**Chapter 2**

**Intelligent Agents**

**The chapter consist of Short type Questions & Answers , Descriptive Question & Answer and MCQs & answers.**

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# Short type Questions & Answers

## Q What is agent in artificial intelligence?

Anything identifies its environment with the use of sensors and acts upon an environment by effectors are known as Agent. Agent includes Programs, Robots and Humans etc.

## Q Do Bots And Intelligent Agents Have Personalities And Emotions?

**Answer :**

IA is used to develop bots... and moreover how u program it is very important.It uses NL and ML also.If a person uses proper ontology then it can answer out.

## Q 2 Batsman Are On 94 Notout,need To Win 7 Runs Off 2 Balls,both Hit A Century? How It Is Possible?

**Answer :**

First batsman hit 4 on no ball and then took a single on next ball. Thus completed his century. Second batsman hit 6 on last ball and completed his century too.

## Q Suppose 2 Batsmen Each On 94. 7 Runs To Win In 3 Balls. Both Make Unbeaten 100. How?

**Answer :**

**Case 1:** A batsman can be given out 1st batsman hits a six....gets caught on d nxt ball...crease is changed....next batsman hits a six again...

**Case 2:** No batsman is out

1st batsman hits d ball n hits d keepers helmet kept behind...he also takes a single...6 runs are added to his total making it 100...on d next ball, 2nd batsman hits a six,making his score 100....as simple as dat....

## State the needs of a computer to pass the turing test.

## 

i)                                                 Computer Vision: To perceive Objects.

ii)                                                  Robotics: To manipulate objects and move about.

## 

## What is called as an omniscience agent?

 It is one which knows  the actual outcome of its actions & can act accordingly

## Define agent function.

It is an abstract mathematical description. That maps any given percept sequence to an action.

## State the properties of task environment.

1.                                                 Fully observable Vs Partially observable.

2.                                                 Deterministic Vs Stochastic.

3.                                                 Episodic Vs Sequential

4.                                                 Static Vs Dynamic

5.                                                 Discrete Vs Continuous

6.                                                 Single agent Vs Multi agent

## Differentiate episodic vs sequential.

In an episodic task environment, the agents experience is divided into atomic episodes. Each episode consists of the agent perceiving and then performing a single action.

The current decision does not affect whether the next part is defective.

In  sequential  environments,  the  current  decision  could  affect  all  future decisions.

Chess and taxi driving are sequential.

## Define problem solving agent.

Problem solving agents decide what to do by finding sequences of actions that lead to desirable states.

## Define agent program.

The agent is a concrete implementation, running on the agent architecture. They take the current percept as input from the sensors and return to the actuators.

## Define agent with example.

An agent is anything that can be viewed as perceiving its environment through sensors and acting upon that environment through actuators.

Ex: Human Agents, Robotics agents & Software agents.

## Define rational agent.

A rational agent is one that does the right thing. A system is rational if it does the “right thing”, given what it knows.

## 

## What is called as an omniscience agent?

 It is one which knows  the actual outcome of its actions & can act accordingly

.

## What are AI Agents Terminology

1. Performance measure of agent: It is the criteria determining the success of an agent.

2. Behaviour/action of agent: It is the action performed by an agent after any specified sequence of the

percepts.

3. Percept: It is defined as an agent’s perceptual inputs at a specified instance.

4. Percept sequence: It is defined as the history of everything that an agent has perceived till date.

5. Agent function: It is defined as a map from the precept sequence to an action.

Agent function, a = F(p)

where p is the current percept, a is the action carried out, and F is the agent function

## Draw Percept to Action mapping for Vacuum cleaner problem

The Vacuum cleaner agent's goal is to clean the environment .This world ( Environment) has two locations or room , let us called them as

Square A ( Left Square) , and

Square B (Right Square).

Environment of the Problem : Square A and B

The vacuum agent perceives in which square it is in and whether there is dirt in the square. It can choose to move left ,move right or suck up the dirt or do nothing.

