Artificial Intelligence & Soft Computing Viva Questions

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Introduction

1.Define Agent, PEAS

Ans: Agent: An agent is anything in environment which is capable of acting upon the information it perceives. And an Intelligent agent is agent is capable of making decisions about how it acts, based on experience.

PEAS: PEAS stands for Performance Measures, Environment, Actuators, and Sensors. It is a short form used for performance issues grouped under task environment

a) Performance -> It judges the performance of an agent.
b) Environment -> Real environment where the agent works. It basically consists of all the things under which the agents work.
c) Actuator -> Output of the agent. They are tools or equipment's to perform an action.
d) Sensor -> Input to the agent. They are tools or equipment's that capture the state of the environment.

2.What is Artificial Intelligence?

Ans: a)b)Artificial Intelligence is intelligent entity created by humans.
b)It is Capable of performing tasks intelligently without being explicitly instructed.
c)And also Capable of thinking and acting rationally and humanely.

3.What are the applications of Artificial Intelligence?

Ans: **a) Google Search Engine:** When we start writing something on the google search engine, we immediately get the relevant recommendations from google, and this is because of different AI technologies.
b) Ridesharing Applications: Different ride-sharing applications such as Uber uses AI and machine learning to determine the type of ride, minimize the time once the car is hailed by the user, price of the ride, etc.
c) Spam Filters in Email: The AI is also used for email spam filtering so that you can get the important and relevant emails only in your inbox. As per the studies, Gmail successfully filters 99.9% of spam mails.
d) Social Networking: Different social networking sites such as Facebook, Instagram, Pinterest, etc., use the AI technology for different purposes such as face recognition and friend suggestions, when you upload a photograph on Facebook, understanding the contextual meaning of an emoji in Instagram, and so on.
e) Product recommendations: When we search for a product on Amazon, we get the recommendation for similar products, and this is because of different ML algorithms. Similarly, on Netflix, we get personalized recommendations for movies and web series.

4.Types of Environments, Agent?

Ans: Types of Environments:
a) Fully observable (vs Partial observable)
b) Single agent (vs multi agent)
c) Deterministic (vs stochastic)
d) Episodic (vs Sequential)
e) Static (vs Dynamic)
f) Discrete (vs Continuous)
g) Known (vs Unknown)

Types of Agents:
a) Simple reflex agent

b) Model-based reflex agent
c) Goal-based agents
d) Utility-based agents
e) Learning agent

5.Explain soft computing and hard computing

Ans: **Soft Computing** could be a computing model evolved to resolve the non-linear issues that involve unsure, imprecise and approximate solutions of a tangle. These sorts of issues square measure thought of as real-life issues wherever the human-like intelligence is needed to resolve it.

Hard Computing is that the ancient approach employed in computing that desires Associate in Nursing accurately declared analytical model. the outcome of hard computing approach is a warranted, settled, correct result and defines definite management actions employing a mathematical model or algorithmic rule. It deals with binary and crisp logic that need the precise input file consecutive. Hard computing isn't capable of finding the real-world problem's solution.

6.What is Rational Agent?

Ans: T If an Agent makes a decision based on some logical reasoning, then the decision is called Rational decision. A Rational agent is which does "right" things and acts rationally so as to achieve best outcomes even there is uncertainty in knowledge based on his/her experience

Problem Solving

1.What do mean by problem solving agent?

Ans: The problem-solving agent performs precisely by defining problems and several solutions. So we can say that problem solving is a part of artificial intelligence that encompasses a number of techniques such as a tree, B-tree, heuristic algorithms to solve a problem

2.Explain DFS, DLS, DFID

Ans: Depth-first search (DFS) is an algorithm for searching a graph or tree data structure. The algorithm starts at the root (top) node of a tree and goes as far as it can down a given branch (path), then backtracks until it finds an unexplored path, and then explores it. The algorithm does this until the entire graph has been explored.

Depth-limited search (DLS) method is almost equal to depth-first search (DFS), but DLS can work on the infinite state space problem because it bounds the depth of the search tree with a predetermined limit L. Nodes at this depth limit are treated as if they had no successors.

Depth first Iterative Deepening is an iterative graph searching strategy that takes advantage of the completeness of the Breadth-First Search (BFS) strategy but uses much less memory in each iteration (similar to DFS)

3.what is informed and uninformed/blind search?

Ans: Informed Search algorithms have information on the goal state which helps in more efficient searching. This information is obtained by a function that estimates how close a state is to the goal state. Eg:- Best first search, Graph search, A* search

Uninformed search algorithms have no additional information on the goal node other than the one provided in the problem definition. The plans to reach the goal state from the start state differ only by the order and length of actions. Eg:- Breadth first, depth first, depth limited, bidirectional search

4.Explain A* Algorithm?

Ans: It is a variation of Breadth first search where the evaluation of node not only depends on the heuristic value of the node but also considers its distance from the start node. It is most widely form of BFS, A* Algorithm is also called as OR graph/tree search algorithm.

5.Explain Hill climbing Algorithm and its types.

