Module 1 : Introduction to Artificial Intelligence

1. Intelligent agent is one which can take input from the environment through its sensors and act upon the environment accordingly through actuators

2. Its actions are always directed to achieve goal." The two main functions of intelligent agents include perception and action. Perception is done through sensors while actions are initiated through actuators.

3. In the human agent example, we read that there is something called as 'Nervous System' which helps in deciding the action with the assistance of effectors, based on the input given by sensors. In robotic agent, we have software's which demonstrates the functionality of nervous system.

4. The basic abilities of an intelligent agent are to exist to be self-governed, responsive, goal-oriented, etc

5) In case of intelligent agents, the software modules are responsible for exhibiting intelligence

Generally observed capabilities of an intelligent agent can be given as follows:
a) Ability to remain autonomous (self-directed)
b) Responsive
c) Goal-Oriented
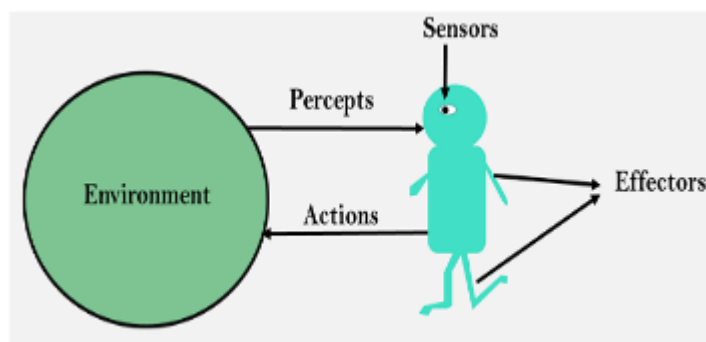Test 918275571188
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The agent keeps taking the input from the environment and goes through these states which will be followed in this situation. As per Wooldridge and Jennings, "An intelligent agent is one that is capable of taking flexible self-governed actions".
Examples: Alexa, Siri, Tesla autopilot car, etc

Define Artificial Intelligence and Application of AI ?

Artificial intelligence (AI) is branch of computer science concerned with building smart machines/computer/device to simulate human intelligence, to think like humans and mimic their actions. " In simpler words we can say that

● An area of computer science that deals with giving machines the ability to seem like they have human intelligence

● The power of a machine to copy intelligent human behaviour

● AI is relevant to any intellectual task where the machine needs to take some decision or choose the next action based on the current state of the system, In short act intelligently or rationally. As it has a very wide range of applications, it is truly a universal field.

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There are several applications of AI across various industries, some of which include:

1. Healthcare: AI can be used to analyze patient data to diagnose diseases, develop treatment plans, and monitor patient progress.
2. Finance: AI can be used to analyze financial data to identify patterns and make predictions, such as stock market trends, fraud detection, and credit risk assessment.
3. Transportation: AI can be used to develop self-driving cars and optimize traffic flow.
4. Customer service: AI-powered chatbots can provide instant customer support and assistance 24/7.
5. Education: AI can be used to develop personalized learning programs and provide feedback to students.
6. Manufacturing: AI can be used to optimize production processes, monitor equipment performance, and predict maintenance needs.

These are just a few examples of the many applications of AI, and the possibilities for its use are virtually limitless.

PEAS descriptors?

■ Part-picking Robot
■ Automatic Taxi Driver
■ Vacuum Cleaner
■ Wumpus World

PEAS: Performance measure, Environment, Actuators and Sensors.

1) A Rational Agent should select an action that is expected to maximize its performance measure, provided by percept sequence and whatever built-in knowledge it has.
2) To design a rational agent, we first need to think about task environment which are essentially problems to which the rational agents are "solutions".
3) To design a task environment, we need four main factors which can completely describe the environment. These four factors are called by the acronym PEAS

A) PERFORMANCE MEASURE:

i. Performance measure is how we measure the system's achievements. For example, consider the case of an automated driver.

ii. Its performance can be measured in terms of desirable quality like minimizing fuel consumption, minimizing cost and time, maximizing safety and passenger comfort and maximizing profits.

iii. Many-a-times, these goals conflict, so there will be optimum trade-offs involved.

B) ENVIRONMENT:

i. Environment involves who the agent is interacting with. For example, an taxi driver deals with a variety of roads, ranging from rural lanes and urban valleys to 12 lane freeways.

ii. The roads contain other traffic, stray animals, pedestrians, police cars and potholes. The taxi driver must also interact with potential and actual customers.

iii. Thus, there are a various factor that will come into the picture. Obviously, the more restricted the environment, the easier the design problem.

C) ACTUATORS:

i. Actuator involves knowing what decides the output of a system. The actuators available to an automated taxi will be more or less the same as those available to a human driver:

ii. Control over steering and braking. Also, it will need output to display screen or voice synthesizer to talk back to the passengers, and perhaps some way to communicate with other vehicles politely or otherwise.

D) SENSORS:

i. Sensors involves knowing what provides input to the system. For example, to achieve its goals in the driving environment, the taxi will need to know there it is, what else is on the road, and how fast it is going.

ii. Its basic sensors should therefore include one or more controllable TV cameras, the speedometer, and the odometer. To control the vehicle especially on curves, it should have an accelerometer. Thus in, this way, we need to take into account the sensors.

PEAS descriptor for Automated Car Driver:

Performance Measure:
1. Safety: Automated system should be able to drive the car safely without dashing anywhere.
2. Optimum speed: Automated system should be able to maintain the optimal speed depending upon the surroundings.
3. Comfortable journey: Automated system should be able to give a comfortable journey to the end user.
Environment:
1. Roads: Automated car driver should be able to drive on any kind of a road ranging from city roads to highway.
2. Traffic conditions: You will find different sort of traffic conditions for different type of roads.

Actuators:
1. Steering wheel: used to direct car in desired directions.
2. Accelerator, gear: To increase or decrease speed of the car.
Sensors: To take i/p from environment in car driving example cameras, sonar system etc.
PEAS descriptor for Vacuum cleaner:

Performance Measure:
1. Cleanness
2. Efficiency
3. Battery life
4. Security

Environment:
1. Room
2. Table
3. Wood floor
4. Carpet
5. Various obstacles

Actuators:
1. Wheels
2. Brushes
3. Vacuum Extractor

Sensors:
1. Camera
2. Dirt detection sensor
3. Cliff sensor
4. Bump sensor
5. Infrared wall sensor

PEAS Description of the Wumpus World Environment:

Performance Measure:
5. +1000 for picking up the gold,
6. -1000 for falling into a pit,
7. -1 for each action taken,
8. -10 for using up the arrow.

Environment:
1. 4x4 Grid of rooms.
2. Initially agent is in room labelled [1, 1] facing to the right.
3. Locations of PITs, Wumpus and gold are chosen randomly.
4. Each square other than the start can be a pit with probability 0.2.
Actuators: Agent can perform five different actions.
4. Move forward/ backward.
5. Turn left 90 degrees.
6. Turn right 90 degrees.
7. Grab gold. 5
8. Shoot Wumpus

Sensors: Agent has five different sensors.
1. Breeze Sensor (Room adjacent to pit)
2. Stench Sensor (Room adjacent to wumpus)
3. Glitter Sensor (Room with gold)
4. Bump Sensor (Collide with wall)
5. Scream Sensor (Wumpus dead)