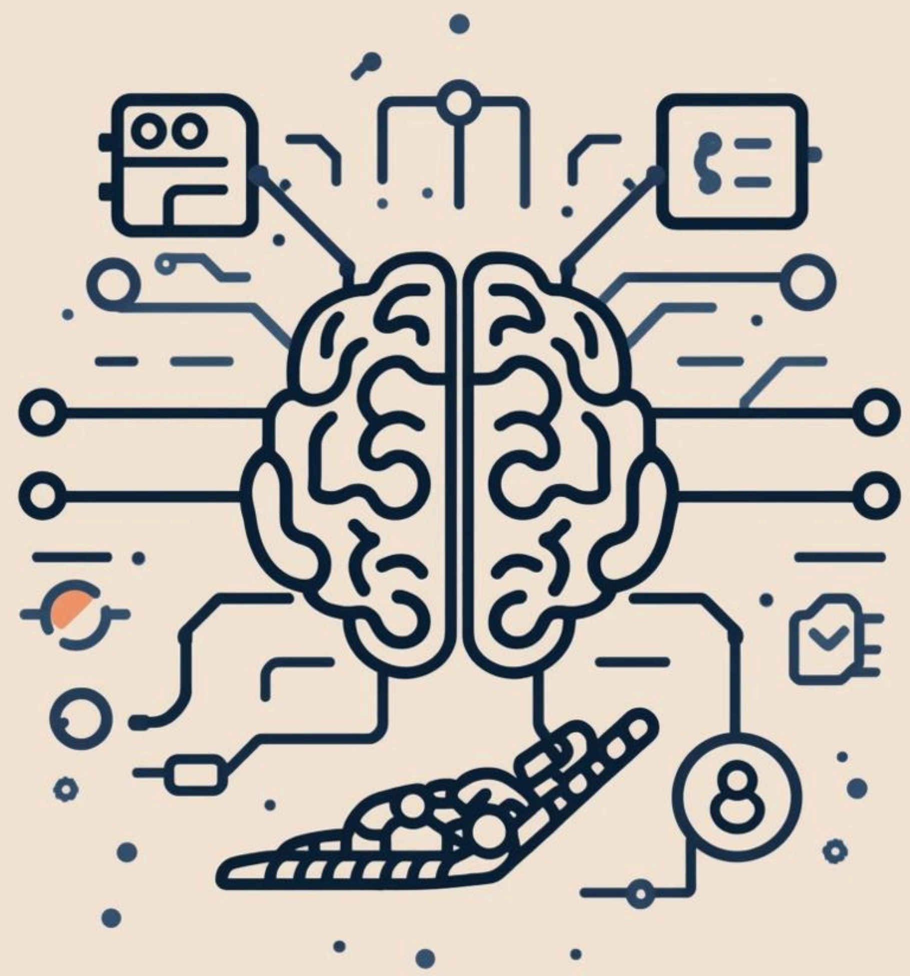
UNDERSTANDING AI TODAY

Artificial Intelligence

Presented by [name here], 2025-10-25



What is AI?

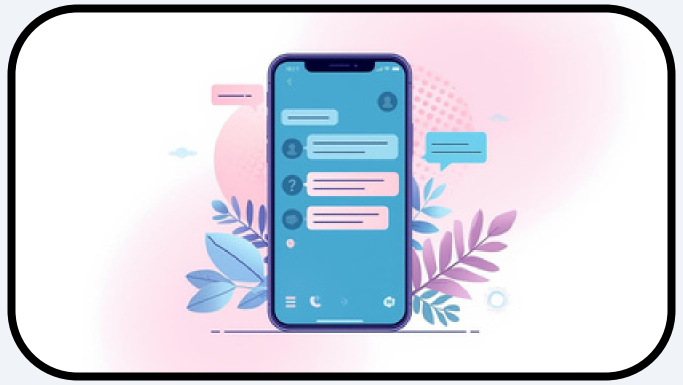
Artificial Intelligence (AI) refers to the **simulation of human intelligence** by machines, enabling them to perform tasks that typically require human cognitive abilities. Key capabilities of AI include learning from data, reasoning through information, and problem-solving effectively. These systems can mimic human functions such as perception and planning, exemplified by AI voice assistants that engage in natural conversations. AI continues to evolve, significantly impacting various sectors and enhancing our daily lives.

Healthcare

AI enhances diagnostics and patient care efficiency.

