GATE

Artificial Intelligence

Un-Informed search

Lecture No.- 01

By- Aditya sir

Topics to be Covered

Topic — Intro

Topic — Syllabus: AI

Topic — Searching Algos

About Aditya Jain sir

77.33/100 -ve -0.66

1. Appeared for GATE during BTech and secured AIR 60 in GATE in very first attempt - City topper
2. Represented college as the first Google DSC Ambassador.
3. The only student from the batch to secure an internship at Amazon. (9+ CGPA)
4. Had offer from IIT Bombay and IISc Bangalore to join the Masters program
5. Joined IIT Bombay for my 2 year Masters program, specialization in Data Science
6. Published multiple research papers in well known conferences along with the team
7. Received the prestigious excellence in Research award from IIT Bombay for my Masters thesis in ML
8. Completed my Masters with an overall GPA of 9.36/10
9. Joined Dream11 as a Data Scientist
10. Have mentored 15,000+ students & working professions in field of Data Science and Analytics
11. Have been mentoring & teaching GATE aspirants to secure a great rank in limited time
12. Have got around 27.5K followers on Linkedin where I share my insights and guide students and professionals.

IITB IISc

NLM → MT

2021 25 AI

Telegram

Telegram Link for Aditya Jain sir:
https://t.me/AdityaSir_PW

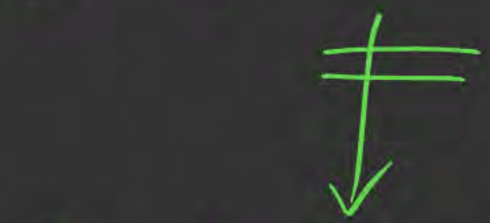
Tomorrow onwards: 11:30 AM - 1:30 PM

Topic : Uninformed Search

Syllabus

Search: Informed, Uniformed, adversarial, logic, propositional, predicate reasoning under uncertainty topic –Conditional independence representation, exact inference through variable elimination, and approximate inference through sampling.

What is AI?



Artificial Intelligence

Rancho

Concepts

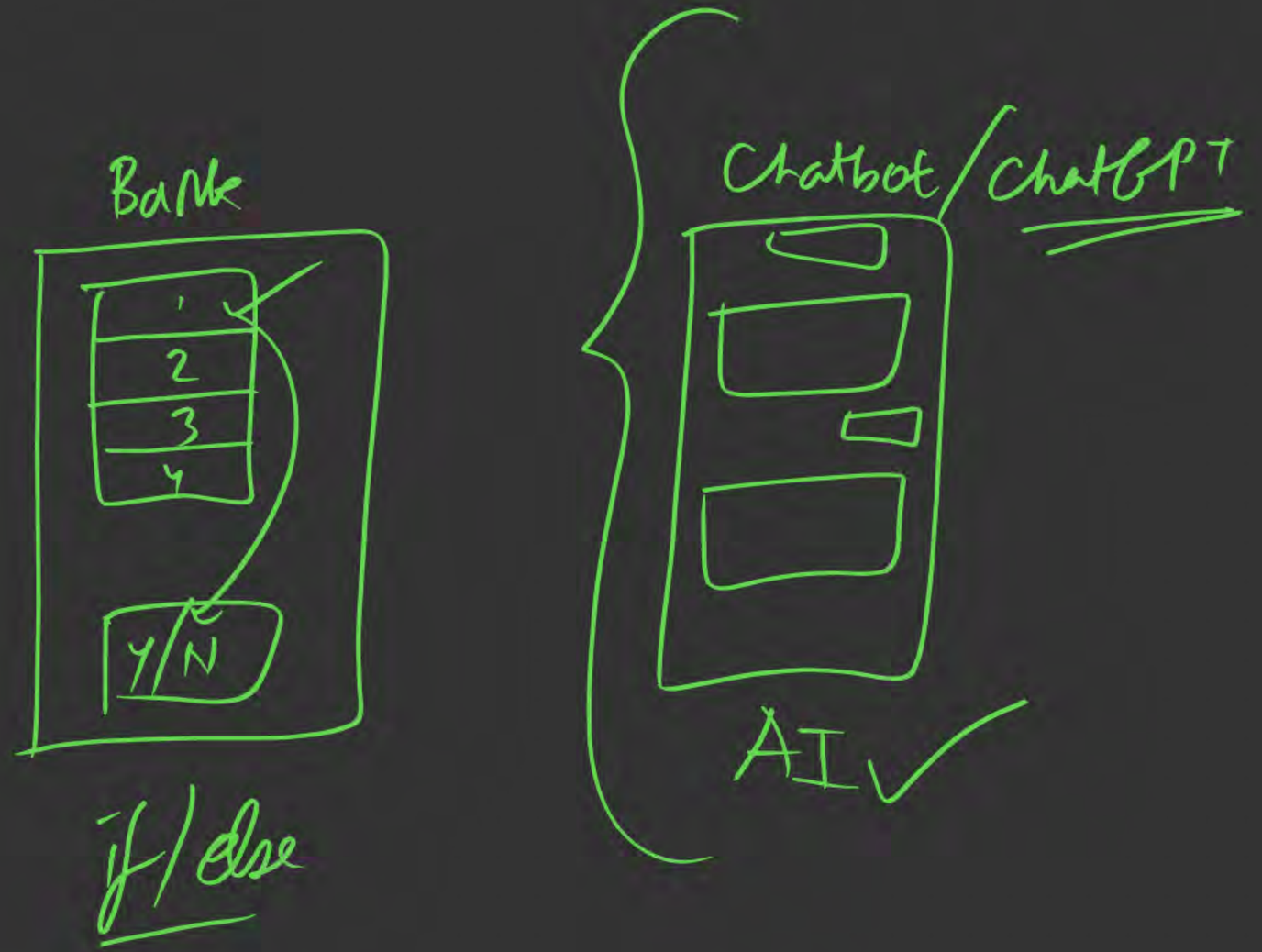
9+6

2+3

Chatur / Silencer

(Speech)

