SNS COLLEGE OF ENGINEERING

Kurumbapalayam (Po), Coimbatore – 641 107

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Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai

## DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING-IOT Including CS&BCT

COURSE NAME :**19SB601 ARTIFICIAL INTELLIGENCE AND NATURAL LANGUAGE PROCESSING**

III YEAR / VI SEMESTER

Unit I-INTRODUCTION TO ARTIFICIAL INTELLIGENCE& INTELLIGENT SYSTEMS

Topic : Problem Solving by Searching

15-03-2023

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ARTIFICIAL INTELLIGENT

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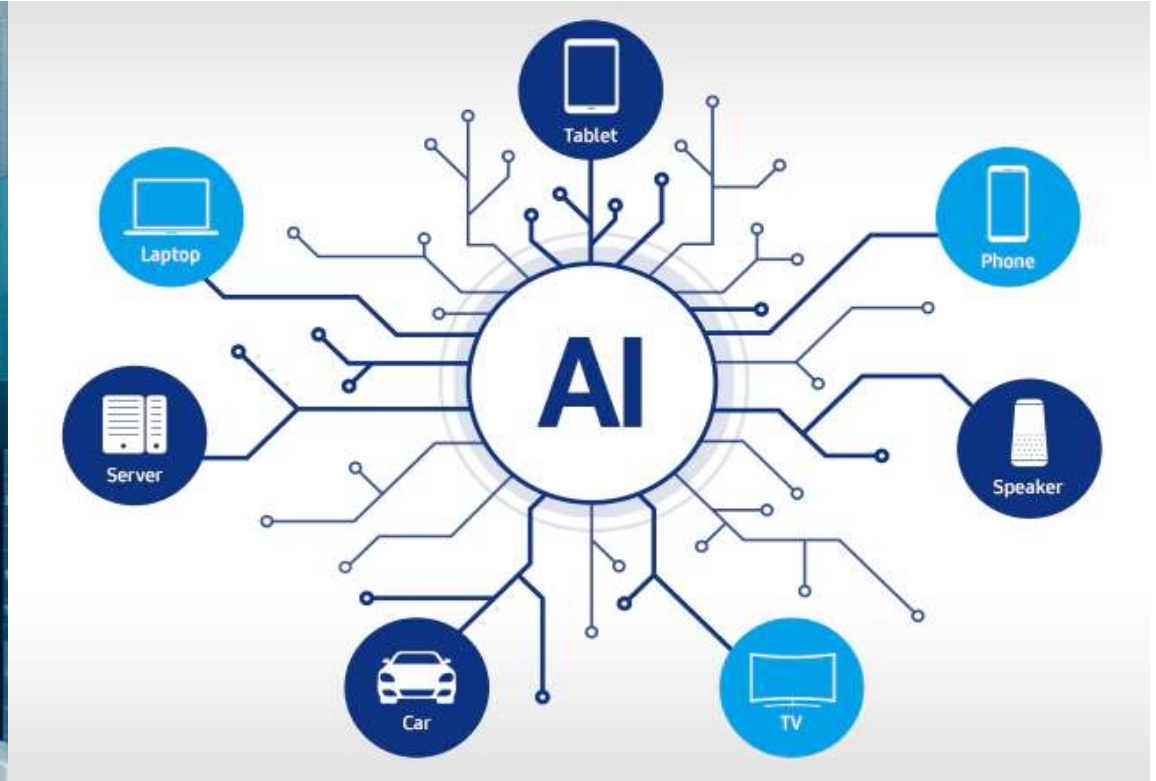
Definition

➢ Artificial intelligence techniques, including **various techniques** such as forming **efficient algorithms** and **performing root cause analysis** to find desirable solutions.

➢ In artificial intelligence, problems can be solved by using **searching algorithms, evolutionary computations, knowledge representations**, etc.

Problem-solving searching

The process of problem-solving using searching consists of the following steps.

- Define the problem
- Analyze the problem
- Identification of possible solutions
- Choosing the optimal solution
- Implementation

Properties of search algorithms

Completeness (when it gives a solution)

A search algorithm is said to be complete **when it gives a solution** or returns any solution for a given random input.

Optimality (best solution found)

If a **solution found is best** (lowest path cost) among all the solutions identified, then that solution is said to be an optimal one.

Time complexity

The **time taken** by an algorithm to **complete its task** is called time complexity. If the algorithm completes a task in a lesser amount of time, then it is an efficient one.