Ans: Hill climbing algorithm is a local search algorithm which continuously moves in the direction of increasing elevation/value to find the peak of the mountain or best solution to the problem. It terminates when it reaches a peak value where no neighbour has a higher value.

Types of Hill Climbing Algorithm
✓ Simple hill Climbing
✓ Steepest-Ascent hill-climbing: Types of Hill Climbing Algorithm
✓ Stochastic hill Climbing

6.Explain Stimulated annealing

Ans: Stimulated annealing is a variation of hill climbing algorithm. In stimulated annealing we are actually going downhill and the heuristic function is minimal heuristic. The final state is the one with minimum value, and rather than climbing up in this case we are descending the valley

Knowledge, Reasoning and Planning

What is Prolog in AI?

Ans: Prolog, which is short for programming logic, is a programming language used in creating artificial intelligence. Prolog is classified as a logic programming language and relies on the user to specify the rules and facts about a situation along with the end goal, otherwise known as a query.
Adv: Easy to build database. Doesn't need a lot of programming effort. It has built in list handling. Makes it easier to play with any algorithm involving lists.
Dadv: LISP (another logic programming language) dominates over prolog with respect to I/O features. Sometimes input and output is not easy.

2.What is Knowledge Engineering?

Ans: The process of constructing a knowledge-base in first-order logic is called as knowledge- engineering. In knowledge-engineering, someone who investigates a particular domain, learns important concept of that domain, and generates a formal representation of the objects, is known as knowledge engineer.

3.Explain Forward chaining and Backward chaining.

Ans: **Forward chaining** starts from known facts and applies inference rule to extract more data unit it reaches to the goal. It is a bottom-up approach. Forward chaining is suitable for the planning, monitoring, control, and interpretation application. Forward chaining can generate an infinite number of possible conclusions.

Backward chaining starts from the goal and works backward through inference rules to find the required facts that support the goal. It is a top-down approach. Backward chaining is suitable for diagnostic, prescription, and debugging application. Backward chaining generates a finite number of possible conclusions.

4. Explain first order logic with example.

Ans: First-order logic is also called Predicate logic and First-order predicate calculus (FOPL). It is a formal representation of logic in the form of quantifiers. In predicate logic, the input is taken as an entity, and the output it gives is either true or false.

Example: All girls are beautiful.
Solution: Here, we are talking about all girls. It means universal quantifier will be used. The object is girls. Let, y be the girls.
Therefore, it will be represented as **girls(y)? beautiful(y).**

5.Explain Unification and Resolution

Ans: **Unification:** The process of finding legal substitutions that make different logical expressions look identical. The unification algorithm is a recursive algorithm, The problem of unification is, given two atoms, to find if they unify and if they unify return MGV(Most general unifier) of them

Resolution is used, if there are various statements are given, and we need to prove a conclusion of those statements. Unification is a key concept in proofs by resolutions. Resolution is a single inference rule which can efficiently operate on the conjunctive normal form or clausal form

6.Define Planning

Ans: The planning in Artificial Intelligence is about the decision-making tasks performed by the robots or computer programs to achieve a specific goal. The execution of planning is about choosing a sequence of actions with a high likelihood to complete the specific task

Fuzzy Logic

1.What is crisp relation and fuzzy relation?

Ans: **Crisp Relation:** A crisp relation is used to represents the presence or absence of interaction, association, or interconnectedness between the elements of more than a set. This crisp relational concept can be generalized to allow for various degrees or strengths of relation or interaction between elements.

Fuzzy Relation: The characteristic function of a crisp relation can be generalized to allow tuples to have degrees of membership. Then a fuzzy relation is a fuzzy set defined on tuples that may have varying degrees of membership within the relation. The membership grade indicates strength of the present relation between elements of the tuple. The fuzzy relation can also be represented by an n-dimensional membership array

2.What do you understand by fuzzy logic?

Ans: Fuzzy logic is a method of encoding human learning for AI. It imitates the decision making process of humans through IF-THEN instances and the digital values of YES and NO. It is based on degrees of truth. Dr. Lotfi Zadeh of the University of California at Berkeley was the first person to put forth the idea of fuzzy logic.

3.Can you state some applications of fuzzy logic? How to solve it?

Ans: Fuzzy logic finds applications in multiple industries. Subway systems, uncrewed vehicles, air conditioners, vacuum cleaners, project risk assessment, and facial pattern recognition are just some of the areas which use fuzzy logic.

4.Explain Fuzzification and Defuzzification.

Ans: **Fuzzification:**
It is the method of transforming a crisp quantity into a fuzzy quantity. This can be achieved by identifying the various known crisp and deterministic quantities as completely nondeterministic and quite uncertain in nature.
Defuzzification:

It is the inversion of fuzzification, there the mapping is done to convert the crisp results into fuzzy results but here the mapping is done to convert the fuzzy results into crisp results.This process is capable of generating a nonfuzzy control action which illustrates the possibility distribution of an inferred fuzzy control action.

5.Define Member function.