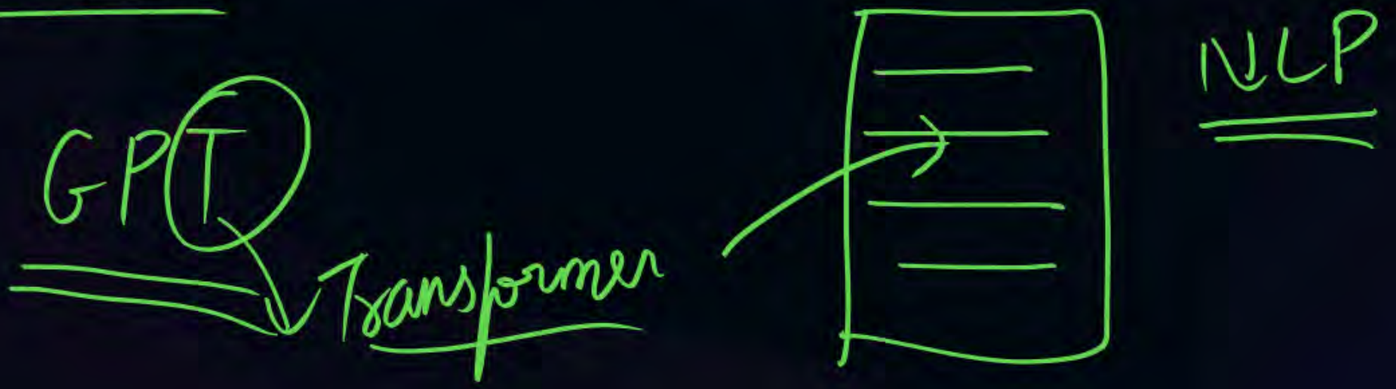
1+1=2

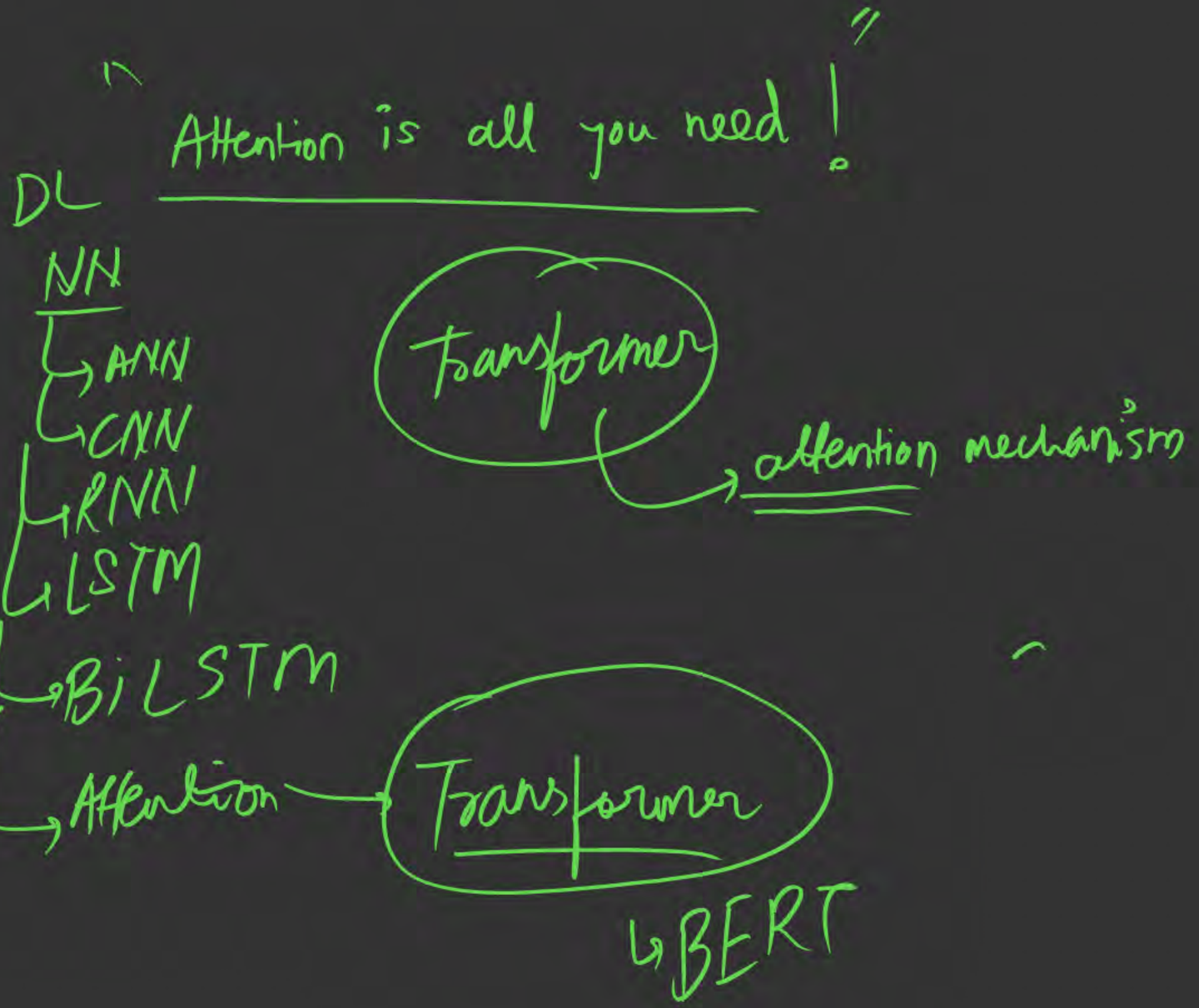

Bank
1
2
3
4
Y/N
if/else
Chatbot/ChatGPT
AI

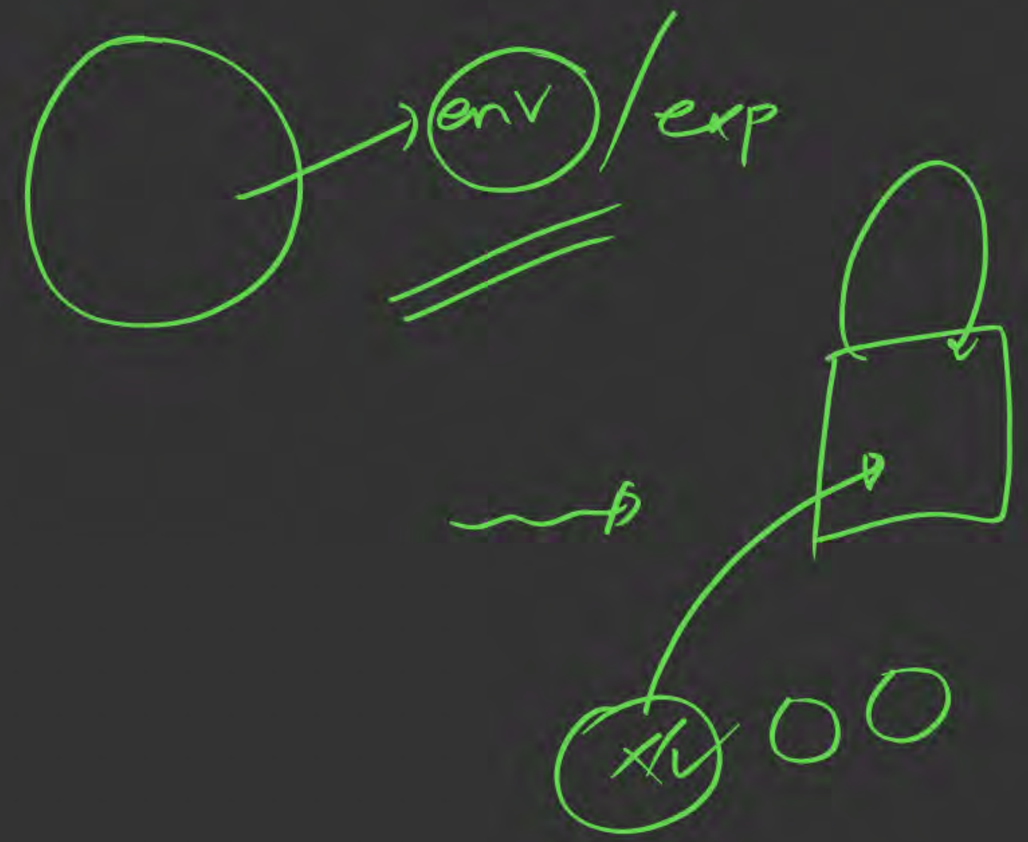
Topic : Uninformed Search

What is Artificial Intelligence ?

- Artificial Intelligence (AI) is a branch of computer science that focuses on creating machines and software capable of performing tasks that typically require human intelligence
- AI can cause a machine to work as human.
- Artificial (man made) and Intelligence (Power of thinking)
- These tasks include learning, reasoning, problem-solving, perception, language understanding, and interaction.



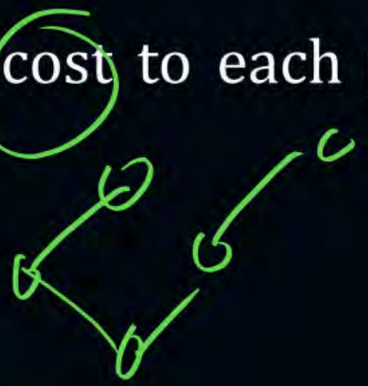

"Attention is all you need!"
DL
NN
ANN
CNN
RNN
LSTM
BiLSTM
Attention
Transformer
attention mechanism
Transformer
BERT


env
exp
b
xv

Topic : Uninformed Search

What is a state and state space...

- **Initial State:** The starting point of the search.
- **Goal State(s):** The desired state(s) that signify a solution.
- **Actions/Operators:** The set of possible actions that can be performed to move from one state to another.
- **Transition Model:** Describes the result of applying an action to a state, leading to a new state.
- **Path Cost:** A function that assigns a cost to each path, helping to find the most efficient solution.

