CS2002301 2021 Fall

Homework #1

Due date: 2021/10/27 08:00 (UTC+8)

1. This assignment weight 0 points.
2. Submit the code to Online judge system (https://nlp.csie.ntust.edu.tw:2021) and submit the report and source code to Moodle system. In the report, briefly explain how you solve the problem and list resources you referenced. Please followed the `Homework rules and Online judge guide`.
3. The source code you submit to Moodle should be the code your "last submit" to Online judge and **TAs will calculate your score by your "last upload"**.
4. If you have any question or confusion, feel free to ask on Moodle forum.

Problem 1 - Shortest path of Maze(3 pt.)

`test case scores: 50+50`

After 魯拉拉 was acknowledged that 瓦基 took almost half of the flour, he felt he was tricked and betrayed. "No one can treat me as a fool!!" said 魯拉拉. He then ask his housekeepers to chase 瓦基 before he escape. There are several rooms and aisles in 魯拉拉's house. In order to leave the house as soon as possible, 瓦基 needs to find the shortest path.

瓦基 got a map of 魯拉拉's house from a kind housekeeper.

- The size of map is $N \times M$ and represented by 4 kinds symbols(his current location, walls, aisles, and the door).
- 瓦基 can only move up, down, left and right.

Please help him to find out the number of "how many moves of shortest path" from his current location to the door.

Constraints:

- Do not use any libraries (vector, queue, stack...) except for standard I/O. Please implement your own stack or queue using array if you needed.
- TAs will manually check your code after the deadline.

Problem 2 - Answer decryption(5 pt.)

`test case scores: 20+40+40`

Professor Chen sent the midterm exam answers to Hank, the TA. To prevent leakage, he encrypted the message with a secret algorithm. To decrypt the cypher, Hank needs to use the following rules:

1. `n[s]` will be decrypted as `s` repeated n times. $n \in [1, 300]$. `s` only consists of ASCII lowercase English letters.
2. The symbol `<` means to swap its neighbor elements(a single character or a `n[s]` block). E.g. `2[apple]<2[cat]->catcatappleapple`, `hi<2[oh]->hohohi`

3. The symbol< has greater precedence than `n[s]`, which means `1[apple]<2[cat]` can be transformed into `2[cat]1[apple]`

4. The symbol < has left-associative. E.g. `2[apple]<2[cat]<2[dog] -> 2[cat]2[apple]<2[dog] -> 2[cat]2[dog]2[apple]`

5. The inputs are always correct, you don't need to deal with the error case

Please write a program to decrypt the cypher.

Constraints:

- Do not use any libraries (vector, queue, stack...) except for standard I/O and string(only allowed in HW1-2). Please implement your own stack or queue using array if you needed.
- TAs will manually check your code after the deadline.