR of the pile sizes. The overall process for deciding what move to make includes assessing each possible action (state) that can be achieved from the current state, and traversing down each path to the specified depth. Once at the specified depth, apply the evaluation function to calculate the utility value of that state. Then, that value will be returned back up, and the agent will make a decision based on the returned values from each path.

Timeline

- **04/11 - 04/18:** Implement evaluation function and testing.
- **04/18 - 04/25:** Further testing and evaluation of the agent.
- **04/25 - 05/02:** Implement GUI.

Special Computing Platform

No special computing platform will be used to complete this project.

Roles and Responsibilities

I, Kevin Ponting, will assume all roles and responsibilities for this project, as the sole member of the group.