

Course Title: Artificial Intelligence

Course Code : CSE401

Id :16CSE049

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Ans. To the question no.: 1

Artificial Intelligence (AI) combines science and engineering in order to build machines capable of intelligent behavior. It brings together work from the fields of philosophy, psychology, and computer science, and contributes to and has drawn on brain science and linguistics. Intelligent robotics is a related discipline in which the machines can manipulate objects in the physical world.

AI as Engineering

AI systems are often thought of as science fiction, but in fact are all around us. AI techniques are used, for example, by credit card companies to notice whether your card has been stolen, by looking for changes in your spending patterns. AI is also used in chess computers; in intelligent agents that search for information on the internet; for scheduling the observations of the Hubble space telescope; and for helping doctors diagnose illnesses. Robots were used to help clean up after the Chernobyl nuclear power disaster. Even your pocket calculator could be said to be AI - 100 years ago, no one would have expected a machine to know how to do maths!

In order to build these intelligent machines AI uses many techniques. Expert Systems use the specialist knowledge that people like doctors and lawyers have in order to assist other people by giving advice on those subjects. Machine Learning is the study of how computers and robots can learn from their experience. Neural Networks are computers that work a little bit like brains (see BRAIN, MENTAL PROCESSES). Natural Language studies human languages, like English or Japanese, by trying to teach computers to understand them.

AI as Science

Surprisingly, tasks which we find hard, computers find easy and vice versa. Although we can write chess playing programs that compete for the world championship it is difficult to build a robot that can walk or catch a ball. Computers can do calculus, but they can't learn to talk as well as a two-year-old child. Trying to understand why this might be is the scientific side of AI - it is the attempt to understand our own intelligence.

We can use intelligent machines to help us answer these questions about what intelligence is, and how it works. When we think we understand how a mental process works in a human or an animal, we can model it on a computer and see if our theory is correct. Sometimes it turns out to be simpler to test our theories of intelligence by building intelligent machines rather than by analyzing people and animals. In this way AI cooperates with other sciences like psychology, and philosophy of mind, which tries to understand what it means to be human, and how we think.

Ans. To the question no.: 2

The PEAS description of “Chess Game” agent along with mentioning the characteristics of task environments.

Performance measure: winning the game,

Environment: chess-pieces on a chess-board, adversary,

Actuators: screen,

Sensors: camera, keyboard.

Ans. To the question no.: 3.a

There are six glass boxes in a row, each with a lock. Each of the first five boxes holds a key unlocking the next box in line; the last box holds a banana. You have the key to the first box, and you want the banana.

State representation: a glass box which holds a key or a banana

Initial state: first box

as described in the question.

Goal test: you have banana.

Actions: open any box you have the key for, get the contents of any open box.

Transitional model (Successor function): generates new states by applying the actions: a box is opened, or the content has been obtained.

Cost function: number of actions.

Ans. To the question no.: 3.d

A container ship is in port, loaded high with containers. There are 13 rows of containers, each row is 15 containers wide and 5 containers tall. You control a crane that can move to any location above the ship, pick up the container under it, and move it into the dock. You want the ship unloaded.

State representation: each container can be unloaded or not yet

Initial state: all containers stacked on the ship.

Goal test: all containers unloaded.

Actions: move crane to a certain location, pick up a container, put down container.

Transitional model (Successor function): generates new states by applying the actions: the crane is moved to a specific location, a container has been picked up, a container has been put down.

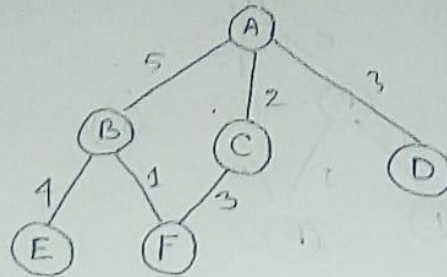
Cost function: time taken to unload ship.

Ans. To the question no. 4 (i)

P-1

Ans. to the ques. no. 1 (i)

① BFS :



Initial :

Open [B, C, D] and close [A]

Item 1 :

Open [B, D] and close [A, C]

Item 2 :

Open [B, D, F] and close [A, C]

Open [B, D] and close [A, C, F]

Open [B] and close [A, C, F, D]

Item 3 :

Open [E] and close [A, C, F, D, B]

Open [] and close [A, C, F, D, B, E]

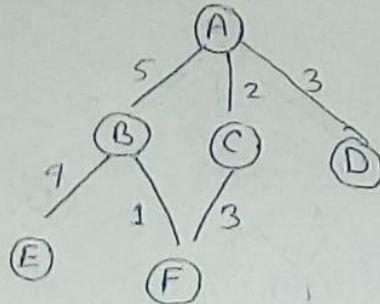
Apply techniques of traversals, all nodes we find that -
 $A \rightarrow C \rightarrow F \rightarrow D \rightarrow B \rightarrow E$.

Ans. To the question no. 4(ii)

[P-2]

Ans. to the ques. no. 4(ii)

(ii) DFS:



Initial : open $[B, C, D]$ and close $[A]$

Item 1 : Open $[B, C]$ and close $[A, D]$

Item 2 : Open $[B, F]$ and close $[A, D, C]$

Item 3 : open $[B]$ and close $[A, D, C, F]$

Item 4 : open $[E]$ and close $[A, D, C, F, B]$

Item 5 : Open $[]$ and close $[A, D, C, F, B, E]$

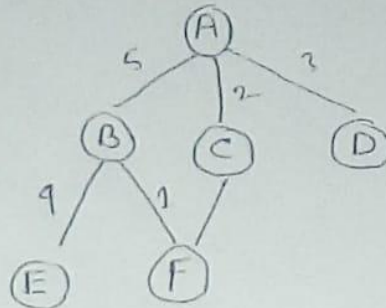
Apply
technique of travers DFS all node, we find
that, $A \rightarrow D \rightarrow C \rightarrow F \rightarrow B \rightarrow E$.

Ans. To the question no. 4(iii)

[P-3]

Ans. to the ques. no. 4(iii)

(iii) UCF :



Initial : Open [B, C, D] and close [A]

Item 1 : Open [B, D, F] and close [A, C]

Open [B, F] and close [A, C, D]

Item 2 :

Open [F, F] and close [A, C, D, B]

Open [E] and close [A, C, D, B, F]

Item 3 :

Open [] and close [A, C, D, B, F, F]

Apply technique of traversing UCF all node, we find that, $A \rightarrow C \rightarrow D \rightarrow B \rightarrow F \rightarrow E$.