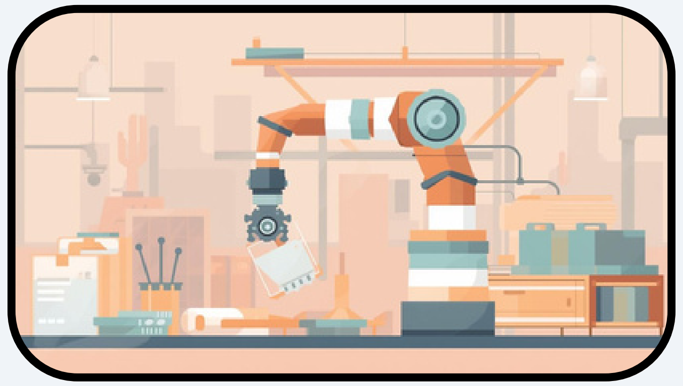
Autonomous Vehicles

Self-driving cars improve safety and traffic flow.



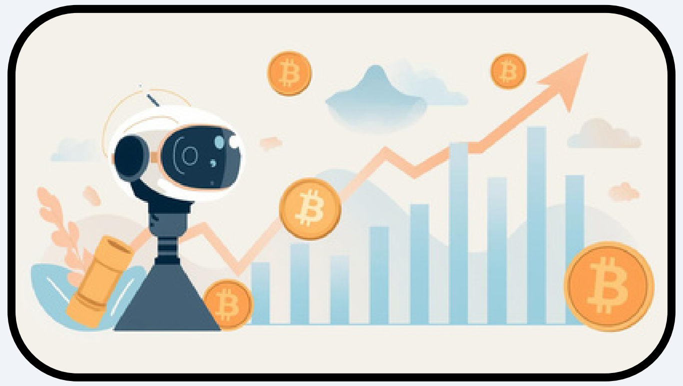
Natural Language Processing

AI chatbots assist with customer service inquiries.



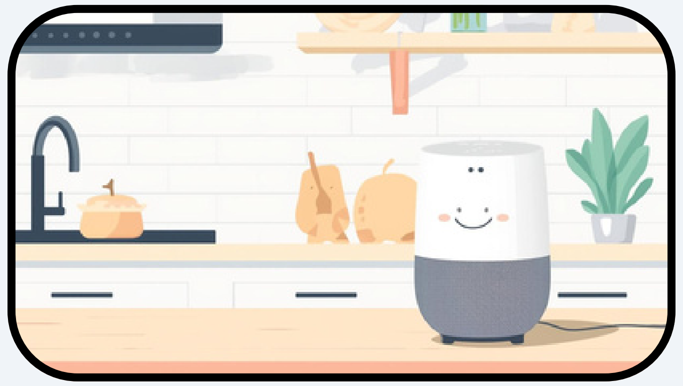
Robotics

AI-powered robots enhance productivity in factories.



Finance

AI algorithms detect fraud and optimize trading.



Smart Assistants

Devices like Alexa simplify daily life tasks.

Goals of Artificial Intelligence Development

Automate Repetitive Tasks

Automating **complex and repetitive tasks** frees up human resources, allowing for increased productivity and efficiency in various industries.

Develop Adaptive Systems

Developing adaptive and learning systems allows AI to improve over time, responding effectively to new information and changing environments.

Enhance Decision-Making

AI enhances decision-making by providing **data-driven insights**, enabling organizations to make informed choices based on comprehensive analysis and patterns.

Types of AI Agents and Environments

Simple Reflex Agents

Simple reflex agents react **directly to stimuli**, using predefined rules without internal state, suitable for straightforward problems like light following.

Model-Based Agents

Model-based agents maintain an **internal model** of the environment, allowing them to make decisions based on both current input and past experiences.

Goal-Based Agents

Goal-based agents operate towards specific **goals or objectives**, assessing potential actions to achieve desired outcomes, exemplified in pathfinding in navigation systems.

Uninformed Search Algorithms Overview

Breadth-First Search (BFS)

BFS explores all nodes at the present depth prior to moving on to nodes at the next depth level, ensuring the shortest path is found.

Depth-First Search (DFS)

DFS traverses as far down a branch as possible before backtracking, which can lead to faster solutions but may get stuck in deep paths.

Depth-Limited Search (DLS)

DLS limits the depth of search to a predetermined level, balancing between breadth and depth and preventing infinite exploration in deep trees.

Informed Search Algorithms: Enhancing Efficiency

Best First Search

Best First Search is an **optimal pathfinding method** that evaluates nodes based on a heuristic to guide the search, prioritizing promising paths.