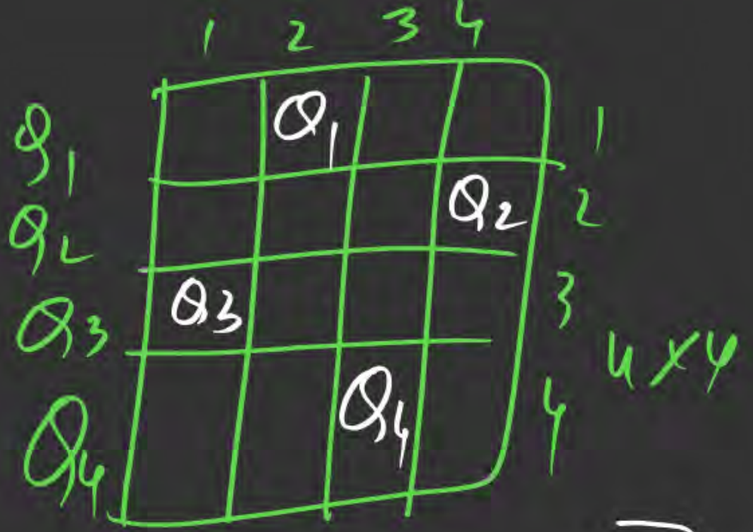


N- Queens Prob:

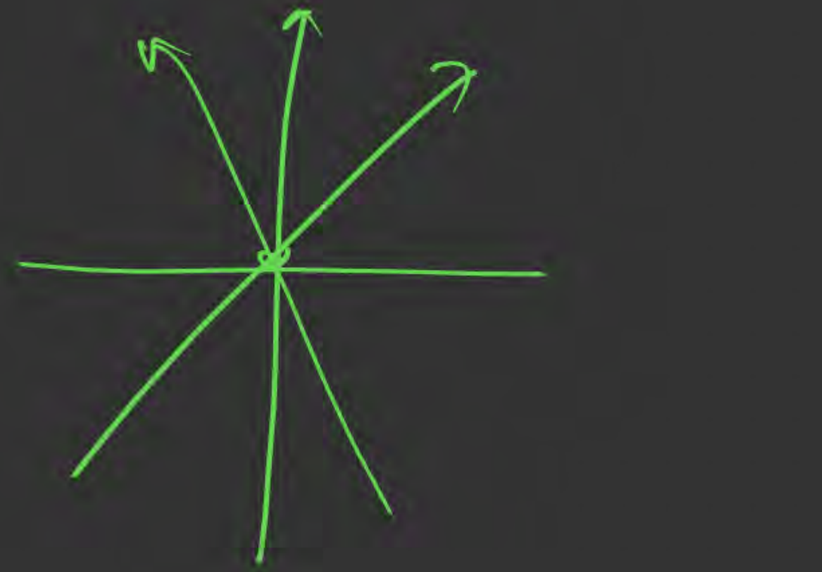
State space

[_ 1 _ 1 _ 1 _ 1 _]

4!



[2, 4, 1, 3]

