Tribhuwan University

Institute of Engineering

Pulchowk Campus

A Project Report on

Artificial Intelligence

Title:Three Men's Morris

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Submitted To:

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ABSTRACT

Three Men's Morris is an abstract strategy game played on a three by three board (counting lines or nodes) that is similar to tic-tac-toe. It is a zero-sum game played on a 9 point grid(node) between two opponents each having three pieces; black and white. Here each player has 3 similar pieces and alternatively each player puts his piece in a node with a goal to make all of his/her pieces in a line as in tic-tac-toe. After all the pieces are placed in some nodes and similar pieces are not in a line, the pieces are moved to adjacent distance alternatively by each player with an aim to make his/her pieces in a row.

In this game, the computer applies logic and competes against the human moves. AI algorithms such as Search techniques, Mini-Max Algorithm are implemented.

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INTRODUCTION

Three Men's Morris is a strategic symmetric two-player board game played on a three by three point grid(node). Each player has three pieces. All the pieces have same movement i.e. each piece can move straight to adjacent node only. A player can move one piece at a time, and next player moves his/her piece. Each player has to block next player from making his/her dice in a line and aim to make his/her piece in a line. The line can be vertical, or horizontal. The winner is the first player to align their three pieces on a line drawn on the board.

The board is empty to begin the game and players take turns placing their pieces on empty intersections. Once all pieces are placed (assuming there is no winner by then), play proceeds with each player moving one of their pieces per turn. A piece may move only to any adjacent empty position. A player wins if thereby they get three pieces in a line:

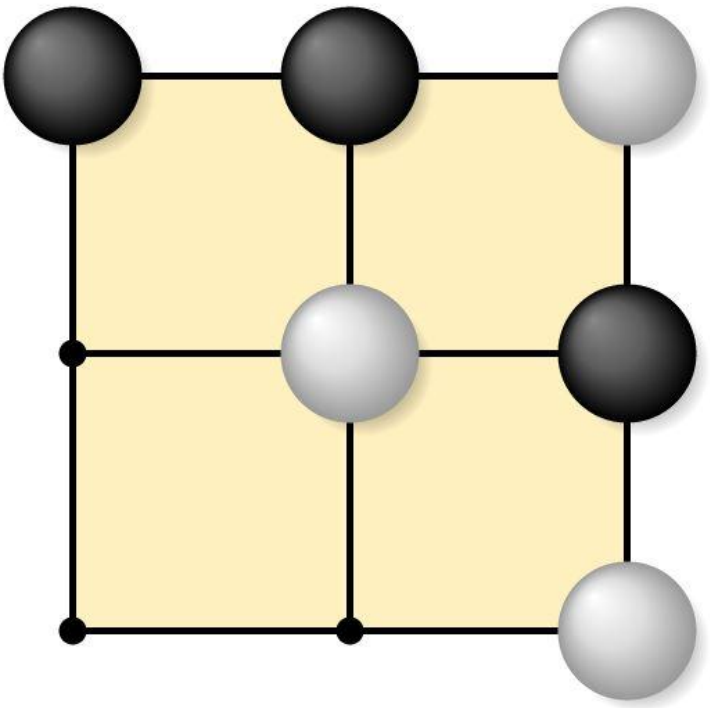


Fig: 3 Men’s Morris Board

OBJECTIVES

i) To understand and implement AI algorithms such as Search techniques, Mini-Max Algorithm
ii) To learn about practical implementation of Artificial intelligence.
iii) To create a simple AI game

METHODOLOGY

Three Men's Morris uses the following AI techniques:

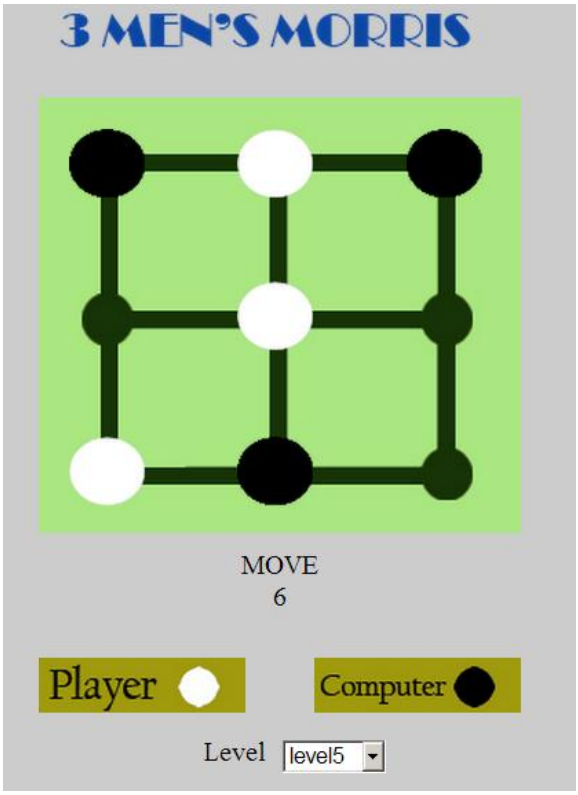
Searching:

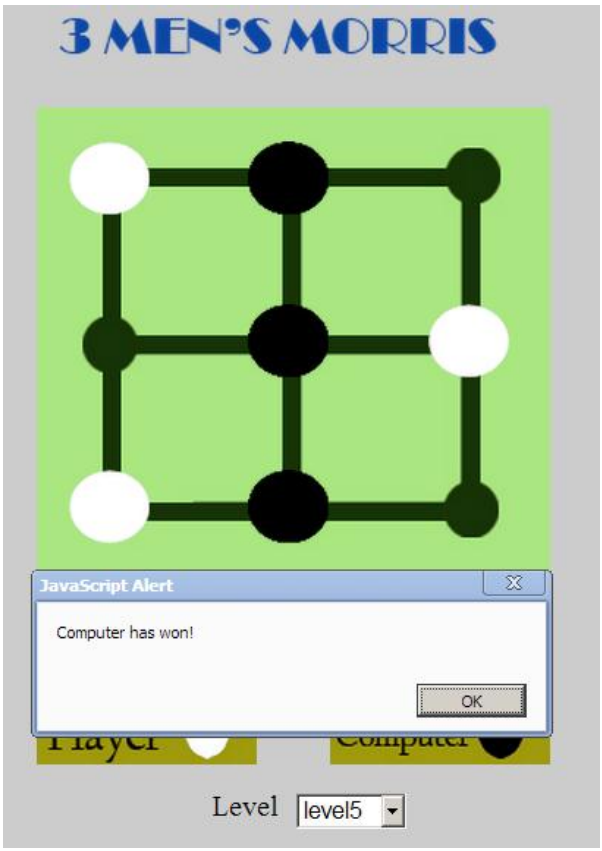
A game tree is used to represent positions and moves. Nodes represent game positions, and the root node corresponds to the current position of the game. The branches of a node represent the legal moves from the position represented by the node. A node is called a leaf if it doesn't have a successor. Using the rules of the game, we can evaluate a leaf as a win, lose, draw, or a specific score. Search techniques are general problem-solving methods. Depth first search searches a tree for the possible moves in order to find the move that produces the best result.

Mini-Max Algorithm:

The game tree search is used to find the best move for the current position, assuming the best play of the opponent. Two players choose a legal move alternately, and both of them intuitively try to maximize their advantage. Because of this reason, finding the best move for a player must assume the opponent also plays his/her best moves. In other words, if the leaves are evaluated on the viewpoint of player A, player A will always play moves that maximize the value of the resulting position, while the opponent B plays moves that minimize the value of the resulting position.

OUTPUT


3 MEN'S MORRIS
MOVE
6
Player
Computer
Level
level5


3 MEN'S MORRIS
JavaScript Alert
Computer has won!
OK
Level
level5

REFERENCES

i) https://en.wikipedia.org/wiki/Three_Men%27s_Morris

ii) https://www.udacity.com/wiki/cs271