

Special Assignment

Questions

Intelligent Agents

Q1 What is the intelligent agent? in AI and where are they used?

A1 Intelligent agent is a program or software that perceives (or observes) its environment through sensors, thinks intelligently and acts upon that environment through its actuators (to perform actions on the environment or produce output).

• Example: Robotic agent

Sensors: cameras, microphones, touchscreens.

Actuators: Motors, speakers

• Intelligent agents can be used for applications in data mining, data analytics & customer service & support.

Q2 Explain rational agents & rationality.

A2 Rational agents: A rational agent should select an action that is expected to maximise its performance measure, given the evidence provided by the percept sequence & whatever built-in knowledge the agent has.

Rationality at any given time depends on 4 things:

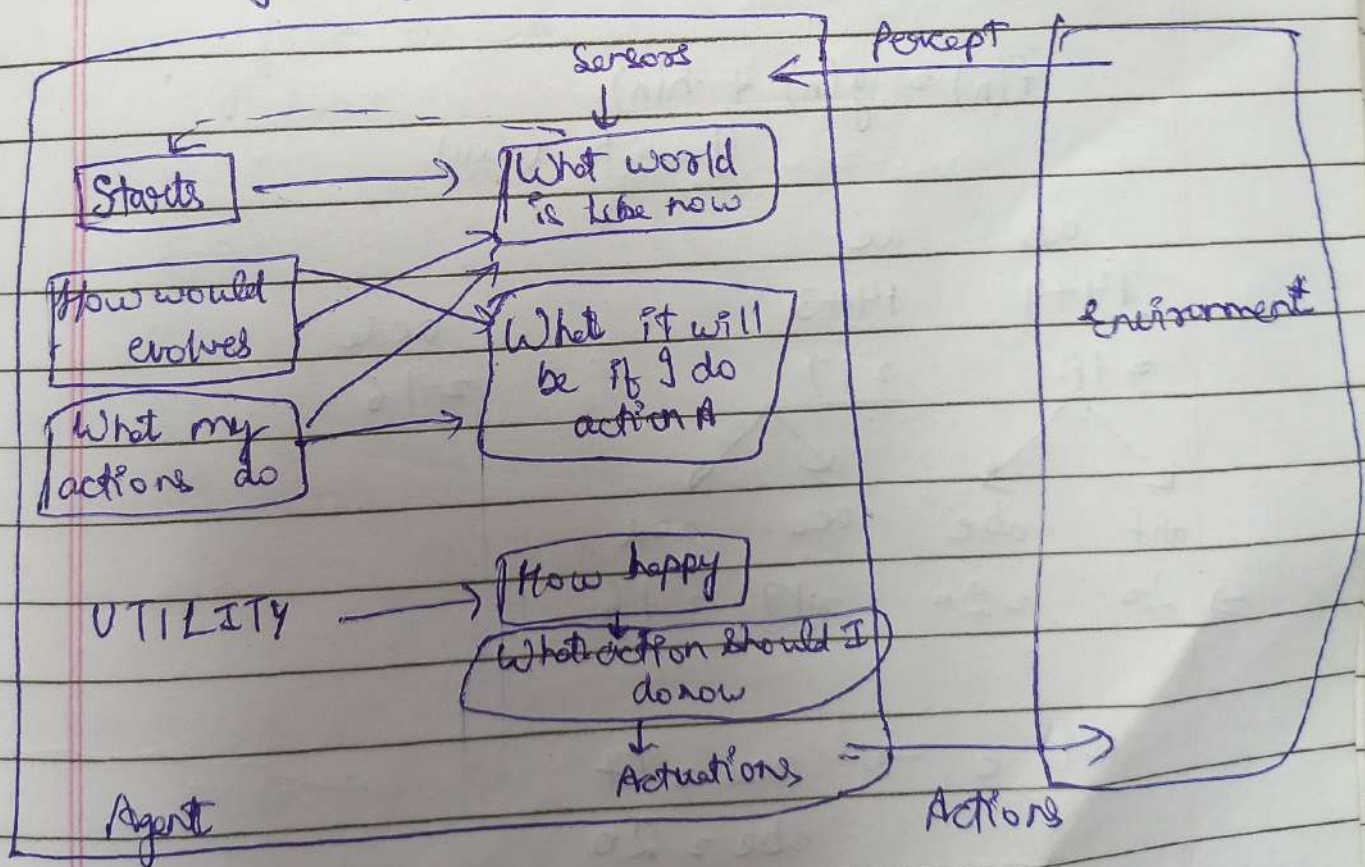
- The performance measure
- The agent's prior knowledge of the environment
- The actions that agent can perform.
- The agent's percept sequence to date.