Space complexity

It is the maximum storage or memory taken by the algorithm at any time while searching.

These properties are also used to compare the efficiency of the different types of searching algorithms.

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Types of search algorithms

Based on the search problems, we can classify the search algorithm as

•Uninformed search

•Informed search

Uninformed search algorithms

➢ The uninformed **search algorithm does not have any domain knowledge** such as closeness, location of the goal state, etc.

➢ it behaves in a brute-force way.

➢ It only knows the information about how to traverse the given tree and how to find the goal state. This algorithm is also known as the Blind search algorithm or Brute -Force algorithm.

The uninformed search strategies are of six types.
They are-

- Breadth-first search

- Depth-first search

- Depth-limited search

- Iterative deepening depth-first search
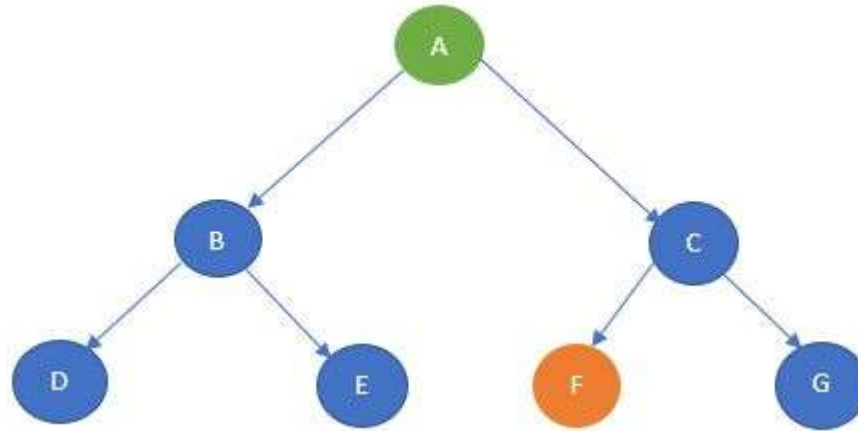
- Bidirectional search
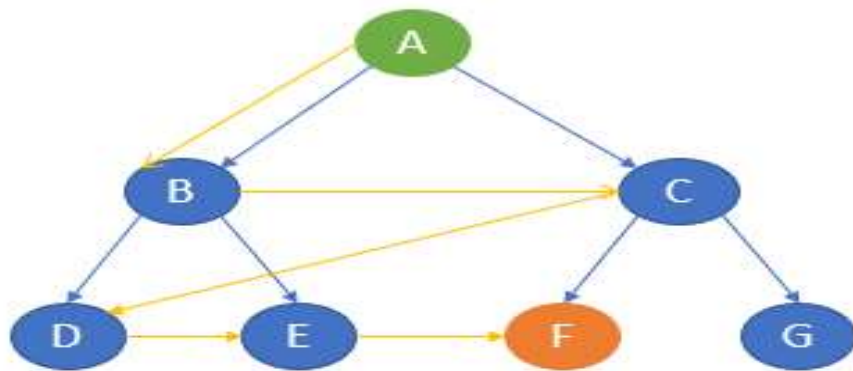
- Uniform cost search

Breadth-first search

➢ It is of the most common search strategies.

➢ It generally starts from the root node and examines the neighbor nodes and then moves to the next level.

➢ It uses First-in First-out (FIFO) strategy as it gives the shortest path to achieving the solution.

➢ BFS is used where the given problem is very small and space complexity is not considered.

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Now, consider the following tree.

Source: Author

➤ Here, let's take node A as the start state and node F as the goal state.

➤ The BFS algorithm starts with the start state and then goes to the next level and visits the node until it reaches the goal state.

➤ In this example, it starts from A and then travel to the next level and visits B and C and then travel to the next level and visits D, E, F and G.

➤ Here, the goal state is defined as F. So, the traversal will stop at F.

The path of traversal is:

A —-> B —-> C —-> D —-> E —-> F

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Advantages of BFS

➢ BFS will never be trapped in any unwanted nodes.
➢ If the graph has more than one solution, then BFS will return the optimal solution which provides the shortest path.

Disadvantages of BFS

➢ BFS stores all the nodes in the current level and then go to the next level. It requires a lot of memory to store the nodes.

➢ BFS takes more time to reach the goal state which is far away.

Thank you ....