

## Milestone 3

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### Description

The file milestone\_3.py contains the minimax algorithm code. The algorithm works in the following way:

1. Get initial state of the board by inserting two 2's at two random positions in the board
2. For this state, find the best direction to swipe as per the Minimax algorithm for the given depth.
3. Swipe in the direction obtained in step 2
4. Insert randomly a 2/4 at a random empty space.
5. If the board is full or contains 2048, end the game. Else, continue from step 2.

In Minimax algorithm, swiping, and then inserting a random 2/4 are considered two steps. Hence, in the following program execution outputs, when depth is 3, the algorithm first makes a swipe, then inserts 2/4 at random position, and then does a swipe again, and this altogether gives us depth 3.

### How to run the program

Execute following command to run the program on a windows terminal

`"python3 .\milestone_3.py"`

The default depth is configured to be 3. However, to change the depth, please change "depth" variable value in milestone\_3 function in milestone\_3.py

In milestone\_3.py the actual code written for this assignment can be found after the title:

```
#####  
#  
#                               Milestone 3  
#  
#####
```

The other code is the code written for previous milestones and was used in milestone 3.

Output of program execution:

The output of the execution of the program is shown below. The selected depth d is 3.

```
PS C:\Users\keert\OneDrive\Documents\S30\2048ai> python3 .\milestone_3.py

===== FINAL BOARD =====

 4 | 16 | 8 | 4
-----
 8 | 64 | 2 | 32
-----
32 |256 |128 | 16
-----
 4 | 16 |512 | 2

Depth d : 3
Maximum score : 6712
Total run time of the game : 3.970170259475708

=====
```

Fig 1

As we can see, the maximum score was 6712 and the total run time of the program was 3.97 seconds.