Based on above task one of the very simple **agent function** is the following : If the current square is dirty then suck , otherwise move to other square. Hence we can write :

Precepts: location and status, e.g., [A, Dirty]

Actions: left, right, suck, and no-op( Do Nothing)

The partial tabulation of the agent function along with the agent program is shown below which is also known as Percept sequence to action mapping :

|  |  |
| --- | --- |
| **Percept Sequence to Action Mapping** | |
| **Percept Sequence** | **Action** |
| **[A, Clean]** | Right |
| **[A, Dirty]** | **Suck** |
| **[B, Clean]** | Left |
| **[B, Dirty]** | **Suck** |
| **[A, Dirty], [A, Clean]** | Right |
| **[A, Clean], [B, Dirty]** | **Suck** |
| **[B, Dirty], [B, Clean]** | Left |
| **[B, Clean], [A, Dirty]** | **Suck** |
| **[A, Clean], [B, Clean]** | No-op |
| **[B, Clean], [A, Clean]** | **No-op** |

## Q What’s TensorFlow?

TensorFlow is an open-source framework dedicated to ML. It’s a comprehensive and highly adaptable ecosystem of libraries, tools, and community resources that help developers build and deploy ML-powered applications. Both AlphaGo and Google Cloud Vision were built on the Tensorflow platform.

## Q What is Autonomy

If the system’s behaviour is determined by its own experience the system is known as autonomous. When agent has very less experience it would have to act randomly unless designer or the programmer gave some sort of assistance. Designer would be responsible to provide IA with some initial knowledge as well as ability to learn.

A actual autonomous intelligent agents would be able to perform successfully and efficiently in all type of environments , given sufficient time to adapt. An agent that operates on the basis of built in assumptions will only operate successfully when those assumptions hold and lack flexibility

## Q What is Rational Agent

A rational agent always performs **right action**, where the right action means the action that

causes the agent to be most successful in the given percept sequence. The problem the agent

solves is characterized by Performance Measure, Environment, Actuators, and Sensors

(PEAS).

Rational action: whichever action maximizes the expected value of the performance measure given the percept sequence to date.

Rational ≠ omniscient

Rational ≠ clairvoyant

Rational ≠ successful

Rationality of an agent depends on mainly four parameters :

1. **T**he Degree of success which is determined by the **performance measures**.
2. Agent’s **Percept Sequence** which have been perceivedtill now.
3. **Prior knowledge about the environment** which the agent has gain till now.
4. The **actions** that the agent can perform in the environment.

## What are the problems arises when knowledge of the states or actions is incomplete?

1.                                                 Sensor less problems

2.                                                 Contingency problems

3.                                                 Exploration problems

## What are the steps to evaluate an algorithm’s performance?

1.                                                 Completeness

2.                                                 Optimality

3.                                                 Time Complexity

4.                                                 Space Complexity

## Give examples for real world problems.

i)                                                 The route finding

ii)                                                  Touring

iii)                                                 Traveling sales person

iv)                                                Robot navigation

# Descriptive Question & Answer

## Q Write PEAS descriptions for

## A music composer

## An aircraft autolander

## An essay evaluator

## A robotic sentry gun for the Keck Lab

Music Composer

* Performance Measures - number of measures composed per unit time,number of instruments considered, ease of play by a human, range of frequencies within human audible zone,melodic, harmonic and rhythmic criteria, ...
* Environment Software
* Actuator None required, this can be a pure softbot
* Sensors Code that reads in basic parameters

Aircraft Autolander

* Performance Measures

Lack of damage to plane, other aircraft or ground structures,

lack of injuries to passengers or ground crew or other innocent

observers, cargo remains intact, fuel economy, lands at correct airport

on correct runway, doesn't take too long

* Environment: Lower atmosphere and surface of planet Earth.
* Actuators: Throttle, landing gear, rudders, ailerons, flaps ...
* Sensors: Cameras, Altimeter, Spedometer, other meters, ...

Essay Evaluator

* Performance Measures : awards scores for quality, penalizes crap, detection of plagiarism, impartiality, usefulness of explanation of grading, ...
* Environment: Software
* Actuator: None, this can be a pure softbot
* Sensors: File reading software, (perhaps even OCR)

Robotic Sentry Gun for the Keck Lab

* Performance Measures Percentage of correct targets hit, lack of hitting friends, minimal energy consumption, ...
* Environment: The Keck Lab
* Actuator: Gun, trigger, motors, camera, ...
* Sensors: Camera, sonar, bump sensors, ...

