



Ain Shams University
Faculty of Engineering
CSE481: Artificial Intelligence
Intelligent Mancala Game

Team Members:

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Game description:

Mancala is a generic name for a family of two-player turn-based strategy board games played with small stones, beans, or seeds and rows of holes or pits in the earth, a board or other playing surface. The objective is usually to capture all or some set of the opponent's pieces.

Implementation description:

We choose suitable representation for the game and implemented show and initialize function as utility function for it, then we implemented the game rule for Human player and tested it separately by player vs player mode, then we start implementing the algorithm of Min-Max with alpha-beta pruning by using recursion.

Bonus features:

- 1) Implement an iterative-deepening variation of the alpha-beta algorithm.
- 2) Support various difficulty levels corresponding to different game tree depths.
- 3) Support game saving and loading.

Utility function Descriptions:

1. `initialize()`

Inputs: none

Outputs: none

Description: used to initialize the representation of the game.

2. `show(representation)`

Inputs: representation

Outputs: none

Description: used to show the representation of the game.

3. `save(path, data)`

Inputs: path, data

Outputs: none

Description: used to save the last game.

4. `load(path)`

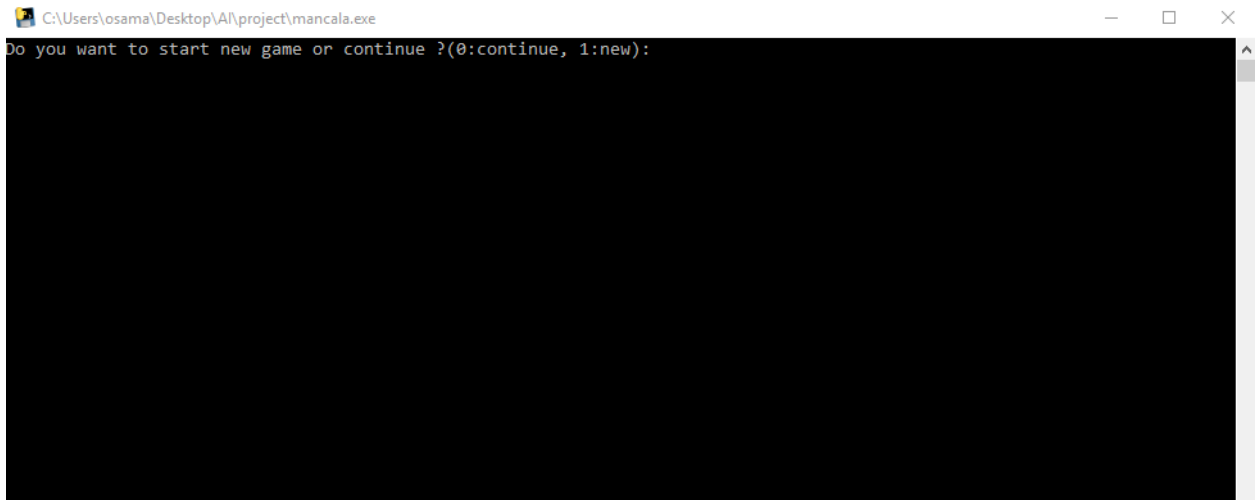
Inputs: path

Outputs: representation

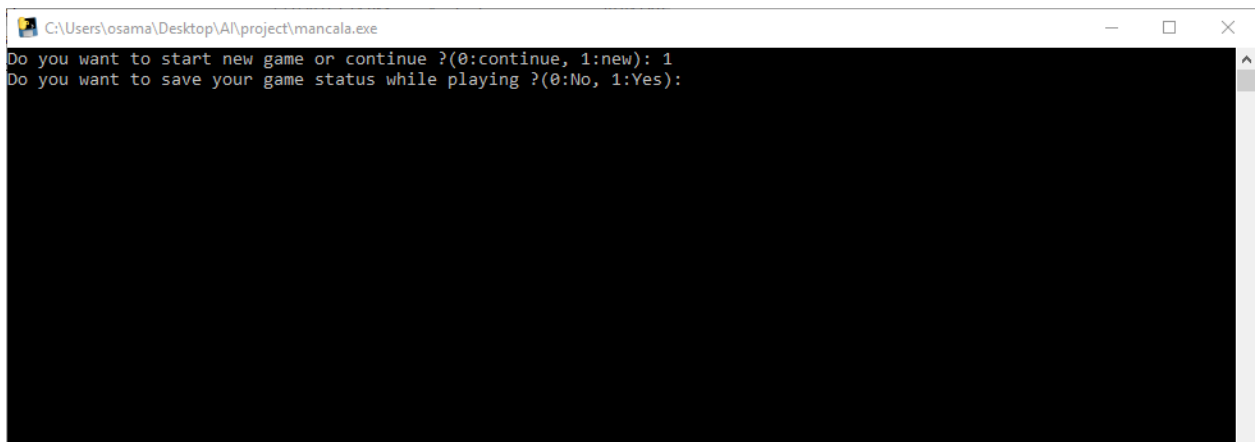
Description: used to load the last game status.