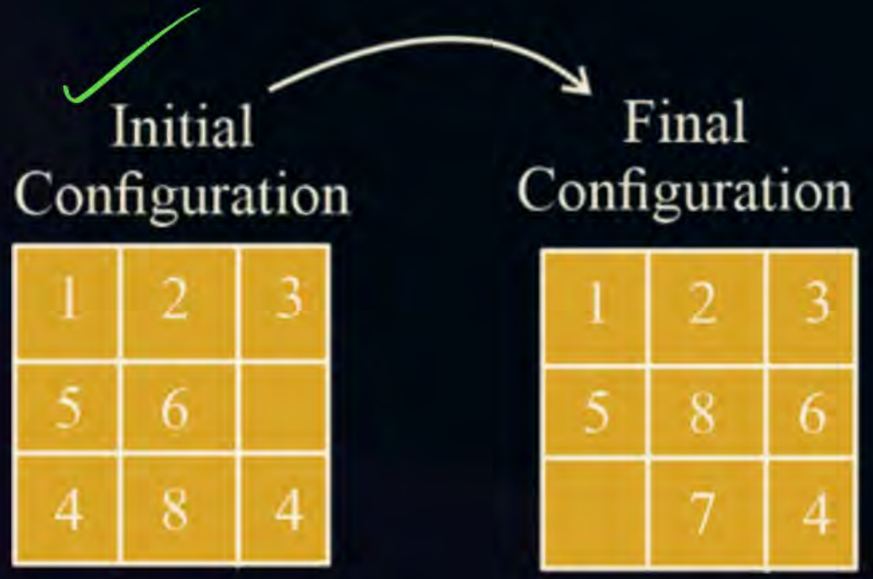


Topic : Uninformed Search

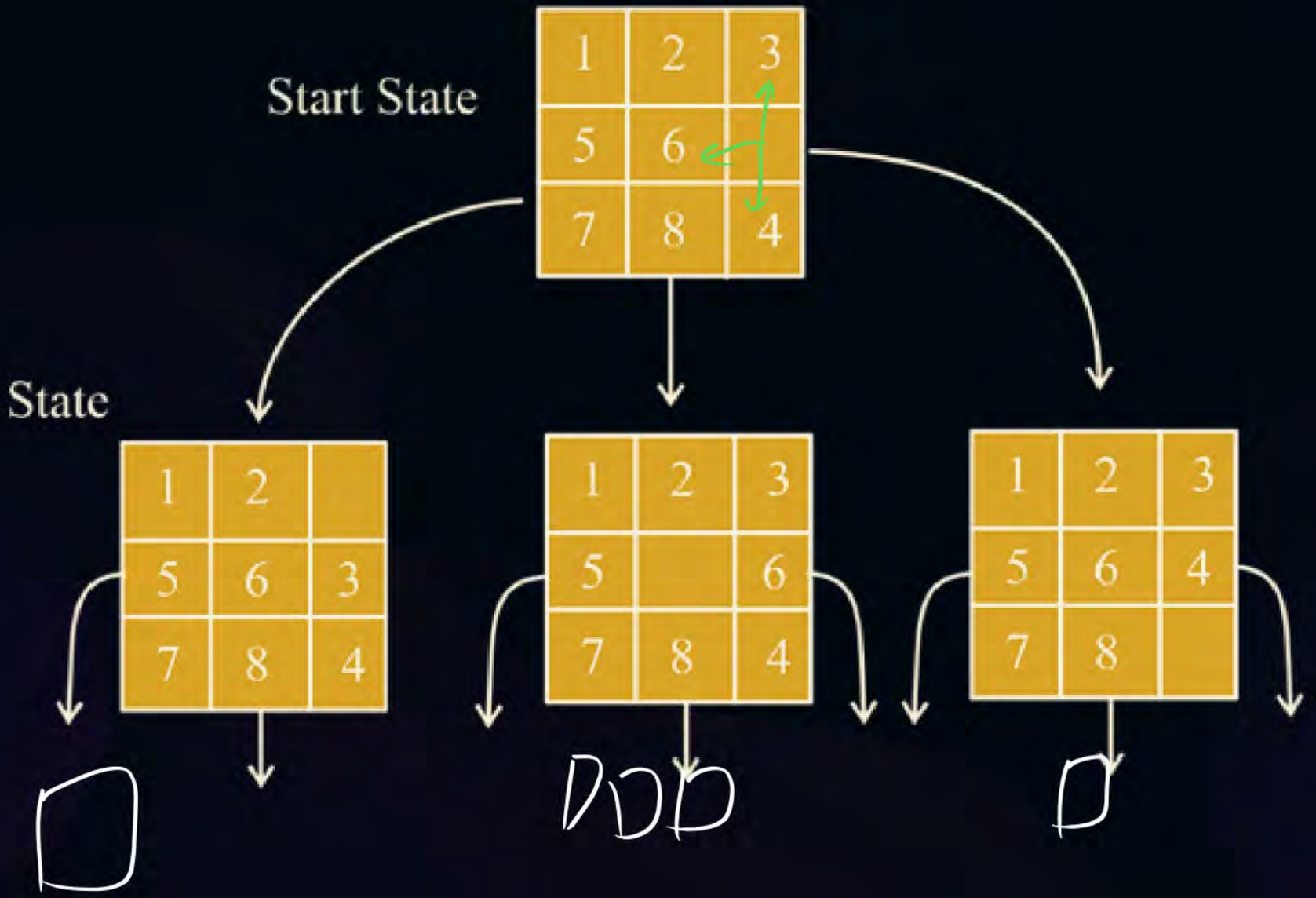
What is a state and state space...

- **Example Eight tile puzzle:** Given a 3 × 3 board with 8 tiles (every tile has one number from 1 to 8) and one empty space. The objective is to place the numbers on tiles to match the final configuration using the empty space. We can slide four adjacent (left, right, above, and below) tiles into the empty space