## Q Explain difference between PAGE Descriptors & PEAS Descriptors.

*PAGE Descriptors* are not the unique way of describing intelligent systems.

In designing intelligent systems there are four main factors to consider:

P **Percepts** – the inputs to our system

A **Actions** – the outputs of our system

G **Goals** – what the agent is expected to achieve

E **Environment** – what the agent is interacting with

One popular alternative involves *PEAS Descriptors*:

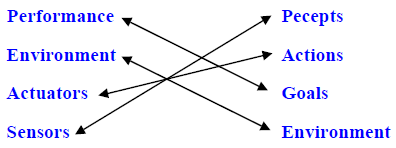
P **Performance** – how we measure the system’s achievements

E **Environment** – what the agent is interacting with

A **Actuators** – what produces the outputs of the system

S **Sensors** – what provides the inputs to the system

We can see that there is a clear and simple mapping between *PAGE* and *PEAS*:



## Q List down all the properties of Agent Environment and explain them in short

|  |  |
| --- | --- |
| **Environment Types-I :**  **Fully observable (accessible) vs. partially observable (inaccessible)** | **Environment Types-II: Deterministic vs. stochastic (non-deterministic)** |
| * Fully observable if agents sensors detect all aspects of environment relevant to choice of action * Could be partially observable due to noisy, inaccurate or missing sensors, or inability to measure everything that is needed * Model can keep track of what was sensed previously, cannot be sensed now, but is probably still true. * Often, if other agents are involved, their intentions are not observable, but their actions are * E.g chess – the board is fully observable, as are opponent’s moves. * Driving – what is around the next bend is not observable (yet). | * ·         Deterministic = the next state of the environment is completely predictable from the current state and the action executed by the agent * Stochastic = the next state has some uncertainty associated with it * Uncertainty could come from randomness, lack of a good environment model, or lack of complete sensor coverage * Strategic environment if the environment is deterministic except for the actions of other agents * Examples:  Non-deterministic environment: physical world: Robot on Mars Deterministic environment: Tic Tac Toe game |
| **Environment Types-III : Episodic vs. sequential** | **Environment Types-IV: Discrete vs. continuous** |
| * The agent's experience is divided into atomic  "episodes" (each episode consists of the agent perceiving and then performing a single action) and the choice of action in each episode depends only on the episode itself * Sequential if current decisions affect future decisions, or rely on previous ones * Examples of episodic are expert advice systems – an episode is a single question and answer * Most environments (and agents) are sequential * Many are both – a number of episodes containing a number of sequential steps to a conclusion * Examples:  Episodic environment: mail sorting system Non-episodic environment: chess game | * Discrete = time moves in fixed steps, usually with one measurement per step (and perhaps one action, but could be no action). E.g. a game of chess * Continuous = Signals constantly coming into sensors, actions continually changing. E.g. driving a car |
| **Environment types-V:**  **Static vs. dynamic:** | **Environment types-VI**  **Single agent vs. multi agent:** |
| * Dynamic if the environment may change over time. Static if nothing (other than the agent) in the environment changes * Other agents in an environment make it dynamic * The goal might also change over time * Not dynamic if the agent moves from one part of an environment to another, though it has a very similar effect * E.g. – Playing football, other players make it dynamic, mowing a lawn is static (unless there is a cat…), expert systems usually static (unless knowledge changes) | * An agent operating by itself in an environment is single agent! * Multi agent is when other agents are present! * A strict definition of an other agent is anything that changes from step to step. A stronger definition is that it must sense and act * Competitive or co-operative Multi-agent environments * Human users are an example of another agent in a system * E.g. Other players in a football team (or opposing team), wind and waves in a sailing agent, other cars in a taxi driver |

## Q If the pure reflex vacuum cleaner agent from the text had a performance measure in which two points were given for each square cleaned, and one point was subtracted for each movement from one square to the other, and the squares never became dirty once cleaned, describe an agent function that would make an agent rational

By "pure" reflex agent we mean the agent acts on the basis of the currentpercept only, and ignores the rest of the percept history. By rationalwe mean the agent tries to maximize the performance measure. What are themaxiums?

