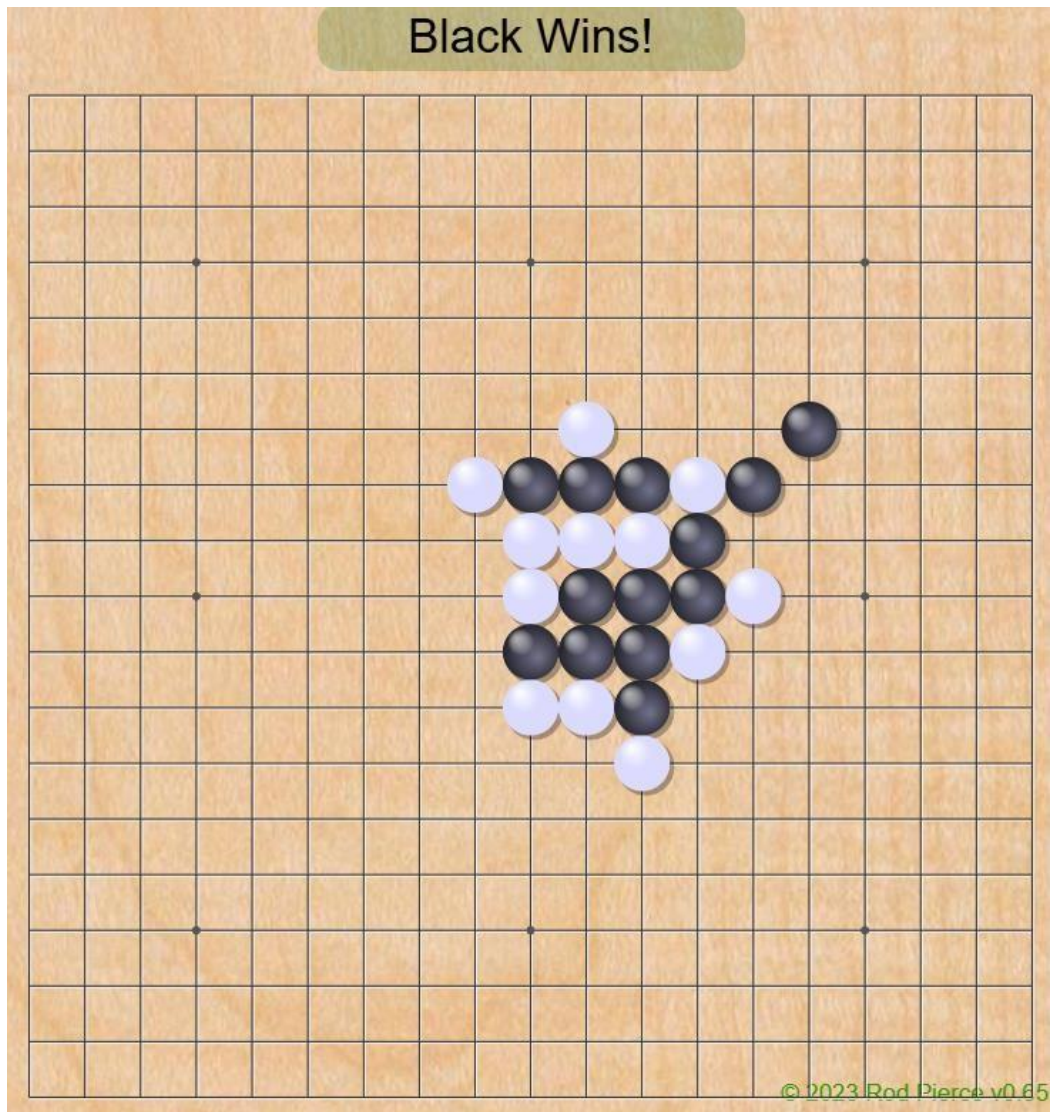# Project : Gomoku (Five in a Row) Game Solver

Project Type:

Game

1. Game Overview

Create a game solver that plays the game of Gomoku (Five in a Row). The goal of Gomoku is for a player to get five of their marks in a row (horizontally, vertically, or diagonally) on a game board before the other player.

This project has two main parts:

a. **Human vs. AI:** Implement a version where a human player can play against the AI. The AI will use the Minimax algorithm to determine its moves.
b. **AI vs. AI:** Implement a version where the AI plays against itself.
   - The Minimax algorithm against the Alpha-Beta pruning algorithm.

2. Project component

Game Engine: is responsible for:

- Taking the current position of the Gomoku board.
- Applying the search algorithm (Minimax/Alpha-Beta) to determine the next move. This algorithm must be implemented in Python.
- Considering depth limits to manage the search space.
- Sending the chosen move back to the user and displaying it.

3. Project Knowledge

- The Gomoku board (you can specify the size, e.g., 15x15 or 19x19).
- Game rules of Gomoku.
- Minimax Algorithm.
- Alpha-Beta Pruning Algorithm

4. To do this we examined:

- Minimax Algorithm
- Alpha Beta Pruning Algorithm

5. Project Input

- The user should enter the initial (or current) position of the Gomoku board. This could be a representation of the board state.

6. Project Output

- The output should be the coordinates of the AI's chosen move.
- The program can display the updated board after the AI's move.

7. Grading Criteria

1	Accept Input from user
2	Game State Representation
2	Game Engine (Gomoku rules and move generation in Python)
1	Formatted Output (chosen move)
2	AI Implementation (Minimax)
2	AI Implementation (Alpha-Beta Prunning)
2	AI vs. AI mode. **Alpha-Beta Pruning** Vs. **Minimax** Algorithm
2	**Bonus** brilliant GUI

Important Notes:

Please read these notes carefully to avoid losing grades:

- The number of students in a team is 4-5 students from the same lab group or with the same TA .

- Please make sure that the load is almost equally distributed between team members .

- Please submit one .py file (or a zip file) containing your solution. The file name must follow this Structure :

  For General Students Gen_TA_ID1_ID2_ID3_ID4_ID5 _GROUP.py

  For Special Students SP_TA_ID1_ID2_ID3_ID4_ID5 _GROUP.py

- Note that: any violation in the project submission will cost you 0.5 mark of the project grade (like submitting more than one file, not following the naming convention, using different file extension)

Cheaters will be given a NEGATIVE grade and no excuses will be accepted .