actions

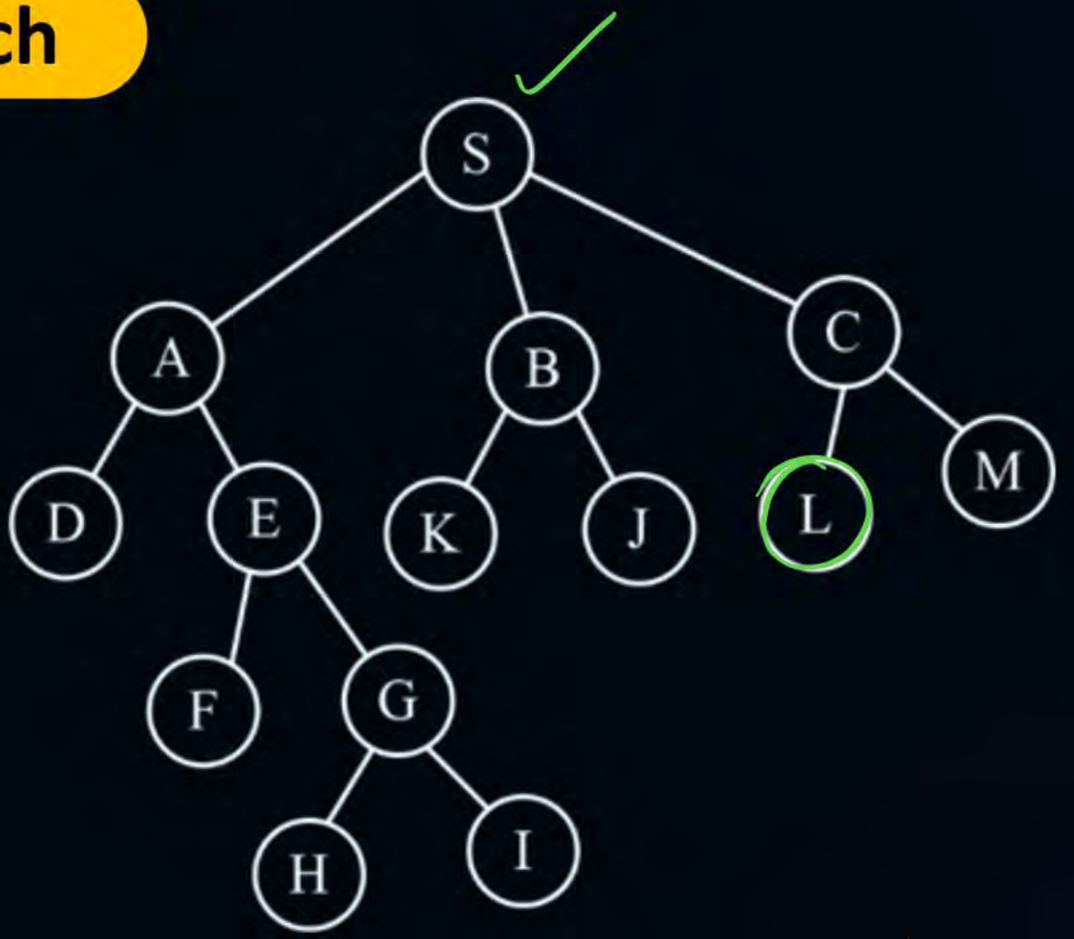


Topic : Uninformed Search



Topic : Uninformed Search

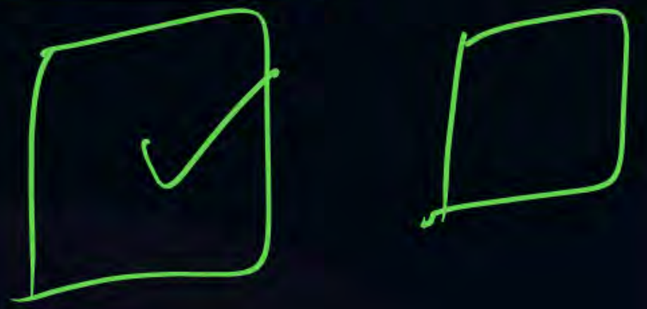
- These are states
- State space
- Starting state
- Goal state
- Search ??



Topic : Uninformed Search

What is a state and state space...

- State: A specific configuration of the system at a particular point in time
- **State Space:** The entire set of possible states that the system can be in, including the initial state, goal state(s), and all intermediate states
- **State Space Search:** We are moving from start state and search for goal state in state space, Used in Problem Solving. It is a process used in A.I in which Successive Configurations or States of an instance are considered with intention of a GOAL State with desired property
- we are moving from start state and search for goal state in state space

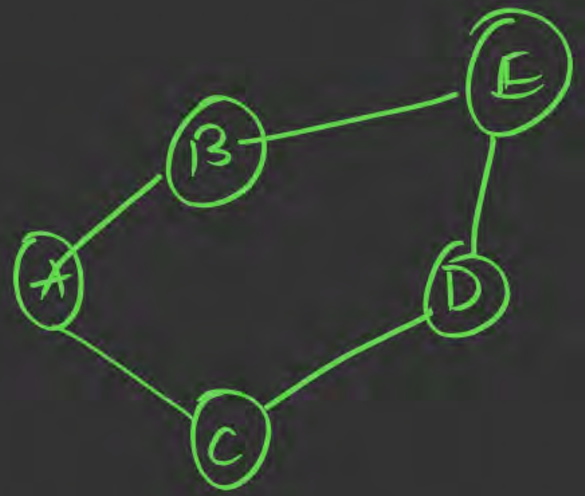


Topic : Uninformed Search

What is a state and state space...

- State space search is a fundamental concept in artificial intelligence (Al) that involves exploring possible states of a system to find a solution to a problem.
- An essential method in artificial intelligence is state space search, which looks for potential states and their transitions to solve issues.
- According to this method, the problem is modelled as a state space, with each state representing a possible configuration and transitions denoting actions or operations that change the state of the problem. Finding a route that meets predetermined requirements from an initial state to a goal state is the aim.