If the world starts with two dirty squares the highest score the agent couldget is 3. If it starts with one clean and one dirty square then the maximumachievable score for the agent is 2 if it starts in the dirtysquare and 1 if it starts in the clean one. If both squaresstart off clean, the best the agent can do is get 0 points.

To be rational the agent needs a function which does the best itcan over all situations. We don't know the probability distributionof starting states, so let's assume all are equally likely.How many possible agent functions are there for pure reflex agents?There are only four possible percepts and four possible actions(left, right, suck, nop), so there are 4^4 = 256 possible functions.

We could take each of these possible functions and compute theirscores on each of the four possible initial environments andsee which function does the best when averaged over all of them.

Instead of trying all 1024 combinations, we can rule out a fewto begin with using our own brains. First, we can replace allclauses in which we try to move right in B or left in A with nops.Second, we cannot allow both (A, clean) and (B, clean) to both resultin moves, or else the vacuum could run forever and rack up a scoreapproaching negative infinity. Third, failing to suck in a dirtysquare is definitely a point loser, so we have to keep these.

This pretty much leaves us with four possible functions. Two ofthem are:

fn (A, clean) => right

| (A, dirty) => suck

| (B, clean) => nop

| (B, dirty) => suck

and

fn (A, clean) => nop

| (A, dirty) => suck

| (B, clean) => left

| (B, dirty) => suck

Either one will get the 3 if both squares are dirty, but they may

miss a chance for a 1 (settling for a zero), and may have to

take a -1 when a 0 is possible.

The other two are:

fn (A, clean) => nop

| (A, dirty) => suck

| (B, clean) => nop

| (B, dirty) => suck

and

fn (A, clean) => nop

| (A, dirty) => suck

| (B, clean) => nop

| (B, dirty) => suck

hese never get the 3 (they max at 2), they might miss the chance

for a 1 (settling for a zero, like the other functions), but they

never take a -1 in place of a zero.

Let's try a serious analysis. We can treat only one representative

from each of the two groups, since within each group the functions

are mirror images.

Let f(A,clean)=right|f(x,dirty)=suck|f(B,clean)=nop

Let g(x,clean)=nop|g(x,dirty)=suck

Let states be represented as current\_location x A.status x B.status

For f:

State score f() max theoretical score

---------------------------------------------------

(A, clean, clean) -1 0

(A, clean, dirty) 1 1

(A, dirty, clean) 1 2

(A, dirty, dirty) 3 3

(B, clean, clean) 0 0

(B, clean, dirty) 2 2

(B, dirty, clean) 0 1

(B, dirty, dirty) 2 3

That's 8/12. Now for g:

State score f() max theoretical score

---------------------------------------------------

(A, clean, clean) 0 0

(A, clean, dirty) 0 1

(A, dirty, clean) 2 2

(A, dirty, dirty) 2 3

(B, clean, clean) 0 0

(B, clean, dirty) 2 2

(B, dirty, clean) 0 1

(B, dirty, dirty) 2 3

Also 8/12. Well what do you know? All four answers are acceptable!

Sucking on a clean square doesn't hurt either! This performance measure was under-specified.

## Q Categorize a *shopping bot for an offline bookstore* according to each of the six dimensions (fully/partially observable, deterministic/stochastic, episodic/sequential, static/dynamic, discrete/continuous, single/multi agent)

An offline bookstore shopping bot senses and acts in the real world where it will bump into and communicate with other agents and try not to get run over on its way to and from the store. Its environment is

partially observable (real world robots aren't omnipotent)

stochastic (earthquakes, floods, ...)

sequential (the books you buy deplete the in-store inventory)

dynamic (other agents are buying)

continuous (it's moving around in the world)

multi-agent (there are other customers)

## Q Suppose the vacuum cleaner world was extended to have four squares in a walled-in 2 x 2 grid, and two new actions up and down. Suppose also the performance measure was +5 for cleaning a square, -4 for sucking in a clean square, -2 for making a move. A clean square will become dirty if the vacuum enters it for the nth time where n mod 4 = 0. The vacuum can only sense whether the current square it is in is dirty or clean, but it cannot sense its current location. It can attempt a move action and receive a bump percept if the move runs in to an outer wall. Bumping into a wall will leave the agent in the same square, but does *not* increase the number of times the square is considered entered.

