**CIS 579: Artificial Intelligence**

Report : P2-Hidden Markov Models

To locate the Robot in Windy Maze

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Problem Statement:

We assume that a robot aims to locate itself in the windy maze as shown in the above. The robot will perform two kinds of actions: sensing and moving.

Sensing: In a square, the robot will sense the four directions to see if there is an obstacle int his direction. We assume that the whole maze is surrounded by obstacles and the black squares are also obstacle. However, the sensing is not perfect. We assume that the robot can detect the obstacle with 80% if there is and might mistake an open square as a obstacle with 15%. The detections in all directions are done independently.

Moving: In the windy situation, the robot can drift to the left or the right with probability 0.1. If the drifting direction is an obstacle, it will be bounced back to the original position. For example, in the square of left bottom, if the robot moves northward, it will reach the square to the north with 80% and reach the square to the east with 10% and be bounced back to the original position with 10%.

We assume that the robot initially stays in one open square, but it doesn’t know its exact location except that it knows that it can’t be in any obstacle square. Then the robot performs the following sequence of actions:

1. Sensing: [0, 0, 0, 0]

2. Moving: N

3. Sensing: [1, 0, 0, 0]

4. Moving: N

5. Sensing: [0, 0, 0, 0]

6. Moving: W

7. Sensing: [0, 1, 0, 1]

8. Moving: W

9. Sensing: [1, 0, 0, 0]

Where (W,N,E,S) observation at directions.

0 indicates “no obstacle observed”

1 indicated “obstacle observed”

Approach:

Background Work: To solve problem following mentioned approach

Text

Description automatically generated

Text, letter

Description automatically generated

A close-up of a piece of paper

Description automatically generated with low confidence

A close-up of some paper

Description automatically generated with low confidence

A piece of paper with writing on it

Description automatically generated with medium confidence

