1. (20 points) Agent environments. An agent has been designed to help air traffic controllers direct traffic. Answer the following question about task environment state:

a. Briefly describe the state of the problem.

b. Is state static, dynamic, or semidynamic? Justify your answer.

a Ans: For example, if an agent is placed at an airport, the agent shows all plans around the airport. The controllers decide direction to each plan. Also, it a real-time system. It reflects real positions of plans on a map and the positions change with time.

b Ans: Dynamic 🡪 Plans keep flying. A plan doesn’t hover at the same position and waits for controllers.

2. (20 points) A Pacman ghost agent uses the following strategy. If the Pacman has eaten a power pill in the last 30 seconds, the agent will move in a direction opposite of the Pacman’s current position, subject to constraints of available moves. Otherwise, ghost moves in a valid direction that will move the ghost closer to the Pacman. Based on these simple rules, would you consider the agent type to be simple reflex, model-based reflex, utility-based, or learning? Briefly justify your answer.

Ans: Simple reflex. Ghosts only consider the current state of the Pacman. If Pacman is power state, ghosts do run away. Otherwise, ghosts move toward to the Pacman.

3. (20 points) A plan for designing a smart city intersection calls for designing an agent that is responsive to pedestrians wishing to cross the street. Rather than pushing a button to activate a mid-block cross walk without traffic lights, a state- based agent activates the cross walk when pedestrians are waiting near the cross walk. Assume two actions: Activate crosswalk, deactivate crosswalk

a. Assume a clock tick percept is noted every 1 s along with any other measured percepts. What other sensors and percepts should be used to provide service?

Ans:

1. A sensor which observes whether there is a pedestrian near intersections.

2. A stopwatch which measures elapsed time.

b. Provide a state transition table that ensures that pedestrians have anywhere from a minimum of 30 s to a maximum of 90 s to cross the street. Also ensure that traffic is allowed to flow for a minimum of 120 s when traffic is present, and the crosswalk signal is not engaged.

|  |  |  |  |
| --- | --- | --- | --- |
| Crosswalk signal | Elapsed Time | Pedestrians | Action |
| Activate | <= 30 s | Crossing | Activate |
| None | Activate |
| > 30s and <=90s | Crossing | Activate |
| None | Deactivate/Reset stopwatch |
| >90s | Crossing | Deactivate/ Reset stopwatch |
| None | Deactivate/ Reset stopwatch |
| Deactivate | <= 120s | Waiting | Deactivate |
| None | Deactivate |
| >120 s | Waiting | Activate/ Reset stopwatch |
| None | Deactivate |

N-puzzles:

Multiple Solutions=True Multiple Solutions=False

 