1.4 SEARCH STRATEGIES

There are two types of strategies that describe a solution for a given problem:

1. ***Uninformed Search (Blind Search)***

This type of search strategy does not have any additional information about the states except the information provided in the problem definition. They can only generate the successors and distinguish a goal state from a non-goal state. These type of search does not maintain any internal state, that's why it is also known as **Blind search.**

There are following types of uninformed searches:

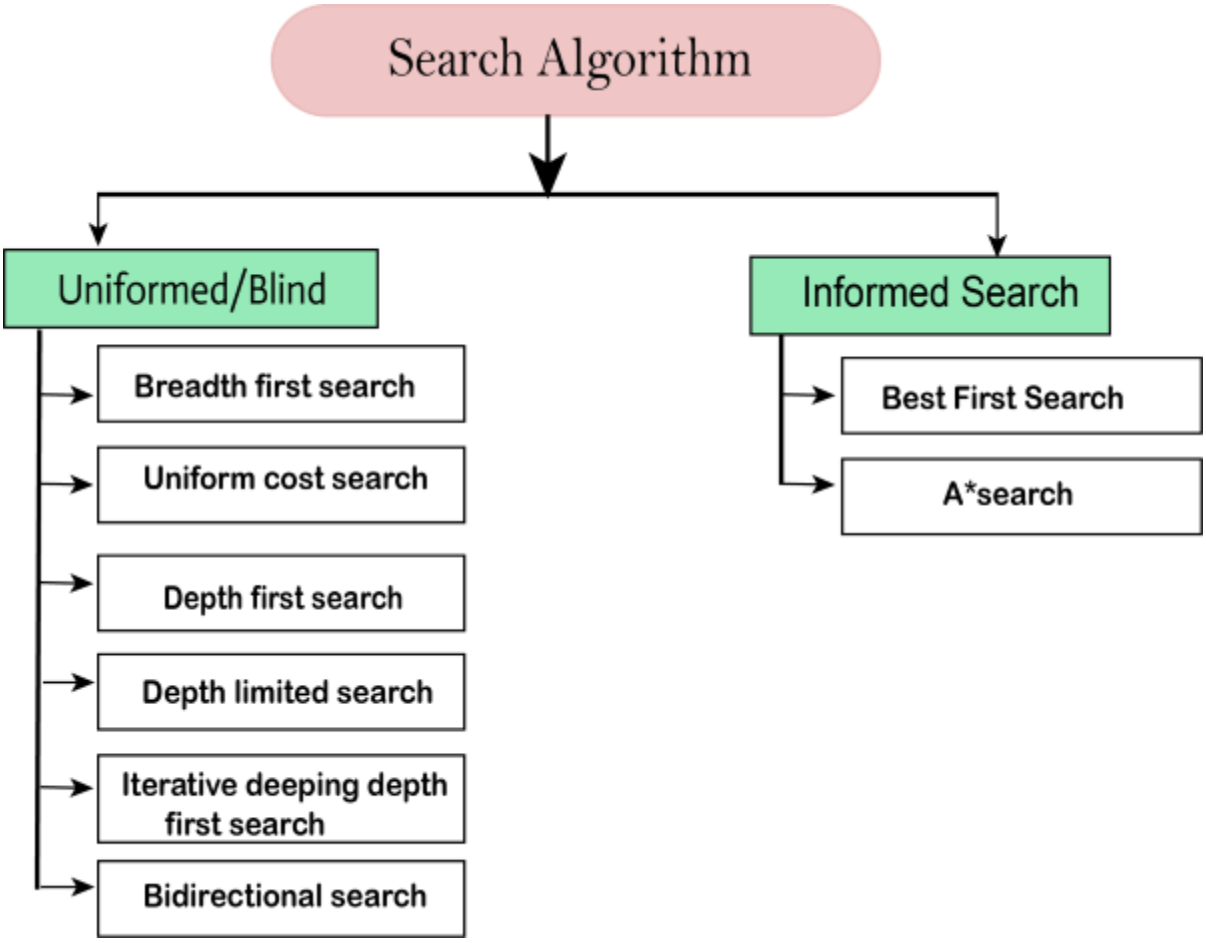
- Breadth-first search
- Uniform cost search
- Depth-first search
- Depth-limited search
- Iterative deepening search
- Bidirectional search

2. ***Informed Search (Heuristic Search)***

This type of search strategy contains some additional information about the states beyond the problem definition. This search uses problem-specific knowledge to find more efficient solutions. This search maintains some sort of internal states via heuristic functions (which provides hints), so it is also called **heuristic search.**

There are following types of informed searches:

- Best first search (Greedy search)
- A* search



Search Algorithm Terminologies:

- **Search:** Searchingis a step by step procedure to solve a search-problem in a given search space. A search problem can have three main factors:
    a. **Search Space:** Search space represents a set of possible solutions, which a system may have.
    b. **Start State:** It is a state from where agent begins **the search**.
    c. **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:

Following are the four essential properties of search algorithms to compare the efficiency of these 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.