## D - Deceptive Directions

## Problem

Get $w \times h$ grid map and a shortest sequence of NWSE steps to reach some treasure. But all the steps have been replaced by wrong ones. Where could the treasure be?

## Solution

## D - Deceptive Directions

## Problem

Get $w \times h$ grid map and a shortest sequence of NWSE steps to reach some treasure. But all the steps have been replaced by wrong ones. Where could the treasure be?

## Solution

(1) Compute distance $d[p]$ from start to every position $p$ in the maze using BFS.

## D - Deceptive Directions

## Problem

Get $w \times h$ grid map and a shortest sequence of NWSE steps to reach some treasure. But all the steps have been replaced by wrong ones. Where could the treasure be?

## Solution

(1) Compute distance $d[p]$ from start to every position $p$ in the maze using BFS.
(2) Forbid all steps that could not have been used by the correct instruction sequence:

## D - Deceptive Directions

## Problem

Get $w \times h$ grid map and a shortest sequence of NWSE steps to reach some treasure. But all the steps have been replaced by wrong ones. Where could the treasure be?

## Solution

(1) Compute distance $d[p]$ from start to every position $p$ in the maze using BFS.
(2) Forbid all steps that could not have been used by the correct instruction sequence:

- Forbid step $p \rightarrow q$ if not used in any shortest path (i.e., if $d[q] \neq d[p]+1$ ).


## D - Deceptive Directions

## Problem

Get $w \times h$ grid map and a shortest sequence of NWSE steps to reach some treasure. But all the steps have been replaced by wrong ones. Where could the treasure be?

## Solution

(1) Compute distance $d[p]$ from start to every position $p$ in the maze using BFS.
(2) Forbid all steps that could not have been used by the correct instruction sequence:

- Forbid step $p \rightarrow q$ if not used in any shortest path (i.e., if $d[q] \neq d[p]+1$ ).
- Forbid step $p \rightarrow q$ if going from $p$ to $q$ means taking the same step as the $d[q]$ 'th step in the corrupted instruction sequence.


## D - Deceptive Directions

## Problem

Get $w \times h$ grid map and a shortest sequence of NWSE steps to reach some treasure. But all the steps have been replaced by wrong ones. Where could the treasure be?

## Solution

(1) Compute distance $d[p]$ from start to every position $p$ in the maze using BFS.
(2) Forbid all steps that could not have been used by the correct instruction sequence:

- Forbid step $p \rightarrow q$ if not used in any shortest path (i.e., if $d[q] \neq d[p]+1$ ).
- Forbid step $p \rightarrow q$ if going from $p$ to $q$ means taking the same step as the $d[q]$ 'th step in the corrupted instruction sequence.
(3) Run BFS again with these steps forbidden.


## D - Deceptive Directions

## Problem

Get $w \times h$ grid map and a shortest sequence of NWSE steps to reach some treasure. But all the steps have been replaced by wrong ones. Where could the treasure be?

## Solution

(1) Compute distance $d[p]$ from start to every position $p$ in the maze using BFS.
(2) Forbid all steps that could not have been used by the correct instruction sequence:

- Forbid step $p \rightarrow q$ if not used in any shortest path (i.e., if $d[q] \neq d[p]+1$ ).
- Forbid step $p \rightarrow q$ if going from $p$ to $q$ means taking the same step as the $d[q]$ 'th step in the corrupted instruction sequence.
(3) Run BFS again with these steps forbidden.
- All reached positions at same distance as instruction length are possible treasure locations.


## D - Deceptive Directions

## Problem

Get $w \times h$ grid map and a shortest sequence of NWSE steps to reach some treasure. But all the steps have been replaced by wrong ones. Where could the treasure be?

## Solution

(1) Compute distance $d[p]$ from start to every position $p$ in the maze using BFS.
(2) Forbid all steps that could not have been used by the correct instruction sequence:

- Forbid step $p \rightarrow q$ if not used in any shortest path (i.e., if $d[q] \neq d[p]+1$ ).
- Forbid step $p \rightarrow q$ if going from $p$ to $q$ means taking the same step as the $d[q]$ 'th step in the corrupted instruction sequence.
(3) Run BFS again with these steps forbidden.
- All reached positions at same distance as instruction length are possible treasure locations.
(0) Time complexity: $O(w \cdot h)$.


## D - Deceptive Directions

## Problem

Get $w \times h$ grid map and a shortest sequence of NWSE steps to reach some treasure. But all the steps have been replaced by wrong ones. Where could the treasure be?

## Solution

(1) Compute distance $d[p]$ from start to every position $p$ in the maze using BFS.
(2) Forbid all steps that could not have been used by the correct instruction sequence:

- Forbid step $p \rightarrow q$ if not used in any shortest path (i.e., if $d[q] \neq d[p]+1$ ).
- Forbid step $p \rightarrow q$ if going from $p$ to $q$ means taking the same step as the $d[q]$ 'th step in the corrupted instruction sequence.
(3) Run BFS again with these steps forbidden.
- All reached positions at same distance as instruction length are possible treasure locations.
(0) Time complexity: $O(w \cdot h)$.

Statistics at 4-hour mark: 325 submissions, 55 accepted, first after 00:38