## Ignoring belief states, how many states are there in a problem formulation of this world?

## Give an agent program for this world that would make this agent rational. Use pseudocode, but be fairly precise. Be sure to describe the model the agent constructs. It may be helpful to sketch (a portion of) the belief state graph.

a) There are 4\*2\*2\*2\*2 = 64 states.

b) The algorithm is (note that I have embedded the agent's "knowledge"

in comments within the code):

if (current\_square\_dirty()) suck;

up;

if (received\_bump()) {

// In A or B, with A or B clean

left();

if (received\_bump()) {

// In A, A is clean

right();

if (current\_square\_dirty()) suck;

down();

if (current\_square\_dirty()) suck;

left();

if (current\_square\_dirty()) suck;

} else {

// In A, with B clean

if (current\_square\_dirty()) suck;

down();

if (current\_square\_dirty()) suck;

right();

if (current\_square\_dirty()) suck;

}

} else {

// In A or B, with C or D clean

if (current\_square\_dirty()) suck;

left;

if (received\_bump()) {

// In A, with A and C clean

right();

if (current\_square\_dirty()) suck;

down();

if (current\_square\_dirty()) suck;

} else {

// In A, with B and D clean

if (current\_square\_dirty()) suck;

down();

if (current\_square\_dirty()) suck;

}

}

## Q List down all types of agent architecture . Explain utility based agent.

There are five types of agents named as :

1. Simple Reflex Agent

2. Model based Agent

3. Goal Based Agent

4. Utility Based Agent

5. Learning agent

Utility Based Agent

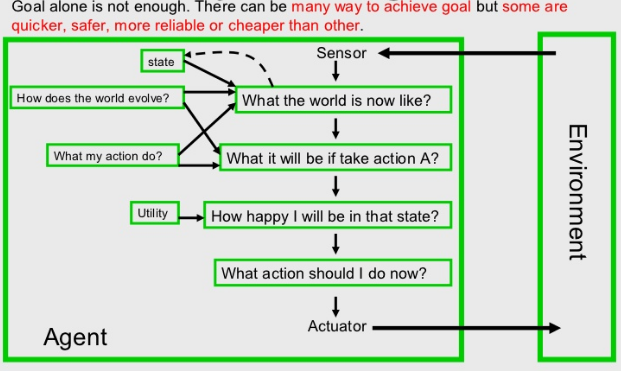


Figure : Utility based agent

Goals alone are insufficient to produce top high quality behaviour. Frequently there are numerous groupings of actions that can bring about a similar goal being accomplished. Given proper criteria, it might be conceivable to picked ‘best’ sequence of actions from a number that all result in the goal being accomplished. We discuss the utility of specific states.

Any utility based agent can be depicted as having an utility capacity that maps a state, or grouping of states, on to a genuine number that speaks to its utility or convenience or usefulness. We would then be able to utilize the utility to pick between alternative sequences of actions/states that prompt a given goal being accomplished. At the point when there are conflicting goals, just some of which can be accomplished, the utility is ready to evaluate the suitable exchange offs. At the point when there are a few goals, none of which can be accomplished with assurance, the utility enables the likeliness of progress or likeliness of success to be weighed up against the significance of the goals. Goals alone are insufficient to generate high quality behaviour in most environment. Goals simply give binary distinction between happy and unhappy state .Where a more performance measure should allow a comparison of different world States according to exactly how happy they would make the agent in the event that they could be accomplished. Since happy state does not sound logical ,the standard phrasing of happy state is utility.

Utility function : It maps a state or a sequence of state on to a real number, which describe the associated degree of happiness. complete satisfaction of the utility function allows rational decision in two kinds of cases where goal are inadequate.

Hence utility based agent using the model of the world along with the utility function that measures its preference among states of the world. Then it chooses the action that leads to best expected utility ,where expected utility is computed by all possible outcome state weighted by probability of outcome.