path



E
A

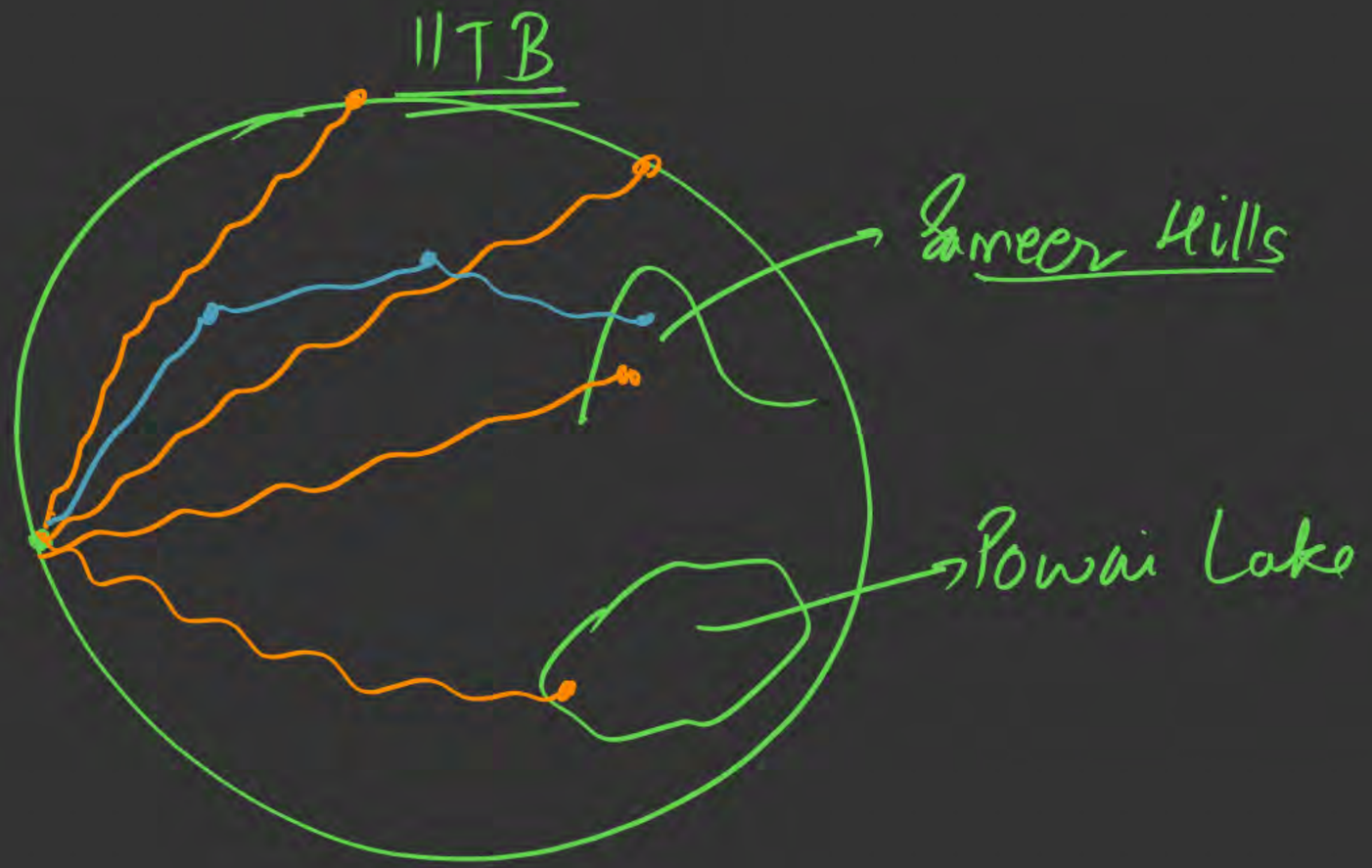
G
E

1) A - B - E
2) A - C - D - E

Topic : Uninformed Search

Types of search in AI

- In Al, search algorithms can be broadly categorized into three types:
- Uninformed (blind) search,
- Informed (heuristic) search,
- And adversarial search.



Chichore

Topic : Uninformed Search

- No info abt path
- Only goal state $ Start state
- We try to follow all path until goal state is Reached.

BFS/DFS, etc

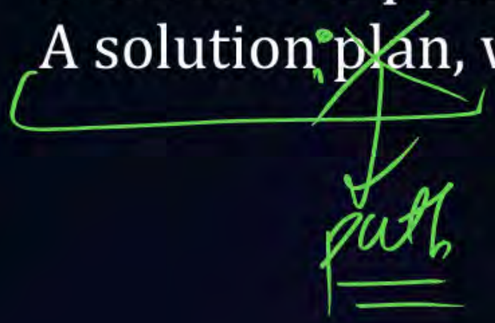
How we follow these paths is defined by the algorithm we use in Un-Informed search

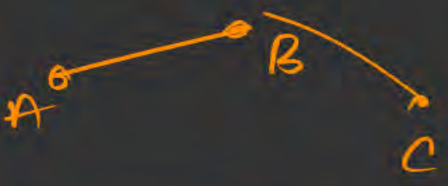
Topic : Uninformed Search

- Uninformed search is a class of general-purpose search algorithms which operates in brute force-way. Uninformed search algorithms do not have additional information about state or search space other than how to traverse the tree, so it is also called blind search.
- The search algorithms in this section 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/or length of actions. Uninformed search is also called Blind search. These algorithms can only generate the successors and differentiate between the goal state and non-goal state.
- Uninformed search algorithms do not have any additional information about the goal state other than the information provided in the problem definition. They explore the search space blindly without any guidance or heuristics to indicate which path is likely to lead to the goal.

Topic : Uninformed Search

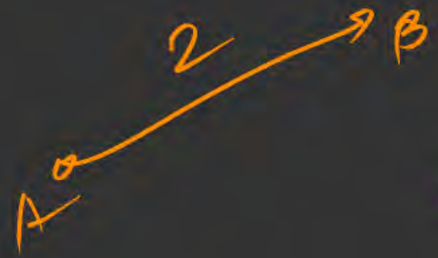
- The following uninformed search algorithms are discussed in this section.
- Depth First Search. (DFS)
- Breadth First Search (BFS)
- Uniform Cost Search (UCS)
- Each of these algorithms will have:
- A problem graph, containing the start node S and the goal node G.
- A strategy, describing the manner in which the graph will be traversed to get to G.
- Store all the possible states (nodes) that you can go from the current states.
- A solution plan, which the sequence of nodes from S to G.

