

Mancala Game

Qian Song
songqian@pdx.edu

OSS course project summer 2016

Github: https://github.com/Qian82/Qian_OSSProject_2016

Under MIT License

Outline

- ✿ *Zero-Sum-Game Introduction*
- ✿ *Mancala game rules*
- ✿ *Applied Algorithm*
- ✿ *Implementation and Display of game*

What is a zero-sum game?



- ✳ *Zero-sum game is a situation in game theory in which one person's gain is equivalent to another's loss, so the net change in benefit is zero. A zero-sum game may have as few as two players.*

Introduction to Mancala



- ✿ *The Mancala 'board' is made up of two rows of six pits, each.*
- ✿ *Four pieces -- marbles or stones -- are placed in each of the 12 holes. The color of the pieces is irrelevant.*
- ✿ *Each player has a 'store' to the right side of the Mancala board.*

Introduction to Mancala

- ✿ *The game begins with one player pick up all stones in any one of the pits on his side.*
- ✿ *Moving counter-clockwise, the player deposits one of the stones in each pit until the stones run out.*
- ✿ *If you run into your own store, deposit it, if you run into your opponent's store, skip it.*
- ✿ *If the last piece you drop is in your own store, you get a free turn.*

Introduction to Mancala

- ✿ *If the last piece you drop is in an empty pit on your side, you capture the piece and any piece directly opposite.*
- ✿ *Always keep captured pieces in your store.*
- ✿ *The game ends when all pits on any one side of the mandala board are empty.*
- ✿ *The player who still has pieces on his side of board when the game ends captures all of those pieces.*
- ✿ *The winner has most pieces in his/her store.*

Introduction to Mancala

- ✿ *Still not quite clear on how to play?*
- ✿ *Watch this video:*
- ✿ https://www.youtube.com/watch?v=jGM_yntoNsE

Program and algorithm

		Player-2							
		1	2	3	4	5	6	7	8
A	0		4	4	4	4	4	4	
B			4	4	4	4	4	4	0
		Player-1							

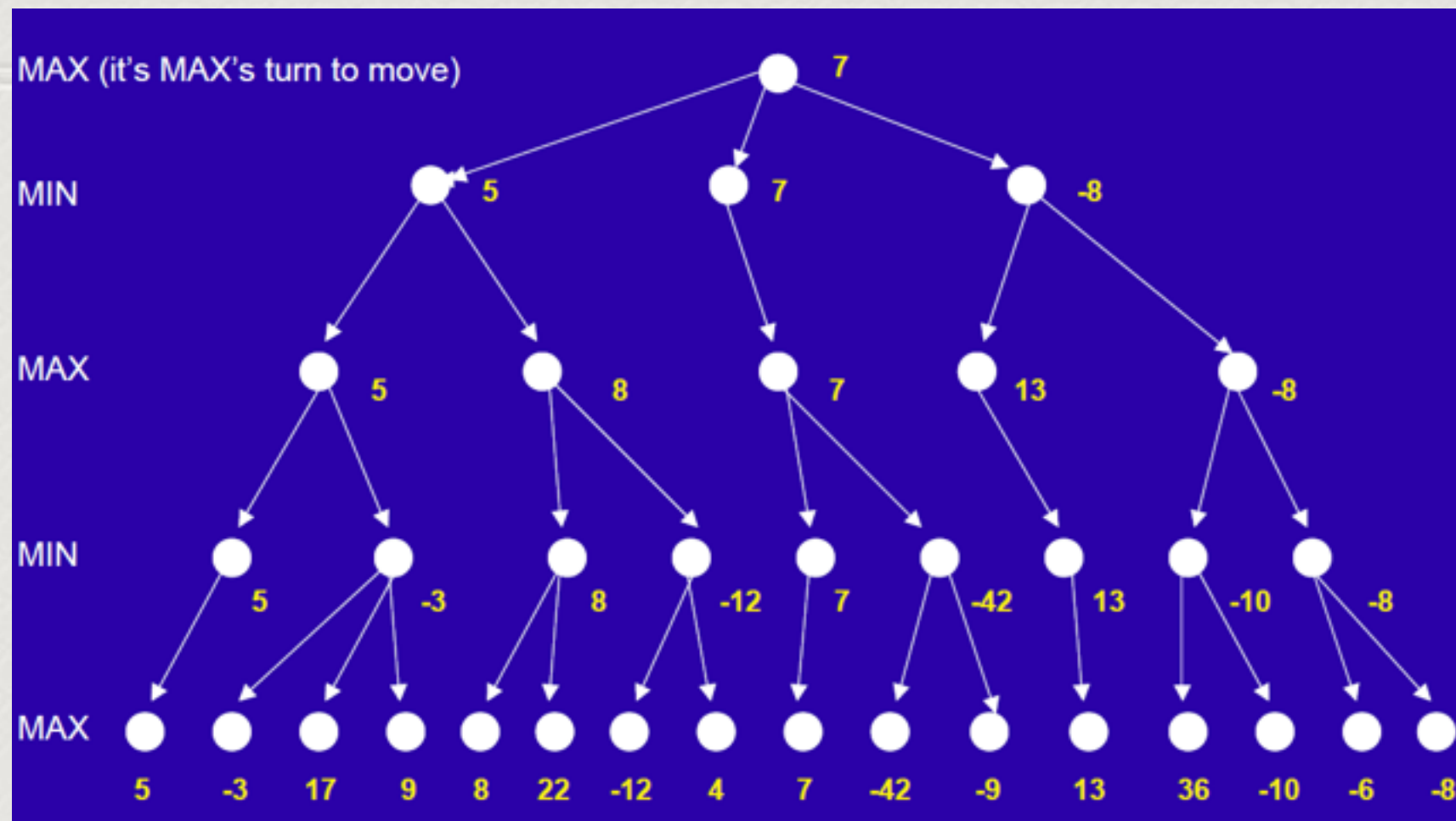
Two arrays to represent two rows of the board(each row includes one player's pits), the elements of the arrays represent the number of pieces in each pit.

Program and algorithm

✧ Minimax decision

- ✧ *An algorithm used to determine the score in a zero-sum game after a certain number of moves, with best play according to an evaluation function. It is a kind of tree-searching algorithm.*
- ✧ *Evaluation function is a function used by game-playing programs to estimate the value or goodness of a position in the minimax and related algorithm.*

Minimax decision



"OK, if I make this move, then my opponent can only make these several moves, and each of those would let me win. So this is the right move to make."

Minimax decision

- ✿ *My evaluation function is: $evaluation = A[1] - B[8]$*
- ✿ *In my program, I choose $depth = 5$*

Implementation and Display

- ✿ Python version: terminal interface
- ✿ Javascript version: html interface

challenges



- ✿ *understanding the algorithm and implement it*

What have been gained

- ✿ *Programming experience in python*
- ✿ *programming algorithm (minimax decision)*
- ✿ *Javascript, html, CSS, and JQuery*
- ✿ *More experience on using github*



Thank You!