Search Problem

Search is a problem-solving technique to explores successive stages in problem solving process.

Search Space

- a space to search in to find a problem solution
- To successfully design and implement search algorithm, we must be able to analyze and predict its behavior.

State Space Search

One tool to analyze the search space is to represent it as space graph

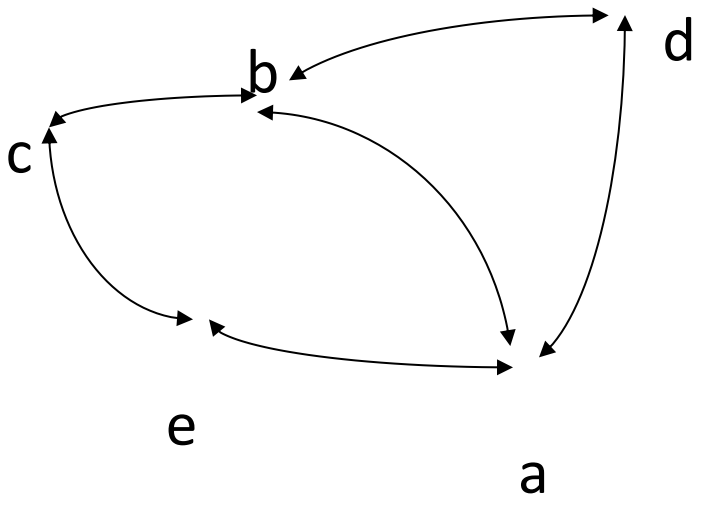
Graph Theory

A graph consists of a set of nodes and a set of arcs or links connecting pairs of nodes.

Or

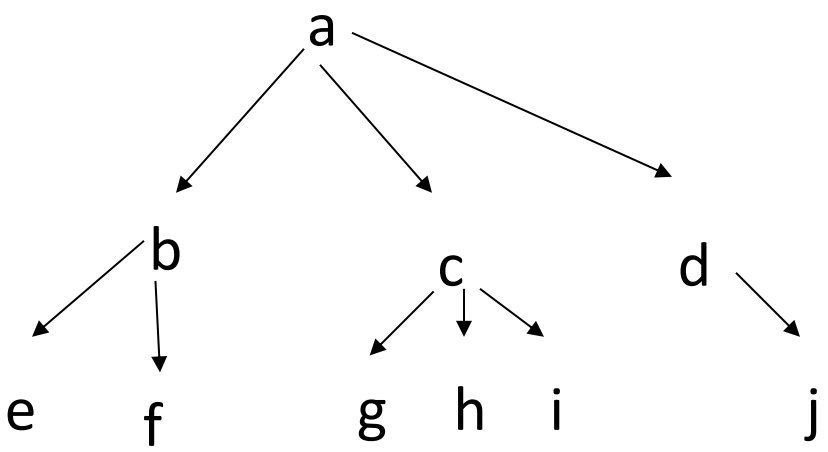
inks connecting pairs of nodes

Nodes = {a, b, c, d, e}
Arcs = {(a,b), (a,d), (b,c),….}



Trees

A tree is a graph in which two nodes have at most one path between them



Difference between TREE & GRAPH

TREE :	GRAPH:
Only one path exist between two vertices (Nodes).	More than one path is allowed between two vertices.
Root node is the starting node of the tree.	There is no root node concept (we can start from any node).
Tree doesn't have loops.	There can be loop in graph.
Number of edges: n-1 (where n is number of nodes)	Number of edges are not defined.
Tree looks like Hierarchicalaa	Graph looks like Network.
All trees are graph.	All graphs are not tree.
A video explain Tree And Graph Important Differences	

How Human think (tic – tac – toe)

(7.55) الدقيقة

الجزء اللي جي بيخص البيئة اللي حنبحث فيها فأما البيئة تكون

(Nondeterministic) أو (Deterministic)

Deterministic

- **fully observable**

single-state problem

- **Non-observable**

Sensor less problem

– Problem-solving may have no idea where it is; solution is a sequence

Nondeterministic

partially observable Unknown state space

انا لاقيت المصدر دة اللي بيشرح

https://www.youtube.com/watch?v=yHXatUO6h28

There are two kinds of search algorithm

Complete	*Incomplete*
guaranteed to find solution or prove there is none	may not find a solution even when it exists • often more efficient (or there would be no point)
A search algorithm is *complete* if whenever there is at least one solution the algorithm **is guaranteed to find it** within a finite amount of time A search algorithm is optimal if when it finds a solution, it is the best one	

Key concepts in search

- **Cost function**

that determines the cost of each action

or

path = sequence of actions

- **Solution:**

path from initial state to a goal state

- **Optimal solution:**

solution with minimal cost

forward chaining & Data-Driven search &Forward versus

A form of reasoning which starts with atomic sentences in the knowledge base and applies inference rules in the forward direction to extract more data until a goal is reached.

backward chaining & Goal-Driven search & backward reasoning

A backward chaining algorithm is a form of reasoning, which starts with the goal and works backward, chaining through rules to find known facts that support the goal.

وطبعا النظري من غير مثال مينفعش خلينا نفرض

A : it’s sunny

B : wear sunscreen

لو حمشي فورورد حقول

it’s sunny so wear sunscreen

لو حمشي باكورد حقول

He is wearing sunscreen , so it must be sunny

مصدر لو عايز تفهم النقطة دي https://www.youtube.com/watch?v=cxUZ146KjAQ

عرفنا احنا أي دة واي دة عظيم جدا وقت اننا نستخدم دة امتى ودة امتى

Data-Driven search	Goal-Driven Search
All or most data are given	The goal is given in the problem
There are a large number of potential goals	There exist a large number of rules
It is difficult to form a goal	Problem data are not given

كدة هرسنا الموضوع دة نخش بقى في غيرة يارب نخلص

Searching Algorithm :

-Blind Search Algorithm (also called an uninformed search) :

is a search that has no information about its domain or nature of the problem.

Example:

1.Breadth-First Search

2.Depth-First Search

-Heuristic Search Algorithm (also called an informed or directed search):

have further information about the cost of the path between any state in search space and the goal state.

Example:

1.Best-First Search

2.A-Star (A*)

3.Tabu Search