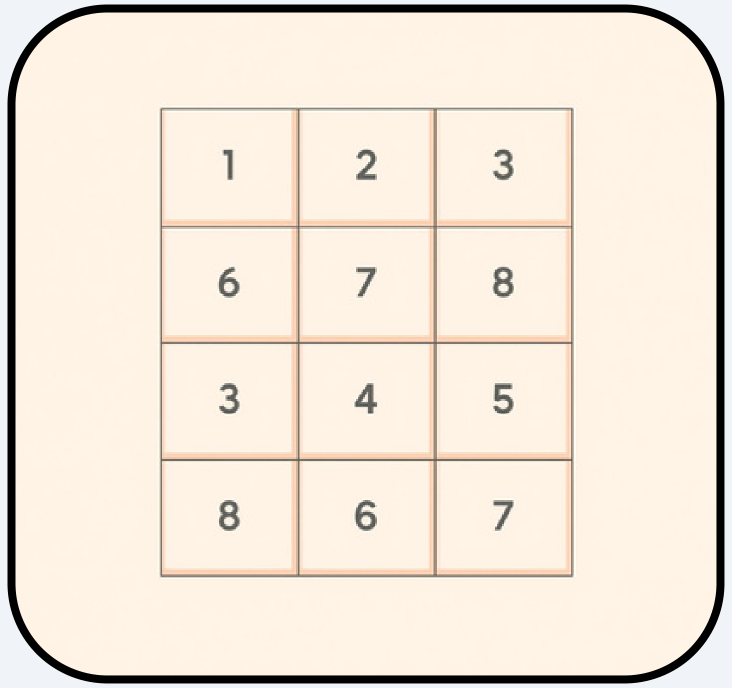
Beam Search

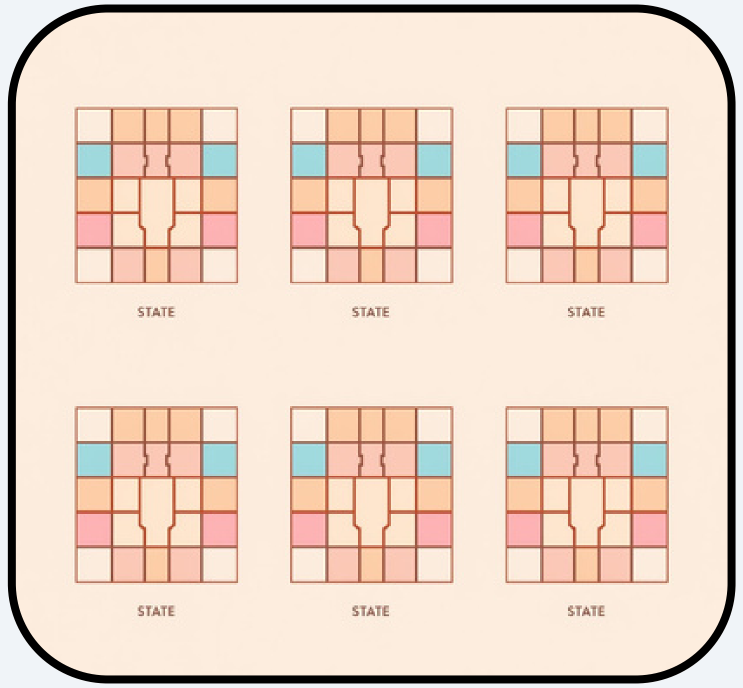
Beam Search is an **optimized approach** that limits the number of expanded nodes at each level, maintaining only the most promising candidates to streamline search.