User guide:

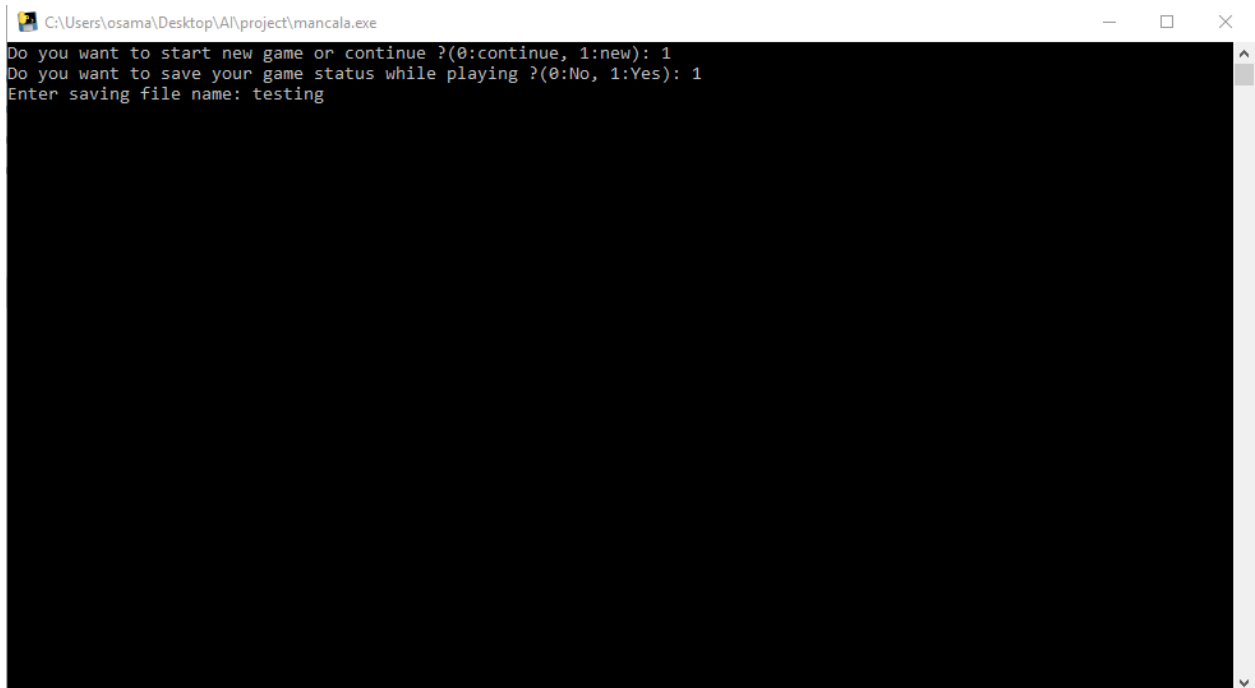
- 1) First enter if you want to play new game or continue a previous game



