

Homework 1

1. Write the definitions of the following terms in your own words:
 - i. Intelligence: The capacity to understand and interpret the world around you.
 - ii. Artificial intelligence: The ability for an inanimate object to perform a specific task in a predetermined environment.
 - iii. Agent: The medium through which an artificial intelligence interprets its state of being.
 - iv. Rationality: The ability to think and decide the best course of action.
 - v. Autonomy: To have the liberty of choosing your own decisions.

2. Investigate three of these contests and briefly describe the progress made over the years. To what extent have the contests advanced the state of the art in AI?
 - i. DARPA Grand Challenge: The purpose for this prize competition is to make advancements in the development of autonomous vehicles. The first robot developed for this organization is "Shakey the robot" in 1966, which is responsible for the development of the A* search algorithm. One of their most recent challenges focuses on subterranean environments and finding a way to map and navigate using AI.
 - ii. RoboCup: The RoboCup was founded in 1996 by a group of university professors, with the goal of having humanoid robot soccer players compete against FIFA players sometime in the 21st century. Thanks to the competition aspect of this event the robots' AI and movement are improved every year.
 - iii. PASCAL VOC Challenge: This organization focused on image analysis and recognition using AI. The Challenge ran each year from 2005 to 2012, with each year improving on the detection of different objects in an image.

3. Using your own words, define the following terms:
 - i. Agent function: The specific task an agent is assigned to do.
 - ii. Reflex agent: A type of agent that acts according to the situation it's found in.
 - iii. Model-based agent: An agent that has information on its surroundings.
 - iv. Goal-based agent: An agent that is programmed to complete a specific task.
 - v. Utility-based agent: An agent that has a specific use for unique instances.

4. For each of the following activities, give a PEAS description of the task environment and characterize its properties.
 - Playing soccer:
 - Performance measures: Points earned for each goal, rules of the game.
 - Environment: Size of the field, limits of the play area, goal area, number of players, soccer ball.
 - Actuators: Feet, head, hands for the goalie.
 - Sensors: Eyes, ears.
 - Shopping for used AI books on the Internet:
 - Performance measures: Cost of the book, quality of the book, quality of the website.
 - Environment: Computer or phone, website.

- Actuators: Hands, internet connection, credit card.
- Sensors: Eyes.
- Playing a tennis match:
 - Performance measures: Number of points to win a set, number of sets being played.
 - Environment: Size of the court, number of players, type of flooring (grass or pavement), net.
 - Actuators: Racket, tennis ball.
 - Sensors: Eyes, ears, ball speed monitor.
- Performing a high jump:
 - Performance measures: Maximum height reached, amount of time in the air.
 - Environment: Type of flooring being jumped from (trampoline, concrete, etc.)
 - Actuators: Legs, strength, balance.
 - Sensors: Eyes.
- Bidding on an item at an auction:
 - Performance measures: Cost of the item, value of the item.
 - Environment: Item being auctioned, bidders, announcer.
 - Actuators: Amount of money in your possession, signs, speakers, microphones.
 - Sensors: Eyes, ears.

5. Analyze the rationality of various vacuum-cleaner agent functions.

- Show that the simple vacuum-cleaner agent function described in Figure 2.3 is indeed rational under the assumptions listed on pages 37 and 38.

The function is rational since it can distinguish between a clean or dirty room and act accordingly.

- Describe a rational agent function for the case in which each movement costs one point. Does the corresponding agent program require internal state?

If each movement of the vacuum cleaner cost one point, then it should require an internal state so it can minimize the number of movements it needs to complete its task.

- Discuss possible agent designs for the cases in which clean squares can become dirty and the geography of the environment is unknown.

A possible agent could be a camera or a sensor that examines the state of the environment.

6. Code: I tried to implement a switch like statement, but it doesn't seem to exist in python.

7. It is creating the environment and the two possible states it can have (dirty or clean).

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Command Prompt - python3 -i agents.py

C:\Users\kgali\aima-python>python3 -i agents.py
>>> a = ReflexVacuumAgent()
>>> a.program((loc_A, 'Clean'))
'Right'
>>> a.program((loc_B, 'Clean'))
'Left'
>>> a.program((loc_A, 'Dirty'))
'Suck'
>>> a.program((loc_A, 'Dirty'))
'Suck'
>>> _
```

It added the vacuum agent and ran it, to make the dirty room clean.

```
>>> e = TrivialVacuumEnvironment()
>>> e.status
{(0, 0): 'Clean', (1, 0): 'Dirty'}
>>> e.add_thing(ModelBasedVacuumAgent())
>>> e.run(5)
>>> e.status
{(0, 0): 'Clean', (1, 0): 'Clean'}
>>> _
```