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AI Practicals

EXPERIMENT 1

AIM: AI problem formulation and understanding its PEAS**.**

THEORY:

In Artificial Intelligence an Intelligent Agent (IA) is an entity that makes a decision, that enables artificial intelligence to be put into action. It can also be described as a software entity that conducts operations in the place of users or programs after sensing the environment. It uses actuators to initiate action in that environment.

PEAS is a type of model on which an AI agent works upon. When we define an AI agent or rational agent, then we can group its properties under PEAS representation model.

PEAS stands for Performance measure, Environment, Actuator, Sensor.

1. **Performance Measure:** Performance measure is the unit to define the success of an agent. Performance varies with agents based on their different precept.
2. **Environment:** Environment is the surrounding of an agent at every instant. It keeps changing with time if the agent is set in motion. The major types of environments:
    - Fully Observable & Partially Observable
    - Episodic & Sequential
    - Static & Dynamic
    - Discrete & Continuous
    - Deterministic & Stochastic
3. **Actuator:** Actuator is a part of the agent that delivers the output of an action to the environment.
4. **Sensor:** Sensors are the receptive parts of an agent which takes in the input for the agent.

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PEAS

1) AI Assistant (Alexa/Siri)

- **Define:** AI Assistant viz, Siri and Alexa are intelligent agents using sensors, such as microphones and other inputs, to perceive a request and they draw on their collective experience and knowledge to make a decision.
- **PEAS:**
  - **Performance:** Efficient Search , Speed , Security , Battery life
  - **Environment:** Person, Web browser, Internet Connectivity
  - **Actuators:** Speaker , Monitor , Lights
  - **Sensors:** Microphone , Speech Detector , Touch Sensors

- **Environment:** Partially observable, dynamic, Stochastic, collaborative, Single Agent, Continuous.

2) Automated Gun

- **Define:** The Automated Gun agent is an intelligent agent that detects the target and shoots on movement while not shooting other innocents or civilians.
- **PEAS:**
  - **Performance:** Locking correct Target, No innocent killing, Security
  - **Environment:** Target, , Operator, Other Civilians/Pedestrians, Location, Weather.
  - **Actuators:** Trigger, Reload, Movable Arms and Stand,
  - **Sensors:** Movement detection, SONAR, Visual Sensors, Wind Sensors, Heat Sensors

- **Environment:** Partially observable, Dynamic, Stochastic, Single-Agent, Continuous, Episodic.

3) Fruit-Segregation Robot

- **Define:** The Fruit Segregation Robot scans the fruit and places it into its respective bin. Thus, helps in segregating the fruits from the pile based on their size and quality.

- **PEAS:**
  - **Performance:** Precision(percentage of Fruits in the correct bins), Time, Less bad quality fruits picked, Efficient segregation based on shape

- **Environment:** Bins, Conveyor belt, Placement of Fruits , Supervisor
- **Actuators:** Robot's Arm, Wheels, Robot's Grippers
- **Sensors:** Camera , Arm Activators, Fruit shape and quality Detector

- **Environment:** Partially observable, Dynamic , Stochastic, Single Agent, episodic, Discrete.

4) Football Playing Bot

- **Define:** A football bot is an intelligent agent that will play along with the other players in a multiplayer football game.
- **PEAS:**
  - **Performance:** Score Goal , Less Foul play, Win , Playing according to the role assigned ,
  - **Environment:** Team players , opponents , Network, Referee, Football Field
  - **Actuators**: Bot's Legs, Head and Hands, Navigators
  - **Sensors:** Distance from ball detector, Orientation detector, Other Players detector, position in the field, speed detector

- **Environment:** Partially observable , dynamic , Stochastic , competitive, Sequential, Multi-Agent, Continuous.

5) Delivery Robots (COVID)

- **Define:** An autonomous self driving robots which are used for delivery of food and other utilities.
- **PEAS:**
  - **Performance:** Safety, time, Abiding traffic rules, Comfort , Cost
  - **Environment**: Road , Customer , Pedestrian ,
  - **Actuators:** Robot wheels , Robot Arms , Speaker
  - **Sensors:** Camera , SONAR , Microphone , Keyboard

- **Environment:** Partially observable , dynamic , Stochastic , collaborative, Single Agent, Continuous.

6) Ticket Checker (COVID)

- **Define:** An automated ticket checker which is used for checking the authenticity of the ticket during the covid by scanning the specified features which it has learnt during the training.
- **PEAS:**
  - **Performance:** Correct Detection(Efficiency) , Time
  - **Environment**: Customer, Entrance-Exit Location, Operator
  - **Actuators:** Monitor, Ticket Insert Rollers, Ticket Shredder, Speaker
  - **Sensors:** Camera, UV/Infrared Scanner, Ticket, QR code scanner

- **Environment:** Fully observable , Dynamic , Deterministic , Single Agent, Discrete.

7) Sanitizer Dispenser (COVID)

- **Define:** It is an automated system which would help in dispensing sanitizer without the usage of one's own hands. Needed especially during the pandemic so as to prevent the spread chain link.
- **PEAS :**
  - **Performance:** Amount of sanitizer dispensed, speed of dispensing, area covered,
  - **Environment**: User, targets (like objects)
  - **Actuators:** Nozzle/Lid, pipe/arms moving it
  - **Sensors:** Proximity sensor, SONAR, infrared sensors,

- **Environment:** Partially observable, sequential, dynamic, stochastic, single-agent and discrete.

8) Automatic Vacuum Cleaner

- **Define:** The vacuum cleaner that cleans all the dirt within the specified place automatically detecting where the dirt is and dodging other obstacles are.

- **PEAS :**
  - **Performance:** Cleanliness, efficiency, battery life, distance travelled , security, safety
  - **Environment:** Obstacles, dirt, flooring, carpet, Operator

- **Actuators:** Brushes, Wheels, Suction machine , vacuum extractor
- **Sensors:** Camera, SONAR, Infrared Sensor, Dirt identification sensor, bump sensors

- **Environment:** Partially observable, Dynamic, Stochastic, Single Agent, Continuous.

9) Taxi Drivers

- **Define:** Automated taxi drivers which are intelligent agents that can be used for building self-driving cars.

- **PEAS :**
  - **Performance:** Safety, time, Abiding traffic rules, Comfort , Cost, Distance travelled
  - **Environment:** Road, Pedestrian , Road Signs, Customer
  - **Actuators**: Accelerator , Steering , Horn , Gear Shifting
  - **Sensors:** Camera, Infrared Sensors(SONAR) , odometer, keyboard

- **Environment**: Partially observable , Dynamic , Stochastic, Single Agent, Continuous.

10) Medical Diagnosis

- **Define:** Medical Diagnosis intelligent agent is used to scan and determine the severity of the medical disease and give efficient recommendations to the detected disease.

- **PEAS:**
  - **Performance:** Precision(Correct Prediction), Healthy, Cost Effective, Suitable to the particular Patient
  - **Environment:** Patient, Doctor , Staff , Hospital
  - **Actuators:** Treatments, Monitor, Referral Doctors
  - **Sensors:** Camera , Keyboard , Patient's answers, Infrared Sensors

- **Environment:** Partially observable, Dynamic, Stochastic, collaborative, Single Agent, Continuous.

CONCLUSION:

Thus, in this experiment I have formulated PEAS for 10 different Intelligent Agents which includes 3 agents related to the current COVID pandemic crisis. PEAS are used to categorize similar agents together and it also delivers the performance measure with respect to the environment, actuators and sensors of the respective agent.