Introduction to Artificial Intelligence Lab

Lab 1: PEAS, environment type, solving a simple problem.

1. Define PEAS for following agents.

   Automated taxi?
   • Performance measure: Safe, fast, comfortable trip, legal, maximize profits
   • Environment: Roads, other cars, pedestrians, customers
   • Actuators: Wheel, accelerator, brake, signal, horn
   • Sensors: Cameras, sonar, speedomoter, GPS, odometer, engine sensor, keybord

   Medical diagnosis system?

   • Performance measure: Healthy patient, minimize cost,
   • Environment: patient, stretcher, operating room, staff
   • Actuators: Screen for testes, patient condition and machine condition
   • Sensors: Cameras, situational patient control tools(fever, hearth rhythm)

   Internet shopping agent?

   • Performance measure: price, quality, efficiency
   • Environment: vendors, shippers, sites
   • Actuators: screen for displays and fillers
   • Sensors: page elements (text, graphics)
2. Define type of environment for the following examples.

Crossword puzzle Observable: Yes Agents: Single Deterministic: Yes Episodic: No Static: Yes Discrete: Yes	Taxi driving Observable : No Agents: Multi Deterministic:No Episodic: No Static: No Discrete: No
English tutor Observable: No Agents: Multi Deterministic: No Episodic: No Static: No Discrete: Yes	Image analysis Observable: Yes Agents: Single Deterministic: Yes Episodic: Yes Static: Yes Discrete: No

3. Consider the following problem:

A Water Jug Problem: You are given two jugs, a 4-gallon one and a 3-gallon one, a pump which has unlimited water which you can use to fill the jug, and the ground on which water may be poured. Neither jug has any measuring markings on it. How can you get exactly 2 gallons of water in the 4-gallon jug?

- State Representation and Initial State:

  x: 4-gallon jug where 0=<x=<4
  y: 3 gallon jug. Whre 0=<y=<3
  Initial state: (x,y)= (0,0)

- Goal Predicate:

(x,y) = (2,0)

- Operators:

1. Fill 4-gal jug (x,y) → (4,y) x < 4
2. Fill 3-gal jug (x,y) → (x,3) y < 3
3. Empty 4-gal jug on ground (x,y) → (0,y) x > 0
4. Empty 3-gal jug on ground (x,y) → (x,0) y > 0
5. Pour water from 3-gal jug (x,y) → (4, y - (4 - x)) to fill 4-gal jug $0 < x+y \geq 4$ and y > 0
6. Pour water from 4-gal jug (x,y) → (x - (3-y), 3) to fill 3-gal-jug $0 < x+y \geq 3$ and x > 0
7. Pour all of water from 3-gal jug (x,y) → (x+y, 0) into 4-gal jug $0 < x+y \leq 4$ and $y \geq 0$
8. Pour all of water from 4-gal jug (x,y) → (0, x+y) into 3-gal jug $0 < x+y \leq 3$ and $x \geq 0$

- Solution:

Fill x	=> (4,0)
Pour x to y till y is full	=> (1,3)
Pour y to floor till y is empyt	=> (1,0)
Pour x to y till x is empty	=> (0,1)
Fill x	=> (4,1)
Pour x to y till y is full	=> (2,3)

- Write a program to implement the water jug problem.