Artificial Intelligence

Assignment 01

SE - A

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SHORT ANSWERS

QUESTION NO 01

What is the common definition of "AI"? Do you agree?

ANSWER

- AI, Artificial Intelligence is a branch of computer science that studies and creates computers that can think and behave like humans.
- One must agree with the definition of AI as the field is producing really promising results.

QUESTION NO 02

Do you know of any AI applications?

ANSWER

- Applications of AI are all around us some of the common applications of AI are:
    - Social Media Recommended Ads Algorithms.
    - Optimal Route suggestion in Maps and Navigation i.e., Google Maps.
    - Facial Detection embedded security systems.
    - Text Autocorrect features.
    - Smart Cars.

QUESTION NO 03

Should AI simulate natural intelligence?

ANSWER

Even if AI wanted to, it cannot simulate natural intelligence. Natural Intelligence is a buildup of many little details that AI fails to process. Furthermore, when confronted with little information, AI is incapable of making sensible decisions. And the AI model and agents need to be trained over large data sets to perform some actions when prompted with a similar task.

QUESTION NO 04

What are the criticisms of AI research? Do you agree?

ANSWER

Bias AI: Because AI algorithms are created by humans, people who either purposefully or mistakenly add bias into the algorithm can bring bias into the algorithm. AI algorithms will yield biased results if they are created with a bias or if the training sets, they are given to learn from are biased. *Is this a problem?*

Yes, this is a problem. This reality could lead to unintended consequences like Microsoft's Twitter chatbot that became racist.

Globally Regulated Laws: While technology has made the globe a smaller place than it has ever been, it also means that AI technology will need the development of new rules and regulations among various nations to allow for safe and successful worldwide interactions. *Is this a Problem?*

Yes. Because we are no longer separated from one another, actions and judgments relating to artificial intelligence in one nation might easily hurt others.

QUESTION NO 05

Explain the meaning of logic? reasoning? ontology?

ANSWER

Logic: Logic is a proper way of thinking about something.

Reasoning: Thinking about something logically and sensibly.

Ontology: It is a branch of metaphysics concerned with the concepts of existence and reality.

QUESTION NO 06

Why and how Probabilistic and statistical methods are used in AI?

ANSWER

- Probability and Statistics methods are used in making the prediction models in AI, and AI ML is all about predictions based on the information present at the given moment.
- Machine Learning is All Math and Code, and probability and statistics can be considered a pre-requisite for ML. Statistics is the basis of AI. AI agents need this knowledge to train themselves and improve their accuracy.

QUESTION NO 07

What are the major research approaches/schools in AI?

ANSWER

Reactive Machines: Most basic applications of AI are reactive machines, these machines are not fed training sets for future references, based on the previous move made, the machine decides the next move.

Limited Memory: Self-Driving cars are the perfect example of Limited Memory AI Applications. Over time, these machines are fed with data and trained on the speed and direction of other cars, lane markings, turns off the road, and other factors.

Theory of Mind: Theory of mind is a concept where bots will understand and react to human emotion, and thoughts. However, we are not there yet.

Self-Awareness: These machines are one step ahead of feeling emotions, these are machines built with self-awareness.

DESIGN AND APPLICATION

QUESTION

Design an application that employs Artificial Intelligence, for example, An automated taxi driver, a part picking robot, etc. Also mention, discuss, and reason about the respective Environment type, Agent type, and PEAS for your application.

ANSWER

Camera Embedded Gesture Controlled Drone

Percepts: Motion sensor, Accelerometers, Gyroscopes, GPS, 4 Directional Photodiodes, Tilt sensors, Magnetic Sensors, Sonar, Flow Intake sensors.

Actions: Accelerate, Follow, Brake, Steer, Capture Image, Record Videos.

Agent: Goal-based.

Goal: Minimize the human efforts in capturing images and videos from difficult angles, Maintain Aerial safety. Provide Aerial View.

Environment: Freeways, Highways, Indoors, Traffics, Weather

BLIND SEARCH

QUESTION

What is a blind search? Discuss a few blind search methods.

ANSWER

Blind Search: Blind Search method is also known as the uninformed search method, where the data is searched without any information about the search space. It searches each node of the search tree until the goal node is achieved.

Blind Search Methods:

1. Breath First Search:
   This algorithm selects a single node (initial or source point) in a graph and then visits all the nodes adjacent to the selected node. Once the algorithm visits and marks the starting node, then it moves towards the nearest unvisited nodes and analyses them.
2. Depth First Search:
   The algorithm starts at the root node and explores each branch before going backward. When a dead-end appears in any iteration, it uses a stack data structure to remember, get the next vertex, and start a search.
3. Uniform Cost Search:
   A variant of the Dijkstra search algorithm that finds a path from the source to the destination by minimizing the total cost. Starting at the root, nodes are extended according to the lowest cumulative cost.

