353. Design Snake Game

Medium 627 237 Add to List Share

Design a Snake game that is played on a device with screen size `height x width`. Play the game online if you are not familiar with the game.

The snake is initially positioned at the top left corner `(0, 0)` with a length of `1` unit.

You are given an array `food` where `food[i] = (`r_i`, `c_i`)` is the row and column position of a piece of food that the snake can eat. When a snake eats a piece of food, its length and the game's score both increase by `1`.

Each piece of food appears one by one on the screen, meaning the second piece of food will not appear until the snake eats the first piece of food.

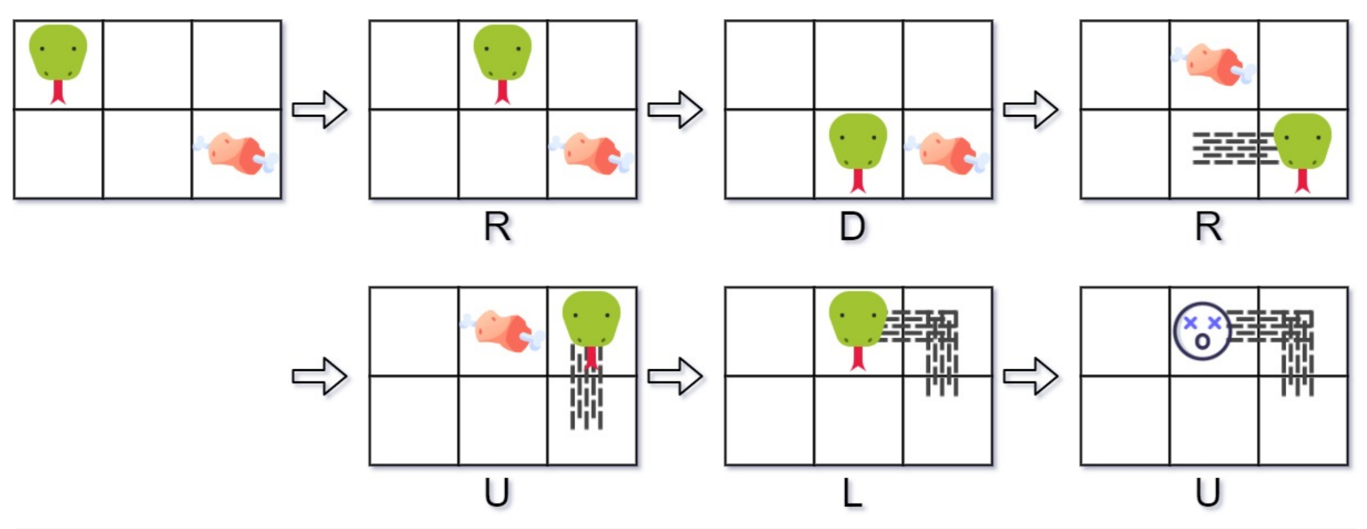
When a piece of food appears on the screen, it is **guaranteed** that it will not appear on a block occupied by the snake.

The game is over if the snake goes out of bounds (hits a wall) or if its head occupies a space that its body occupies **after** moving (i.e. a snake of length 4 cannot run into itself).

Implement the `SnakeGame` class:

- `SnakeGame(int width, int height, int[][] food)` Initializes the object with a screen of size `height x width` and the positions of the `food`.
- `int move(String direction)` Returns the score of the game after applying one `direction` move by the snake. If the game is over, return `-1`.

Example 1:



```
Input
["SnakeGame", "move", "move", "move", "move", "move", "move"]
[[3, 2, [[1, 2], [0, 1]]], ["R"], ["D"], ["R"], ["U"], ["L"], ["U"]]
Output
[null, 0, 0, 1, 1, 2, -1]

Explanation
SnakeGame snakeGame = new SnakeGame(3, 2, [[1, 2], [0, 1]]);
snakeGame.move("R"); // return 0
snakeGame.move("D"); // return 0
snakeGame.move("R"); // return 1, snake eats the first piece of food. The second
piece of food appears at (0, 1).
snakeGame.move("U"); // return 1
snakeGame.move("L"); // return 2, snake eats the second food. No more food
appears.
snakeGame.move("U"); // return -1, game over because snake collides with border
```

Constraints:

- `1 <= width, height <= `10^4
- `1 <= food.length <= 50`
- `food[i].length == 2`
- `0 <= `r_i` < height`
- `0 <= `c_i` < width`
- `direction.length == 1`
- `direction` is `'U'`, `'D'`, `'L'`, or `'R'`.
- At most 10^4 calls will be made to `move`.

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```java
class SnakeGame {

HashMap<Pair<Integer, Integer>, Boolean> snakeMap;
Deque<Pair<Integer, Integer>> snake;
int[][] food;
int foodIndex;
int width;
int height;

public SnakeGame(int width, int height, int[][] food) {
    this.width = width;
    this.height = height;
    this.food = food;
    this.snakeMap = new HashMap<Pair<Integer, Integer>, Boolean>();
    this.snakeMap.put(new Pair<Integer, Integer>(0,0), true); // intially at [0][0]
    this.snake = new LinkedList<Pair<Integer, Integer>>();
    this.snake.offerLast(new Pair<Integer, Integer>(0,0));
}

public int move(String direction) {

    Pair<Integer, Integer> snakeCell = this.snake.peekFirst();
    int newHeadRow = snakeCell.getKey();
    int newHeadColumn = snakeCell.getValue();

    switch (direction) {
    case "U":
        newHeadRow--;
        break;
    case "D":
        newHeadRow++;
        break;
    case "L":
        newHeadColumn--;
        break;
    case "R":
        newHeadColumn++;
        break;
    }

    Pair<Integer, Integer> newHead = new Pair<Integer, Integer>(newHeadRow, newHeadColumn);
    Pair<Integer, Integer> currentTail = this.snake.peekLast();
```