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FACULTY OF EGINEERING

ARTIFICIAL INTELLIGENCE
LECTURE-09

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OUTLINE

- Search Algorithms in Artificial Intelligence
- Search Algorithm Terminologies
- Properties of Search Algorithms
- Types of search algorithms
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Search Algorithms in Artificial Intelligence

•Search algorithms are one of the most important areas of Artificial Intelligence. This topic will explain all about the search algorithms in AI.

•Problem-solving agents:

•In Artificial Intelligence, Search techniques are universal problem-solving methods. Rational agents or Problem-solving agents in AI mostly used these search strategies or algorithms to solve a specific problem and provide the best result. Problem-solving agents are the goal-based agents and use atomic representation. In this topic, we will learn various problem-solving search algorithms.

Search Algorithm Terminologies

Search: Searching is a step by step procedure to solve a search-problem in a given search space. A search problem can have three main factors:

- **Search Space:** Search space represents a set of possible solutions, which a system may have.
- **Start State:** It is a state from where agent begins the search.
- **Goal test:** It is a function which observe the current state and returns whether the goal state is achieved or not.

Search tree: A tree representation of search problem is called Search tree. The root of the search tree is the root node which is corresponding to the initial state.

Actions: It gives the description of all the available actions to the agent.

Transition model: A description of what each action do, can be represented as a transition model.

Path Cost: It is a function which assigns a numeric cost to each path.

Solution: It is an action sequence which leads from the start node to the goal node.

Optimal Solution: If a solution has the lowest cost among all solutions.

Properties of Search Algorithms

•**Completeness:** A search algorithm is said to be complete if it guarantees to return a solution if at least any solution exists for any random input.

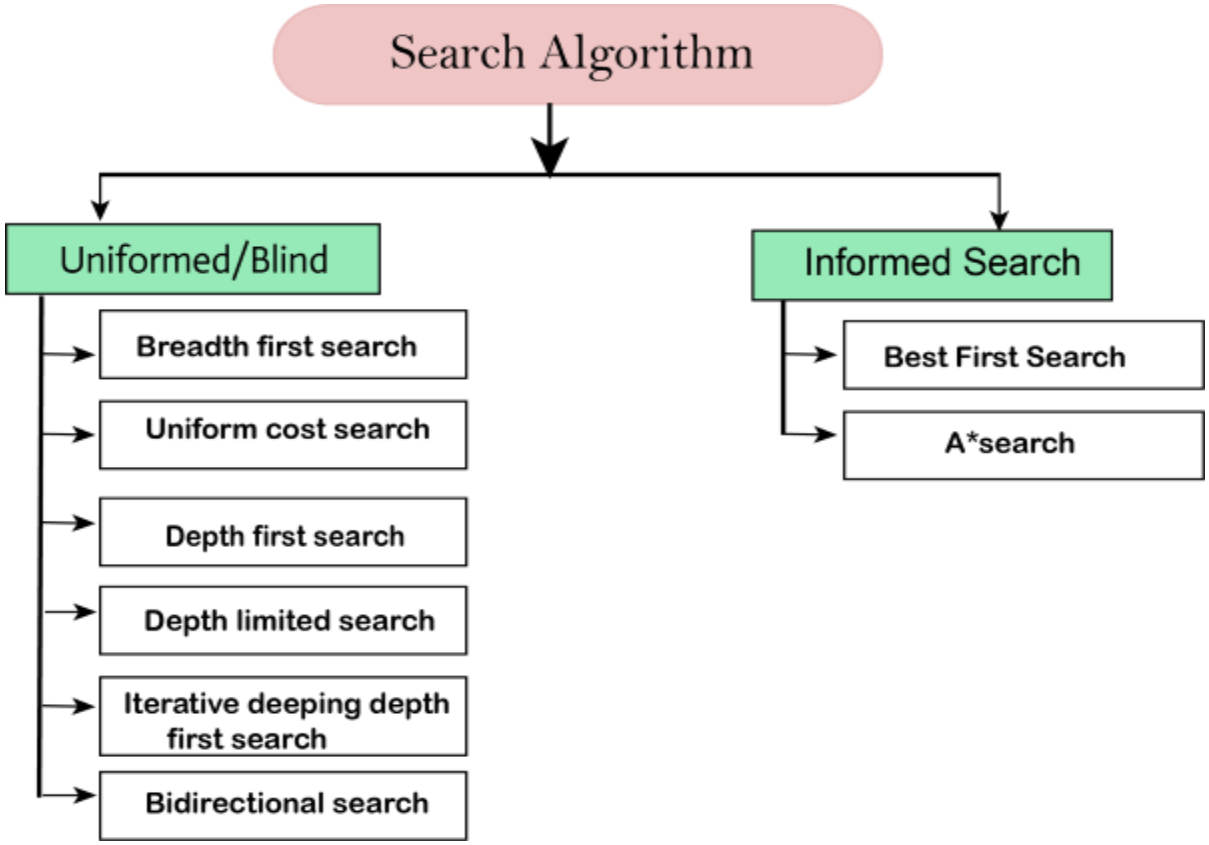
•**Optimality:** If a solution found for an algorithm is guaranteed to be the best solution (lowest path cost) among all other solutions, then such a solution for is said to be an optimal solution.

•**Time Complexity:** Time complexity is a measure of time for an algorithm to complete its task.

•**Space Complexity:** It is the maximum storage space required at any point during the search, as the complexity of the problem.

Types of search algorithms

•Based on the search problems we can classify the search algorithms into uninformed (Blind search) search and informed search (Heuristic search) algorithms.



MCQ

1. Which term is used for describing the judgmental or commonsense part of problem solving?

a) Heuristic

b) Critical

c) Value based

d) Analytical

2. Which stage of the manufacturing process has been described as “the mapping of function onto form”?

a) Design

b) Distribution

c) Project management

d) Field service

3. Which kind of planning consists of successive representations of different levels of a plan?

a) hierarchical planning

b) non-hierarchical planning

c) project planning

d) all of the mentioned

MCQ

4. What was originally called the “imitation game” by its creator?

a) The Turing Test

b) LISP

c) The Logic Theorist

d) Cybernetics

5. Decision support programs are designed to help managers make _____

a) budget projections

b) visual presentations

c) business decisions

d) vacation schedules

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