Artificial Intelligence Course

Presented by

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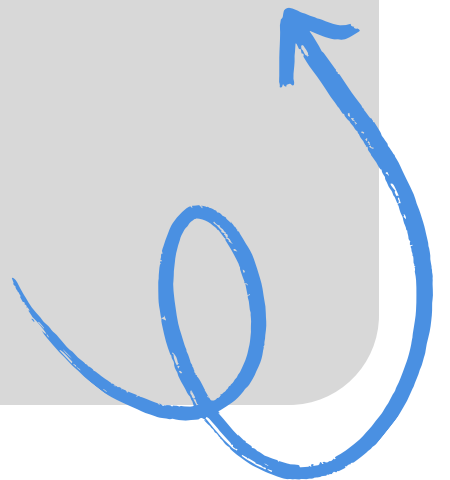Computer Science and Engineering

Course Overview

Theoretical and Practical Knowledge Focus

This course emphasizes understanding **intelligent behavior**, exploring search algorithms, and implementing algorithms through hands-on projects, including the development of engaging AI-based games for better learning.

Core AI Concepts

**Understanding AI Basics and Frameworks**

AI Basics

Artificial Intelligence (AI) simulates human intelligence in machines, allowing them to perform tasks such as reasoning, learning, and problem-solving, essential for developing truly intelligent systems.

Four Approaches

The four approaches to AI include Thinking Humanly, Acting Humanly, Thinking Rationally, and Acting Rationally, providing frameworks to understand intelligent behavior and decision-making in machines.

Agents and Environments

Agents are entities that perceive their environment and act upon it, while environments can be characterized by observable states, determinism, dynamics, and agent interactions, shaping AI behavior.
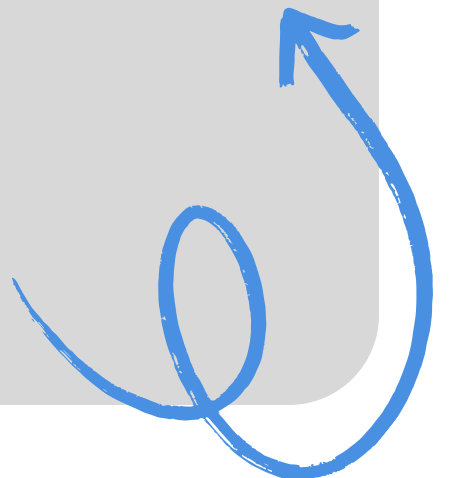
Core AI Concepts: Agents and Environments
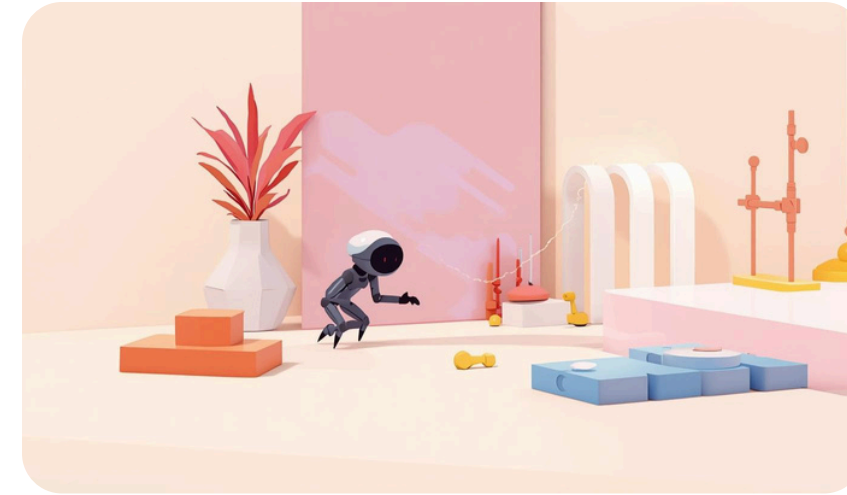
Simple Reflex

Reacts to current perceptions in environment

Model-Based Reflex

Uses internal model for decision-making

Goal-Based

Acts to achieve specified objectives

Utility-Based

Maximizes overall satisfaction in actions

Search Algorithms Overview

Understanding state space and search processes

State Space

The state space represents all possible configurations in a problem, guiding the search process to find solutions efficiently within defined constraints and parameters.

