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CPSC 5610 – Milestone 4
README

How to run Acharya's Milestone 4

Make sure the following files are included in your directory:

- main.py
- min_max_search.py
- 2048.in.txt
- board.py

*The solution is printed in real time on the console.

With a starting empty board

```
1
0,0,0,0
0,0,0,0
0,0,0,0
0,0,0,0
```

Where the first number is the number of boards. Any text files following this format with the correct board format as well will run.

To Run:
To run the game for both searches, simply run main.py. Each search will get an empty board and add 2 random 2s to start.

Explanation of Code:
The MinMax Search is currently set to a depth of 3. This means that the first step will be a maximum move. The code looks at what the minimum board could be for each of 4 possible moves [L, U, R, D] and again the next maximum value from each of those minimum boards. There will be 1 minimum board per move (4 total) and there for 4 maximum next states. The starting move that leads to the highest maximum end is then chosen.

The code can be extended by adding more min & max searches, which can be seen in the extra credit submission.

Example output:

Console:

```
Playing minmax's round, moving  L
[[ 4 16  2  4]
 [ 8  4  8  0]
 [ 4  0  0  0]
 [ 8  0  0  0]]
Current score:  68
Now randomly adding 2 or 4
```

```
[[ 4 16  2  4]
 [ 8  4  8  4]
 [ 4  0  0  0]
 [ 8  0  0  0]]
Playing minmax's round, moving  D
[[ 4  0  0  0]
 [ 8  0  0  0]
 [ 4 16  2  0]
 [ 8  4  8  8]]
Current score:  76
Now randomly adding 2 or 4
[[ 4  4  0  0]
 [ 8  0  0  0]
 [ 4 16  2  0]
 [ 8  4  8  8]]
Playing minmax's round, moving  R
[[ 0  0  0  8]
 [ 0  0  0  8]
 [ 0  4 16  2]
 [ 0  8  4 16]]
Current score:  100
Now randomly adding 2 or 4
[[ 0  0  0  8]
 [ 0  0  0  8]
 [ 2  4 16  2]
 [ 0  8  4 16]]
Playing minmax's round, moving  D
[[ 0  0  0  0]
 [ 0  0  0 16]
 [ 0  4 16  2]
 [ 2  8  4 16]]
Current score:  116
Now randomly adding 2 or 4
[[ 0  0  0  0]
 [ 0  0  0 16]
 [ 4  4 16  2]
 [ 2  8  4 16]]
Playing minmax's round, moving  R
[[ 0  0  0  0]
 [ 0  0  0 16]
 [ 0  8 16  2]
 [ 2  8  4 16]]
Current score:  124
Now randomly adding 2 or 4
[[ 0  0  0  0]
 [ 4  0  0 16]
```

```
 [ 0  8 16  2]
 [ 2  8  4 16]]
Playing minmax's round, moving  D
[[ 0  0  0  0]
 [ 0  0  0 16]
 [ 4  0 16  2]
 [ 2 16  4 16]]
Current score:  140
Now randomly adding 2 or 4
[[ 4  0  0  0]
 [ 0  0  0 16]
 [ 4  0 16  2]
 [ 2 16  4 16]]
Playing minmax's round, moving  D
[[ 0  0  0  0]
 [ 4  0  0 16]
 [ 4  0 16  2]
 [ 2 16  4 16]]
Current score:  140
Now randomly adding 2 or 4
[[ 0  0  0  0]
 [ 4  4  0 16]
 [ 4  0 16  2]
 [ 2 16  4 16]]
Playing minmax's round, moving  L
[[ 0  0  0  0]
 [ 8 16  0  0]
 [ 4 16  2  0]
 [ 2 16  4 16]]
Current score:  148
.
.
.
*Some output removed
Max moves reached. Game terminated with high score of:  888

Process finished with exit code 0
```