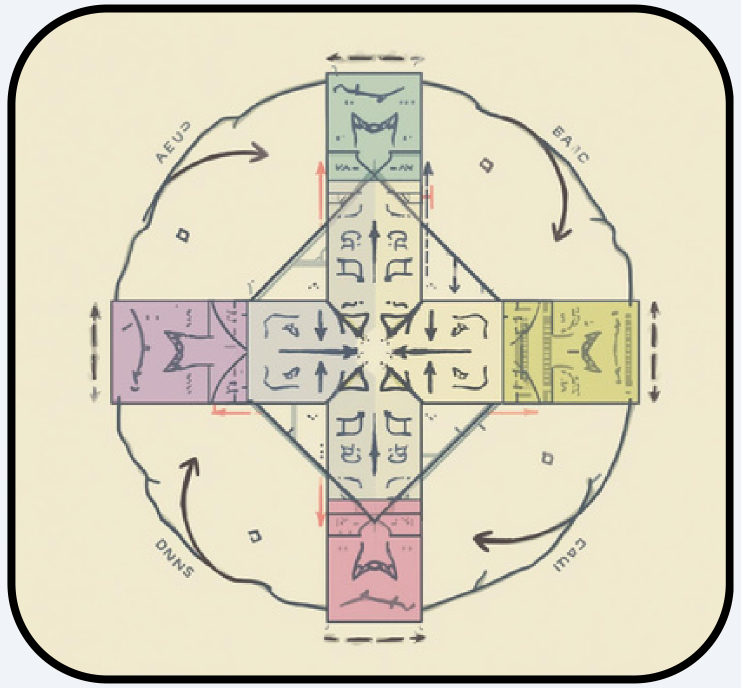
A* Algorithm

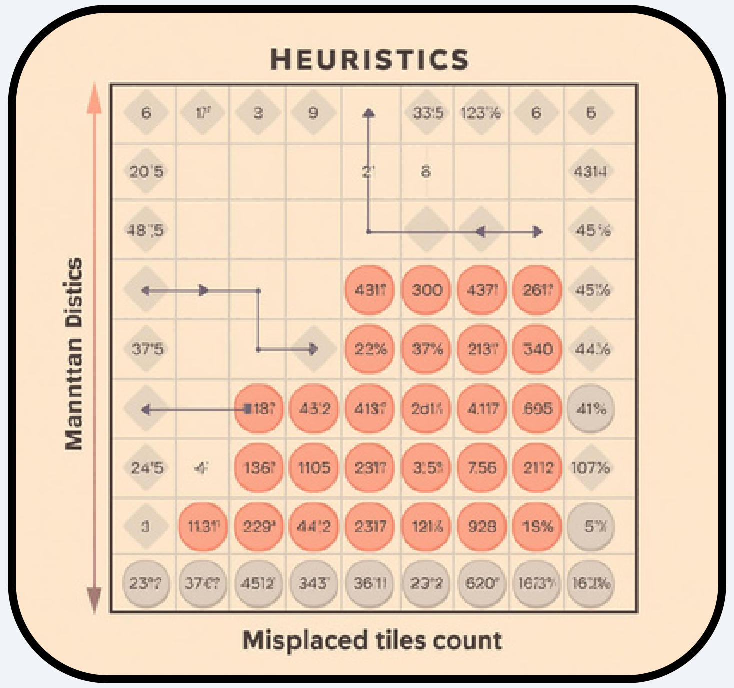
The A* Algorithm combines cost and heuristic, efficiently finding the **shortest path** while considering both actual and estimated costs in its search process.

8-Puzzle Problem Overview









States

Different arrangements of the puzzle tiles

Operators

Actions sliding tiles in various directions

Heuristics

Techniques assessing tile arrangement efficiency

Goal

Reach the target tile arrangement configuration

Game Playing Algorithms: Minimax and Pruning

Understanding the Minimax Algorithm

The **Minimax Algorithm** is a decision-making process used in **zero-sum games** to determine optimal strategies for maximizing the outcome while minimizing potential losses.

Enhancing Efficiency with Alpha-Beta Pruning

Alpha-Beta Pruning optimizes the Minimax Algorithm by systematically eliminating branches in the game tree, enhancing efficiency without affecting the final decision output.

Applications in Various Games

Game-playing algorithms like Minimax and Alpha-Beta Pruning find applications in popular games such as **Tic-Tac-Toe** and **Chess**, facilitating strategic gameplay decisions.

Understanding Constraint Satisfaction Problems (CSP)

Definition of CSP

A **Constraint Satisfaction Problem** involves finding values for variables that meet specific constraints, often used in scheduling and resource allocation.

Examples of CSP

Common examples include **Sudoku puzzles**, map coloring, and task scheduling. Each scenario requires unique solutions while adhering to defined rules.

Solution Approaches

Effective solution techniques include **backtracking search**, forward checking, and constraint propagation, which help efficiently navigate potential solutions and prune the search space.

Summary of AI

Artificial Intelligence (AI) simulates **human intelligence** and cognitive functions, enabling machines to learn, reason, and solve problems. Its applications span diverse fields, including healthcare, where it aids in diagnosis, and autonomous systems like self-driving cars. AI's development is driven by goals such as automating tasks and enhancing decision-making. By utilizing search algorithms and addressing constraint satisfaction problems, AI continues to evolve, offering innovative solutions across various industries and improving our daily lives.

Thank You