Problem Statement:

Question 1: Explain the PEAS and Task environment of the agent.

Following PEAS (Performance, Environment, Actuators, Sensors) for the rabbit rescue robot problem are provided.

1. **Performance** – the main goal of the problem is to bring rabbit efficiently to the finish line. This drive different performance metrics that can be considered. Following are metrics considered for performance measurement.
   1. Agent/Rabbit safety – Avoid the fires thus avoid high fire penalty. Discard path the cause concerns on rabbit safety.
   2. Path Length – Shorter path will help for quickly rescue the rabbit. Target towards short path
   3. Time Taken - Time taken to rescue the rabbit. Minimal time taken will drive towards optional solution.
   4. Total Cost – The total cost of rescue on different paths is a measure to help to observer the solutions performance and minimum Total Cost drive for optimal solution. The Total Cost is Path Cost + Fire Penalty + Bush Plant Penalty.
      1. Path Cost = Base Cost for each transition and is given as +3
      2. Fire Penalty = An additional cost for attempting to move into a fire cell and is given +5
      3. Bush Plant Penalty = An additional cost of attempting to move into Bush plan cell and is given +1

The optimal solution attained by driving minimal total cost. The total cost includes fire penalty thus drive avoidance of fire cells (Rabbit safety). Also driving minimal cost drive short path (avoid additional bush plant penalty) and time taken, assuming cost include time dimensionality as well.

1. **Environment -** It is environment that robot to operate to rescue rabbit. The environment is deterministic, discrete, and partially observable as robot’s sensors can provide only adjacent cell information. The environment is static as immovable walls, bushes, Fire, starting point and final point. It is single agent as one robot involved. More details of Task environment given below table
2. **Actuators –** It is agent capability to interact with its environment. The robot which rescues rabbit can move in four directions, North, South, East and West. Robot might have wheels / Arms to make these moves.
3. **Sensors** - It is the capability that agent get the information from its environment. The Robot has vision sensors that can detect obstacles like fires, bushes, and walls in adjacent cells. Thus, robot will be able to take decision on sensor information.

**Task environment:**

Following table provide the property details of Robot Task Environment. These properties will help in understanding robot controls and potential algorithms.

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| Property | Value | Comments |
| Accessibility | partially observable | The robot sensors only provide information about the adjacent cells. Robot does not have knowledge of all cave grid details |
| Determinism | deterministic | The robot actions at any state result same outcome and consistence. There is no randomness |
| Episodic vs. Sequential | sequential | The robot action in one step will affect subsequent steps. It is not independent episodes |
| Static vs. Dynamic | Static | Environment is static. The fire, bush plant, walls will not change. Only robot will be moving, which dynamic |
| Discrete vs. Continuous | discrete | The state space and actions are discrete. The values are North, South, East and West |
| Single Agent vs. Multi-Agent | Single Agent | The robot is only one agent that rescue rabbit from the cave |
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