Q3] What does a utility-based agent do?
Explain with proper diagram.

A3] The agents which are developed having their end users as building blocks, are called utility based agents. When there are multiple possible alternatives, then to decide which one is best, utility based agents are used.

They choose actions based on a preference (utility) for each state. Utility describes how "happy" the agent is.

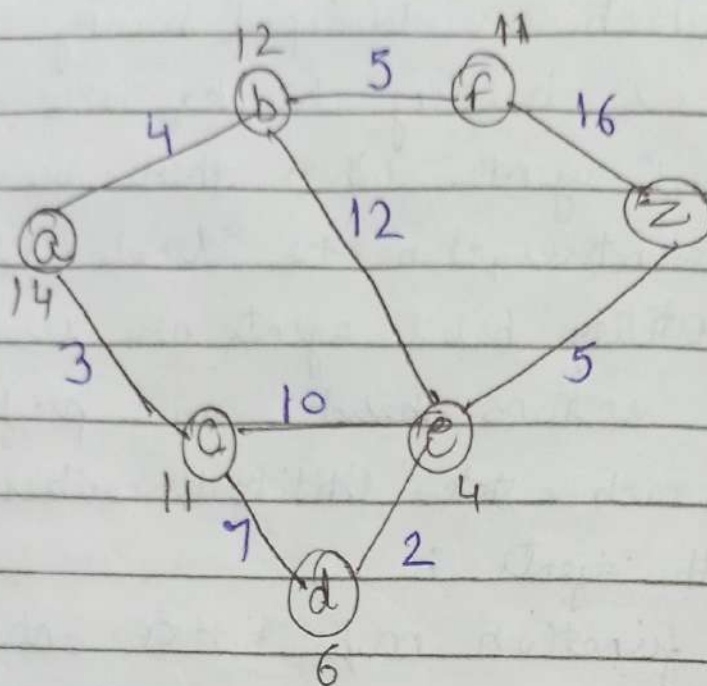
A utility function maps a state onto a real number which describes the associated degree of happiness.



Assignment-1 (A^* , A_0^* , Alpha-beta pruning)

Q1 A^* Search algorithm

Ans



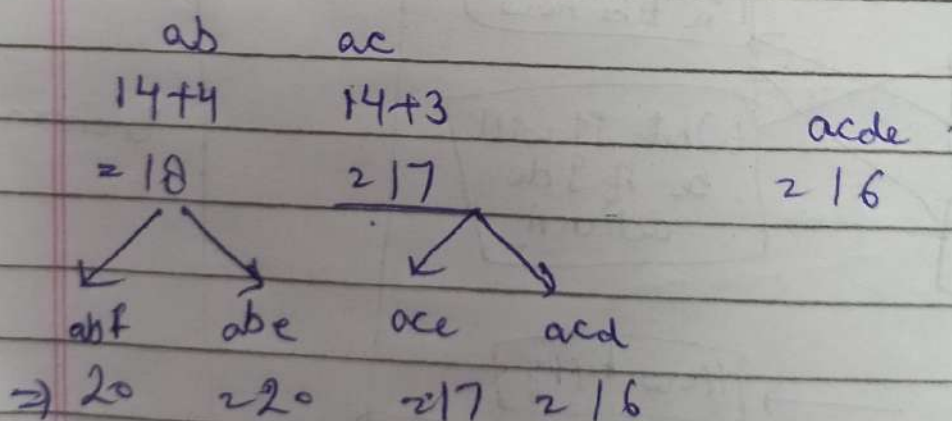
Shortest Path: $A \rightarrow Z$?

a initial state

z goal state

$$f(n) = g(n) + h(n)$$

(heuristic value)



