Theory of Computer Games (Fall 2023) Homework 1

NTU CSIE

Due: 2023/10/19 14:20

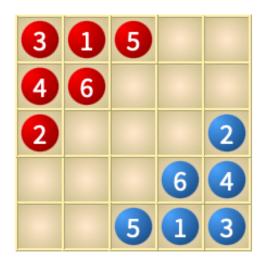
Outline

Game Description

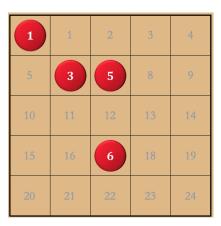
2 Homework Requirements

3 Submission and Grading Policy

Original game - EWN



Our game



- Single-player game
- The value of the dice is fixed
 - the dice sequence in cyclic
- A piece can move in 8 directions

How to select a piece to move

- Assume the dice shows the number x
- If the piece with number x still exists, then you can only choose x.
- If the piece with number x does not exist, then you can choose
 - a: the piece with the biggest number smaller than x
 - b: the piece with the smallest number bigger than x

- Implement the program to find the fewest number of steps for one of the pieces to reach the goal (bottom right corner) within the time limit.
- Write a report

- Input format
 - n, m: number of row and column (n, m \leq 9)
 - initial board (n × m integers)
 - p: the period of cyclic dice sequence (p \leq 18)
 - the cyclic dice sequence (p integers)
 - s: the piece to reach goal, if s = 0, then you can choose any piece.
- Example:

```
5 5
1 0 0 0 0
0 3 5 0 0
0 0 0 0 0
0 0 6 0 0
0 0 0 0 0
6
6 3 5 2 1 4
```

- Output format
 - First line you should output the fewest number of steps. Here we assume the answer is k.
 - Then output the sequence of moves (a_i, b_i) in the following k lines.
 - a_i: the number of piece
 - b_i: move direction
 - 0: 左上
 - 1: 上
 - 2: 右上
 - 3: 左
 - 4: 右
 - 5: 左下
 - 6: 下
 - 7: 右下

• Output example:

3

6 7

3 4

6 4

1	1	2	3	4
5	3	5	8	9
10	11	12	13	14
15	16	6	18	19
20	21	22	23	24

- Test cases:
 - Case 1 (easy): Brute force (BFS, DFS, DFID)
 - Case 2 (medium): A* algorithm with simple heuristics
 - Case 3 (tough): A* algorithm with good heuristics
- Limitation:
 - Time limit is 5 sec.
 - We will run your code on csie workstations.

Submission

- Directory Hierarchy:
 - student_id
 - Makefile
 - src // a folder contains all your codes
 - report.pdf
- Compress your folder into a zip file and submit to https://www.csie.ntu.edu.tw/~tcg/2023/hw1.php
- Due to server limitation, the file size is restricted to 2 MB.
- Thread limit only one.
- You will get some penalty (-10 points) if you don't follow these rules.

Report

- Your report should include but not limit to the following:
 - How to compile your code.
 - What algorithms and heuristics you've implemented.
 - Experiment results and findings of your implementation
- Your report should be named report.pdf.

Grading Policy

- Test cases (80%)
 - score of each test case
 - case 1: (4%) * 7 testcases
 - case 2: (4%) * 7 testcases
 - case 3: (4%) * 6 testcases
 - about non-optimal solution:

If your sequence of moves can solve the game but not the optimal solution, you can get partial points.

score = min(1, q/p), p: your solution, q: optimal solution length.

• Report (20%)