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CSCI4511W

Problem 1:

- There are four kinds of sensors in Google's self-driving car:
 - o **four radars each in front and rear bumpers:** deal with fast traffic on freeways.
 - o **rear-view camera:** detects traffic lights.
 - o **GPS:** determine the vehicle's location and keep track of its movements.
 - o **laser range-finder:** generates a detailed 3D map of the environment.

- Environment/Actions classification:
 - o Partially observable
 - o Multi-agent
 - o Deterministic
 - o Sequential
 - o Dynamic
 - o Continuous

Problem 2:

- Situation 1:
 - **Possible states:** all the seats that are not occupied
 - each seat that is empty represent a state
 - **actions for each state:** find a seat to sit down on (occupying a seat)
 - the act of sitting on a seat is the action for all state
 - **sample initial state:** there is at least one empty seat or all seats are occupied
 - every empty seat can be taken as an initial state since there is not preference
 - **the possible goal states:** find a seat to sit on
 - the goal is to sit on a seat
- Situation 2:
 - **Possible states:** all card in hand that can be played + draw a card from the deck
 - it depends on the pervious state and the cards in hand
 - **actions for each state:** either play a card in hand or add one card to the collection
 - The action depends on the current state of the game
 - **sample initial state:** start with 7 cards and either put a card or add a card.
 - The rule of the game is to state with 7 cards
 - **the possible goal states:** have no cards in hand
 - the goal is to be the first one to have no cards which is winning by the game's rule
- Situation 3:
 - **Possible states:** all buildings in the city that need to be deliver letters to.
 - Since each letter needs to be delivered to a building at that day
 - **Actions for each state:** deliver letters to the building it needs to go to and move to another building that needs delivering letters to.
 - Each state has two action deliver letters and move to another
 - **Sample initial state:** start with the first building to deliver some letters and move to the second building
 - It has to start from one specific building and followed it with rest.
 - **the possible goal states:** deliver letters to all buildings with the least amount of distance/time
 - Because the goal is to deliver letters most efficiently. The fastest way and with the shortest distance

Problem 3:

- What type of agent program playing a complex strategy based board game?
 - o Goal based
 - o Because complex strategy based board game depends on two or more people playing against each other's. The ultimate goal of these games is to win.
 - o Goal based is more appreciate classification for board games. Due to the face that it needs to have a representation of the environment in memory (not simple reflex). Also, it needs to win in all kind of variants of the game (not model-base reflex). Finally, as long as you are wining, it doesn't matter if it is done the fastest way of winning (not utility base)

Problem 4:

- Situation 1:
 - **Rational**
 - Because number 7 has the highest probability change for the sum to be determined to in rolling of two 6-sided dice.

- Situation 2:
 - **Rational**
 - Because the “snake” pattern in the picture go through the side of cars that has more cars in it which make the probability of finding the car at the beginning higher. Also, the “snake” pattern never crossed meaning the person never have to see any car more than once.

Problem 5:

- "hw1.py" program is trying to win a tic tac toe against the user.

- The program output:

```
current state:
X . .
. . .
. . .
available moves: [(1, 2), (1, 3), (2, 1), (2, 2), (2, 3), (3, 1), (3, 2), (3,
3)]

Your move? (2,2)
current state:
X X .
. O .
. . .
available moves: [(1, 3), (2, 1), (2, 3), (3, 1), (3, 2), (3, 3)]
Your move? (1,3)
current state:
X X O
. O .
X . .
available moves: [(2, 1), (2, 3), (3, 2), (3, 3)]

Your move? (2,1)
current state:
X X O
O O X
X . .
available moves: [(3, 2), (3, 3)]

Your move? (3,3)
X X O
O O X
X X O
```