Gomoku

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Game description:

Gomoku, also called *Five in a Row*, is an abstract strategy board game. It is played between two players and here one of them is a computer program. The two players take turns putting stones on a board. It is a 10x10 board.One of the players uses white stones and the other uses black stones.The player who gets 5 of its stones contiguously in a row i.e. horizontally,vertically or diagonally wins. If neither player wins before the board fills up completely,the game result is a tie.

Used algorithm:

Minimax algorithm: It is a recursive backtracking algorithm for decision making and creating game trees.

Alpha beta pruning: It is an advanced algorithm that can reduce the number of nodes in Minimax.

Heuristic function:

The heuristic function is a way to inform the search about the direction to a goal. It provides an informed way to guess which neighbor of a node will lead to a goal.
Here only those nodes are being considered if new nodes are added
AI's win or Human's win can be prevented.That's why
Firstly,it is seen if there are 3/4 stones of the same colour at the same place of the board.
Secondly, the empty intersections are considered which have at least one stone of any colour in the 5 * 5 matrix consisting of the surroundings.

Evaluation function:

For terminal values,we consider when we place a stone on an empty intersection,how many stones are there of same colours .If it is AI's turn and after it's placing the stone, we get 1/2/3/4 same coloured stones then the terminal value of that node will be +1/+2/+3/+4. Same things happen when it is human's turn.The only difference is that for humans, then the terminal value of that node will be 1/-2/-3/-4. If we get the line of five stones of the same colour,then we declare the winner and for AI we assign the terminal value +10 and for human -10.