- 2) Choose if you want to save your game status or not while playing

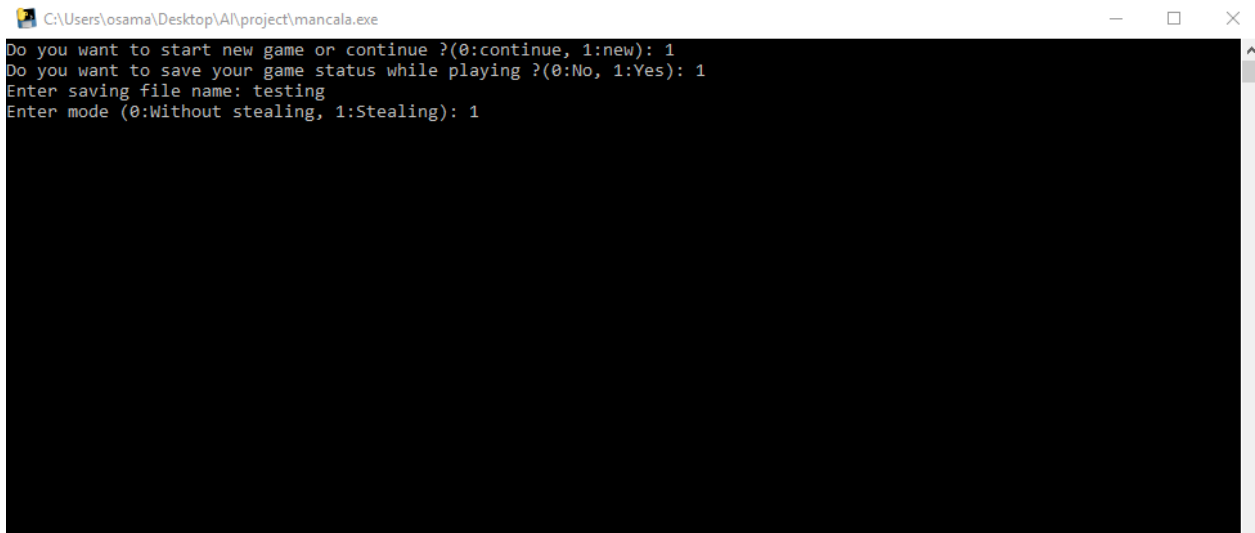


3) Enter the save file name



```
C:\Users\osama\Desktop\AI\project\mancala.exe
Do you want to start new game or continue ?(0:continue, 1:new): 1
Do you want to save your game status while playing ?(0:No, 1:Yes): 1
Enter saving file name: testing
```

4) Choose if you want stealing or without stealing



```
C:\Users\osama\Desktop\AI\project\mancala.exe
Do you want to start new game or continue ?(0:continue, 1:new): 1
Do you want to save your game status while playing ?(0:No, 1:Yes): 1
Enter saving file name: testing
Enter mode (0:Without stealing, 1:Stealing): 1
```

5) Choose game Type from the 4 types:

```
C:\Users\osama\Desktop\AI\project\mancala.exe
Do you want to start new game or continue?(0:continue, 1:new): 1
Do you want to save your game status while playing?(0:No, 1:Yes): 1
Enter saving file name: testing
Enter mode (0:Without stealing, 1:Stealing): 1
Enter game Type:
1- player vs player
2- player vs AI
3- AI vs player
4- AI vs AI
game Type:
```

6) Game ends and one player wins

```
+-----+
| player 2 | M2 | P6 | P5 | P4 | P3 | P2 | P1 | M1 |
+-----+
| -        | 19 | 0 | 0 | 0 | 0 | 1 | 0 | - |
+-----+
| -        | -  | 0 | 0 | 1 | 1 | 0 | 0 | 26 |
+-----+
| player 1 | M2 | P1 | P2 | P3 | P4 | P5 | P6 | M1 |
+-----+
player 1 move
4
Game Over
player 1 wins
+-----+
| player 2 | M2 | P6 | P5 | P4 | P3 | P2 | P1 | M1 |
+-----+
| -        | 19 | 0 | 0 | 0 | 0 | 0 | 0 | - |
+-----+
| -        | -  | 0 | 0 | 0 | 0 | 0 | 0 | 29 |
+-----+
| player 1 | M2 | P1 | P2 | P3 | P4 | P5 | P6 | M1 |
+-----+
do you want to play again yes:1,no:0:
```

Contribution:

Name	Effort
Mahmoud Osama	MinMax with Alphabeta Pruning
Mahmoud Swilam	Human and AI game rules
Omar Abdulaziz	Main, Utility Functions
Mostafa Amgad	Main, Utility Functions
Mostafa Gamal	Main, Utility Functions