Utility Based agent Code

Function REFLEX-AGENT-WITH-UTILITY(*percept*) returns action

persistent: *state,* conception of world state

persistent: *rules*, a set of condition-action rules

persistent: *action*, the most recent action, initially none

state = UPDATE-STATE(*state, action, percept*)

rule = MATCH-RULE(*state, rules*)

rule = UTILITY-OF-RULE(*rules*)

action=RULE-ACTION(rule)

return *action*

## Write a short note on Intelligent agent application

**1. Systems and network management:** framework and system administration is one of the vital application territories to be upgraded utilizing keen operator innovation. the development of customer/server registering has increased the many-sided quality of frameworks being overseen, particularly in the territories of LANS and system driven processing turns out to be more pervasive this multifaceted nature additionally heightens. For exp:- they can help channel and take programmed activities at a more elevated amount of reflection and can even be utilized to distinguish and respond to designs in framework conduct.

**2. Information access and management:** data access and administration is a territory of awesome action, given the ascent in prevalence of the web and blast of information accessible to the client. Clever specialists are helping clients with seek and separating, as well as with arrangement, prioritization, particular disseminaton, and community.

**3. Work flow and administrative management**: administrative management incorporates both work process administration and regions, for example, PC and communication joining, where forms are characterized and robotized. in these zones, clients require to make forms more proficient, as well as lessen the cost of human operators.

**4. Customer help desk:** client enable work area to work is to answer calls from clients and discover the response to the issues. at the point when client call with an issues, the assistance work area individual physically look into answers from printed copy manuals, yet those printed version manuals have been supplanted with accessible CD-ROM accumulations, and a few organizations or having the clients scan through the web for an answer, with keen operator, client portray the issues and the specialist consequently looks through the fitting database, at that point introduces a solidified answer the undoubtedly first. This is a decent case of utilizing wise operator to discover and channel data.

5**. Personal shopping assistant:** IBM's own shopping right hand utilizes canny operator innovation to help the web customer or the web shop proprietor to locate the coveted thing rapidly without having to program page after page of the wrong stock. With the individual shopping assistat, stores and stock are redone as the shrewd specialist took in the customer's inclinations as he/she enters in any online shopping center or stores or taking a gander at particular stock. it could likewise orchestrate the stock with the goal that the things you the most are the first you see. At last, Personal shopping right hand mechanizes your shopping experienceby reminding you to shop when a birthday, a commemorations or thing that is marked down happened.

## Q Explain Rational Agent with concept of Rationality

The concept of rationality

Rationality is only status of being sensible and having great judgmental feeling. Rationality is only concerned about expected activities or actions and results relying on what the IA ( Intelligent agent) has seen. Performing activities with the point of acquiring valuable data is a critical piece of Rationality.

Rational agent

A rational agent always performs **right action**, where the right action means the action that

causes the agent to be most successful in the given percept sequence. The problem the agent

solves is characterized by Performance Measure, Environment, Actuators, and Sensors

(PEAS).

Rational action: whichever action maximizes the expected value of the performance measure given the percept sequence to date.

Rational ≠ omniscient

Rational ≠ clairvoyant

Rational ≠ successful

Rationality of an agent depends on mainly four parameters :

1. **T**he Degree of success which is determined by the **performance measures**.
2. Agent’s **Percept Sequence** which have been perceivedtill now.
3. **Prior knowledge about the environment** which the agent has gain till now.
4. The **actions** that the agent can perform in the environment.

A rational agent does right things and action, the action ,which is one that will cause the agent to be most successful. Performance measure is the criteria to determine how successful the agent is. There is not one fixed measure suitable for all agents. An outside observer establishes a standard of what it means to be successful in an environment and use it to measure performance of agents.

For example: Consider the case of an agent that is supposed to vacuum the dirty floor. A possible performance measure would factor in amount of electricity consumed and amount of noise generated as well. A third performance measure might give highest marks to an agent that not only cleans the floor quietly and effectively, but also find time for himself.

It is also essential to know when the problem is being evaluated .For example; if it is measured that much dirt the agent has cleaned up in the first half of the day, then those agents that starts fast (even if they do little or no work later on) must be rewarded and those that work consistently must be punished.

