Qianyou Wang Qianyou_wang@ucsb.edu 3494028

Report

1. Architecture

   There are 5 functions in this algorithm python file

   The NextMove function implements the prediction of best choice of next move, I apply expectmax algorithm in this file

   The value function would judge the expected score of current grid state, which relies on other function, it would basically return the score (how good this move is)

   The maxtrick function do the trick of searching best move options, it would check every possible results and return the estimate of all possible solutions

   The evaluate function provide the evaluation of current grid state. It would get the sum of grid and then divided to the number of non-empty boxes, which would called utility in machine learning area.

   The gridMove function provide the state after a move take placed in current state, it would be called by searching process

2. Search

   Expectmax is applied in this project, we would search the utility of each possible results and get the estimate E of subtrees, then find the subtree with best utility and choose it as the next move solution

3. Challenges

   There are 2 challenges in my project.

   First one is that to find the state after one move, it is tricky to implement the code for the change after a movement. To overcome this problem I play a lot of 2048 games and remember the change. It helps me to develop my rules of 2048 game

   Second problem is that I am struggle to find the way to implement my minimax or expectmax solution. It is a big challenge for me to implement an advanced algorithm by myself, and I decided to do it with some logic statements than looking for existing code. My code is 100% pure original the algorithm is worked as expected

4. Weaknesses

The most significant problem of this algorithm is speed. It would like to find all possible solution and this takes a lot of time

For this project, a depth limit is applied, so this program would like to reach a local minimal than to find the global minimal. Which means this algorithm is not so good at find the best solution.

With the rising of AI and deep learning, we might replace this solution by deep neural network. It is more powerful and flexible. After training the network, the speed of response would be quite fast.