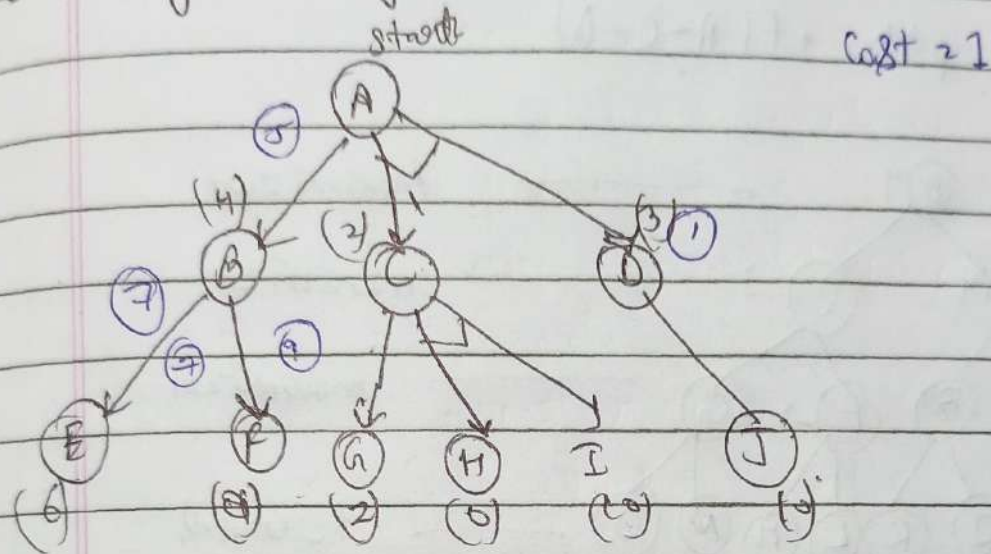
At e → ace = 17
 abe = 20
 acde = 16

As acde is shortest one, selecting that path.

$$\begin{array}{ll} acdez \approx & abfz \\ \approx 17 & \approx 25 \end{array}$$

Shortest path from a to z is \boxed{acdez}
 $a \rightarrow c \rightarrow d \rightarrow e \rightarrow z$

Q2 Apply A* algorithm



Step 1 Start from node A
 2 paths.

$$A \rightarrow B \approx 5 \quad (4+1)$$

$$A \rightarrow C, D \approx 3+2+1+1 \approx 7$$

minimum cost path is chosen $A \rightarrow B$.

Step 2 BE and BF
 7 9

BE has lesser cost
 Now, heuristic have to be updated.

B heuristic $4 \rightarrow 7$.

Now

$$\text{again calculate cost } AB \approx 8$$

$$\text{And } AC, D \approx 7$$

ACD is smaller, so now explore $\neg (A \rightarrow C \rightarrow D)$.

$$f(C \rightarrow H \rightarrow I) = 2$$

$f(C \rightarrow H \rightarrow I)$ is chosen as minimum cost

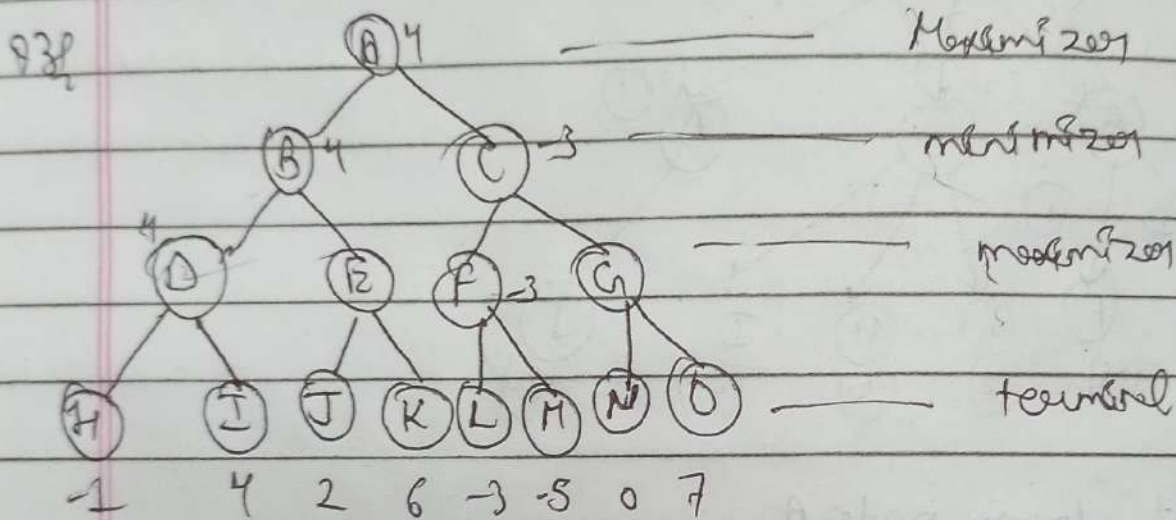
$$f(A \rightarrow J) = 1$$

because if 0 updated to 1.

Now, again calculate cost $f(A \rightarrow C \rightarrow D)$

$$2 + 1 + 1 + 1 = 5$$

Solved path, $f(A \rightarrow C \rightarrow D)$



Apply alpha-beta pruning

Ans

4.