ALGORITHM

QUESTION

Write an algorithm that implements Iterative Deepening Depth First Search (IDDS) on any given graph.

ANSWER

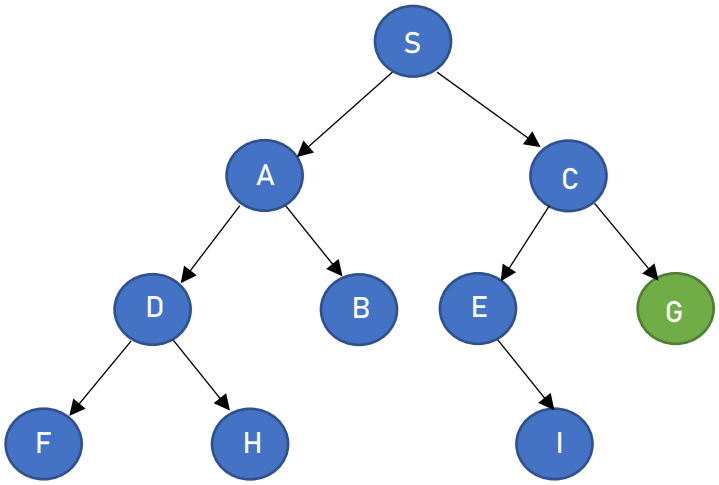
Iterative Deepening Depth First Search is a combination of both - DFS and BFS.

Initially, the Depth Limit is 0, and is increased by 1 in each iteration of the Goal node is not found.

<u>Algorithm</u>

1. Start from the initial node at level 0.
2. Check if the goal node is found at this level using DFS.
   - If found, return TRUE.
   - Else Return False.
3. Increase the Depth limit by 1 and repeat the step [1,2].
4. If limit == Max_Depth
   - If Goal == Not Found, return FALSE (Goal node not in the tree)

Example of IDDS



Start Node = S , Goal Node = G

Level 0 => S (Goal Node not Found)

Level 1 => S → A → C (Goal Node not Found)

Level 2 => S → A → D → B → C → G (Goal Node FOUND)

HEURISTICS

QUESTION

What is meant by heuristics? How do heuristics facilitate to implementation of informed searching?

ANSWER

Heuristics can be defined as a technique that is used to solve problems quickly. A computer that uses heuristics finds an approximate solution, instead of an exact solution.

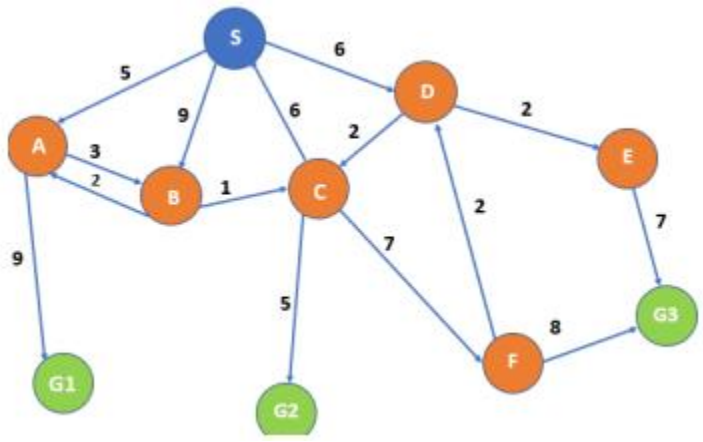
These are shortcuts to solutions.

The heuristics function is used in the implementation of informed searching as it finds the most promising path. It takes the current state as an input and returns the estimation of how close the agent is to the Goal.

UNIFORM COST SEARCH

QUESTION

Use Uniform Cost Search (UCS) Strategy to find the traversal for the following graph. Show all iterations.



ANSWER

Node	S	A	B	C	D	E	F	G1	G2	G3
S	-	5	9	∞	6	∞	∞	∞	∞	∞
SA	-	-	8	∞	6	∞	∞	14	∞	∞
SAD	-	-	8	8	-	8	∞	14	∞	∞
SADB	-	-	-	8	-	8	∞	14	∞	∞
SADBC	-	-	-	-	-	8	13	14	13	∞
SADBCE	-	-	-	-	-	-	13	14	13	15
SADBCEF	-	-	-	-	-	-	-	14	13	15

Path: [S] → [D] → [C] → [G2]

Minimum Cost: [13]