An **Omniscient agent** knows the actual outcome of its action and can act accordingly, but Omniscient agent is impossible in reality.

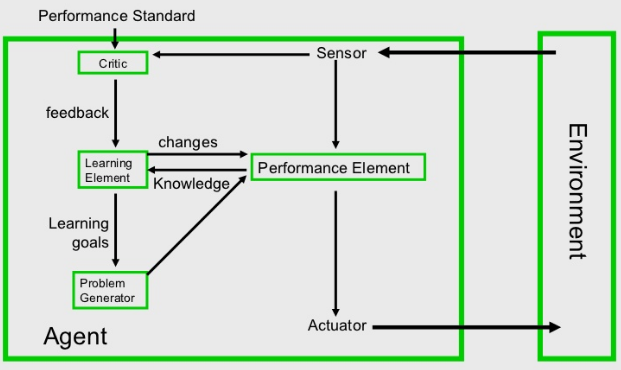
**Ideal rational agent**

An ideal rational agent is the one, which is capable of doing expected actions to expand its

Performance measure, on the basis of:

* Its percept sequence
* Its built-in knowledge base

## Q Explain Learning agent and its components



**Figure Learning agent**

The most powerful agents are able to learn by actively exploring and experimenting with their environment. A learning agent can be divided in to four conceptual components.

A general learning agent has four basic components:

1. **The Performance Element** – which takes in percepts and settles on suitable action similarly as a non-learning agent. The performance element which is in charge of choosing external action and also it the same element that we have previously considered to be the whole agent it takes in percepts and decides on action

2. **The Critic** – which uses a fixed standard of performance to tell the learning element how well the agent is doing. The learning element uses feedback from the critic on how the agent is doing and and decide how execution be changed to improve the situation in future

3. **The Learning Element** – that gets data from the critics and makes proper upgrades to the performance element. The The learning element utilizes feedback from the critic on how the agent is getting along and decide how execution be adjusted to improve the situation in future. The plan of learning element depends particularly on the outline of the performance element.

4. **The Problem Generator**– that suggests actions that will lead to new and

informative experiences (e.g. as in doing tests). it is in charge of recommending action that will prompt new and educational experience. the fact of the matter is that if performance element has its direction it will continue doing the action what are best given what it knows. be that as it may, if the agent will explore a little and some maybe sub optional actions in the short run it may Discover much better action for the long run.

# MCQs & Answers

1. What is the rule of simple reflex agent?

(a) Condition-action rule

(b) Simple-action rule

(c) Both a and b

(d) None of the above

2. What are the composition for agents in an artificial

intelligence?

(a) Architecture

(b) Program

(c) Both a and b

(d) None of the above

3. In which agent does the problem generator is

present?

(a) Learning agent

(b) Reflex agent

(c) Observing agent

(d) None of the above

4. Which is used to improve the agent’s performance?

(a) Learning

(b) Perceiving

(c) Observing

(d) None of the above

5. Which agent deals with happy and unhappy

states?

(a) Simple reflex agent

(b) Utility-based agent

(c) Model-based agent

(d) Learning agent

6. Which action sequences are used to achieve the

agent’s goal?

(a) Search

(b) Plan

(c) Retrieve

(d) Both a and b

7. Which element in agent are used for selecting

external actions?

(a) Learning

(b) Perceive

(c) Performance

(d) Actuator

8. What could possibly be the environment of a

satellite image analysis system?

(a) Computers in space and earth

(b) Image categorisation techniques

(c) Statistical data on image pixel intensity

value and histograms

(d) All of the above

9. Which instruments are used for perceiving and

acting upon the environment?

(a) Sensors and actuators

(b) Sensors

(c) Perceiver

(d) None of the above

10. What is meant by agent’s percept sequence?

(a) Complete history of actuator

(b) Used to perceive the environment

(c) Complete history of perceived things

(d) Both a and b

**MCQ. Answers**

1. (a) 2. (c) 3. (a) 4. (a) 5. (b) 6. (d) 7. (c) 8. (d) 9. (a) 10. (c)