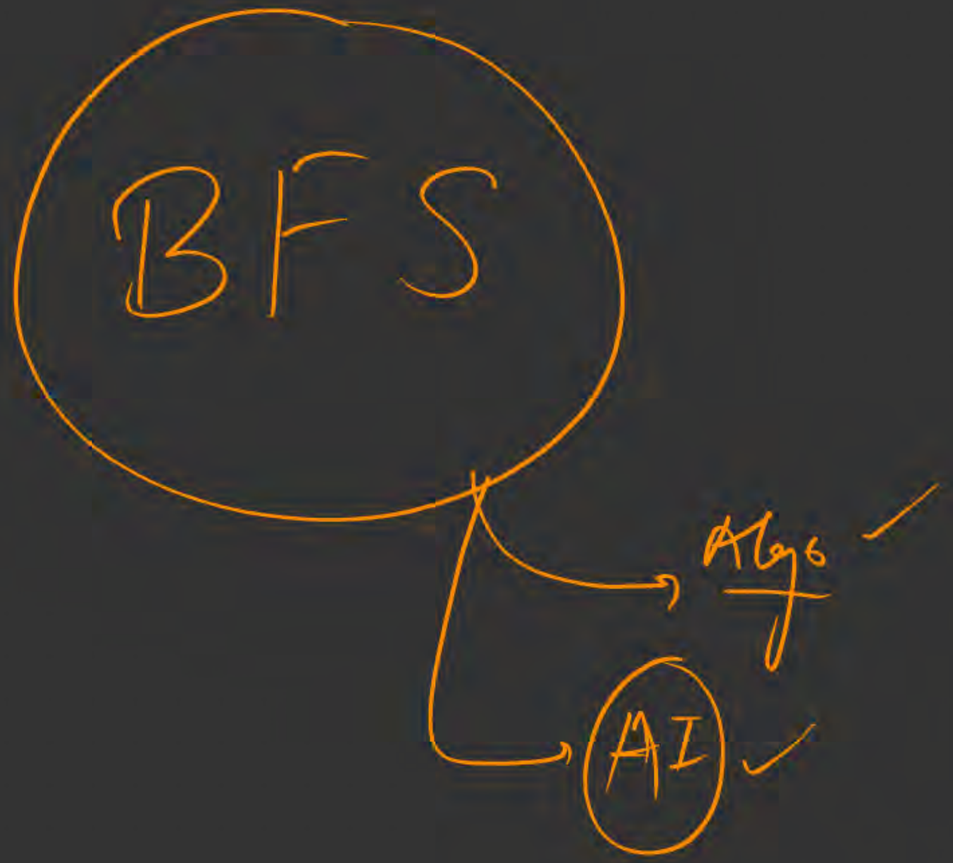




4 Types of graphs

	Weighted	Unweighted
A → B 1 Directed	DW	$D U_w$
A ⟷ B 2 Undirected	$U_d W$	$U_d U_w$




BFS
Algo
AI

Topic : Uninformed Search

Breadth first search

- Breadth-first search (BFS) is an algorithm for traversing or searching tree or graph data structures.
- It starts at the tree root (or some arbitrary node of a graph, sometimes referred to as a 'search key'), and explores all of the neighbor nodes at the present depth prior to moving on to the nodes at the next depth level.
- It is implemented using a queue (FIFO).
- Breadth First Search (BFS) is a graph traversal algorithm that explores all the vertices in a graph at the current depth before moving on to the vertices at the next depth level. It starts at a specified vertex and visits all its neighbors before moving on to the next level of neighbors. BFS is commonly used in algorithms for pathfinding, connected components, and shortest path problems in graphs.

adjacent

Topic : Uninformed Search

Breadth first search

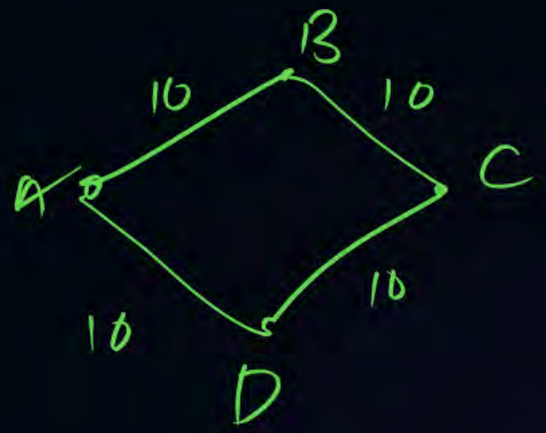
- The Breadth-First Search is a traversing algorithm used to satisfy a given property by searching the tree or graph data structure.
- It belongs to uninformed or blind search AI algorithms as It operates solely based on the connectivity of nodes and doesn't prioritize any particular path over another based on heuristic knowledge or domain-specific information.
- it doesn't incorporate any additional information beyond the structure of the search space. It is optimal for unweighted graphs and is particularly suitable when all actions have the same cost. Due to its systematic search strategy, BFS can efficiently explore even infinite state spaces.
- Breadth-First Search (BFS) is an algorithm for traversing or searching tree or graph data structures.

Topic : Uninformed Search

Breadth first search

- In artificial intelligence (AI), BFS is commonly used for finding the shortest path in unweighted graphs, exploring state spaces in search problems, and ensuring all nodes at a given depth are processed before moving deeper.

and uniweighted



11:30 AM

THANK - YOU