Ans: Fuzzy membership function is used to convert the crisp input provided to the fuzzy inference system. Fuzzy logic itself is not fuzzy, rather it deals with the fuzziness in the data. And this fuzziness in the data is best described by the fuzzy membership function.

6.What is Fuzzy Interference System?

Ans: A fuzzy inference system may be a computer paradigm supported by fuzzy set theory, fuzzy if-then rules, and fuzzy reasoning. A nonlinear mapping that derives its output from fuzzy reasoning and a group of fuzzy if-then rules. The mapping domain and range can be multidimensional spaced fuzzy sets or points.

Artificial Neural Network

What is Artificial Neural Network?

Ans: An artificial neural network is an attempt to simulate the network of neurons that make up a human brain so that the computer will be able to learn things and make decisions in a humanlike manner. ANNs are created by programming regular computers to behave as though they are interconnected brain cells.

2.Explain supervised and unsupervised learning.

Ans: Supervised learning is a machine learning method in which models are trained using labelled data. In supervised learning, models need to find the mapping function to map the input variable (X) with the output variable (Y).

Supervised learning needs supervision to train the model, which is similar to as a student learns things in the presence of a teacher.

Supervised learning can be used for two types of problems: Classification and Regression. Unsupervised learning is another machine learning method in which patterns inferred from the unlabelled input data. The goal of unsupervised learning is to find the structure and patterns from the input data. Unsupervised learning does not need any supervision. Instead, it finds patterns from the data by its own.

Unsupervised learning can be used for two types of problems: Clustering and Association.

3.What is an activation function?

Ans: An activation function is a function used in artificial neural networks which outputs a small value for small inputs, and a larger value if its inputs exceed a threshold. If the inputs are large enough, the activation function "fires", otherwise it does nothing. In other words, an activation function is like a gate that checks that an incoming value is greater than a critical number

4.What are the types of Activation function?

Ans: a) Unipolar binary
b) Sigmoidal/ Unipolar Sigmoidal
c) Tanh function/ Bipolar Sigmoidal
d) ReLu- Rectified Linear units
e) softmax function

5. What is McCulloch-Pitts Model of Neuron

Ans: : The McCulloch-Pitts neural model, which was the earliest ANN model, has only two types of inputs — Excitatory and Inhibitory. The excitatory inputs have weights of positive magnitude and the inhibitory weights have weights of negative magnitude. The inputs of the McCulloch-Pitts neuron could be either 0 or 1.

6.What do you mean by perceptron?

Ans: A Perceptron is a neural network unit that does certain computations to detect features or business intelligence in the input data. It is a function that maps its input “x,” which is multiplied by the learned weight coefficient, and generates an output value ”f(x).

7.Explain different algorithms in Supervised learning?

Ans: Regression, Decision Tree, Random Forest, KNN, Logistic Regression etc.

8.Explain different algorithms in Unsupervised learning?

Ans: Unsupervised learning algorithms include clustering, anomaly detection, neural networks, etc.

9.What is Biological Neural Network?

Ans: Biological Neural Network (BNN) is a structure that consists of Synapse, dendrites, cell body, and axon. In this neural network, the processing is carried out by neurons. Dendrites receive signals from other neurons, Soma sums all the incoming signals and axon transmits the signals to other cells.

Expert System

1.What do you mean by an expert system? What are its qualities?

Ans: An expert system is an AI-based program that has a lot of knowledge (expert-level) of a particular field. This program can use its expertise to solve real problems as well. Expert systems are capable of replacing human experts in their areas.

The qualities of an AI expert system are:
Reliable
Fast
Productive
Understandable

2.List the advantages of an expert system.

Ans: 1).Consistency
2).Memory
3).Diligence
4).Logic
5).Multiple expertise
6).Ability to reason
7.)Fast response
8.)Unbiased in nature

3.What is a hybrid system?

Ans: A Hybrid system is an intelligent system that is framed by combining at least two intelligent technologies like Fuzzy Logic, Neural networks, Genetic algorithms, reinforcement learning, etc. These systems are capable of reasoning and learning in an uncertain and imprecise environment.

4.What are the types of hybrid system?

Ans: Types of Hybrid Systems are:
1) Neuro-Fuzzy Hybrid systems
2) Neuro Genetic Hybrid systems
3) Fuzzy Genetic Hybrid systems

5.What are the components of expert systems.

Ans: There are 5 Components of expert systems:
- Knowledge Base
- Inference Engine
- Knowledge acquisition and learning module
- User Interface
- Explanation module

6.Explain Forward chaining in expert system.

Ans: Forward chaining is a method of reasoning in artificial intelligence in which inference rules are applied to existing data to extract additional data until an endpoint (goal) is achieved. An endpoint (goal) is achieved through the manipulation of knowledge that exists in the knowledge base

7.Explain Backward chaining in expert system.

Ans: Backward chaining is a concept in artificial intelligence that involves backtracking from the endpoint or goal to steps that led to the endpoint. This type of chaining starts from the goal and moves backward to comprehend the steps that were taken to attain this goal