Uninformed Search

Uninformed search strategies operate without additional information, employing methods like breadth-first search or depth-first search to explore state space systematically until a solution is found.
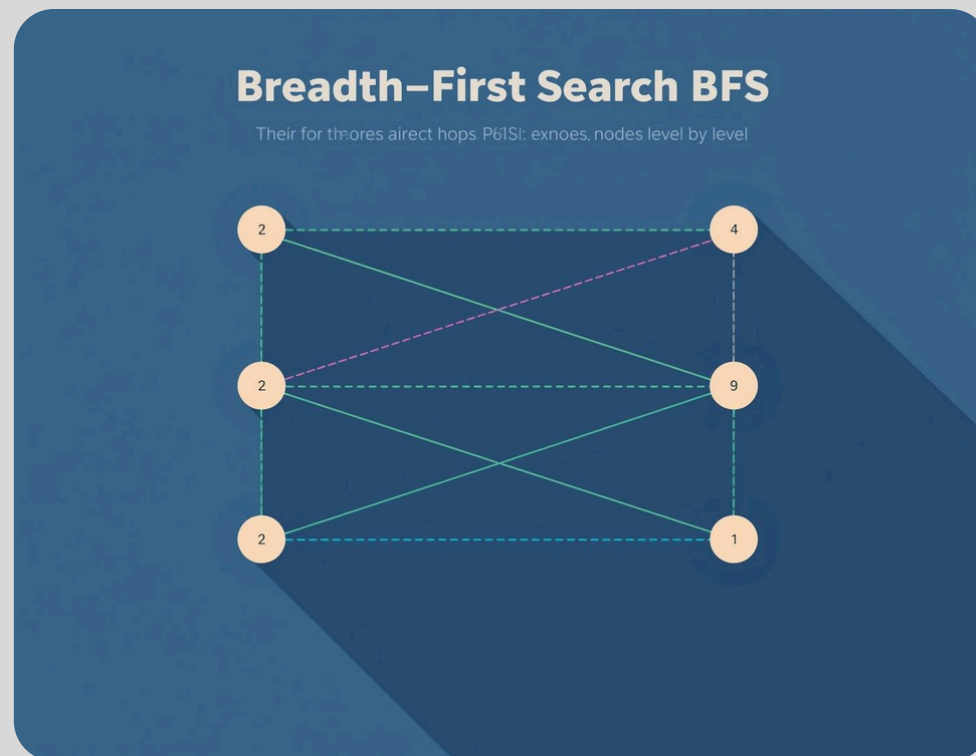
Informed Search

Informed search methods use heuristics to prioritize paths, offering intelligent guidance, significantly enhancing efficiency in finding optimal solutions compared to uninformed approaches.
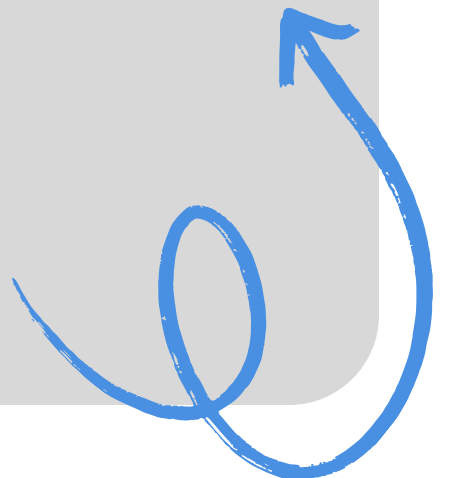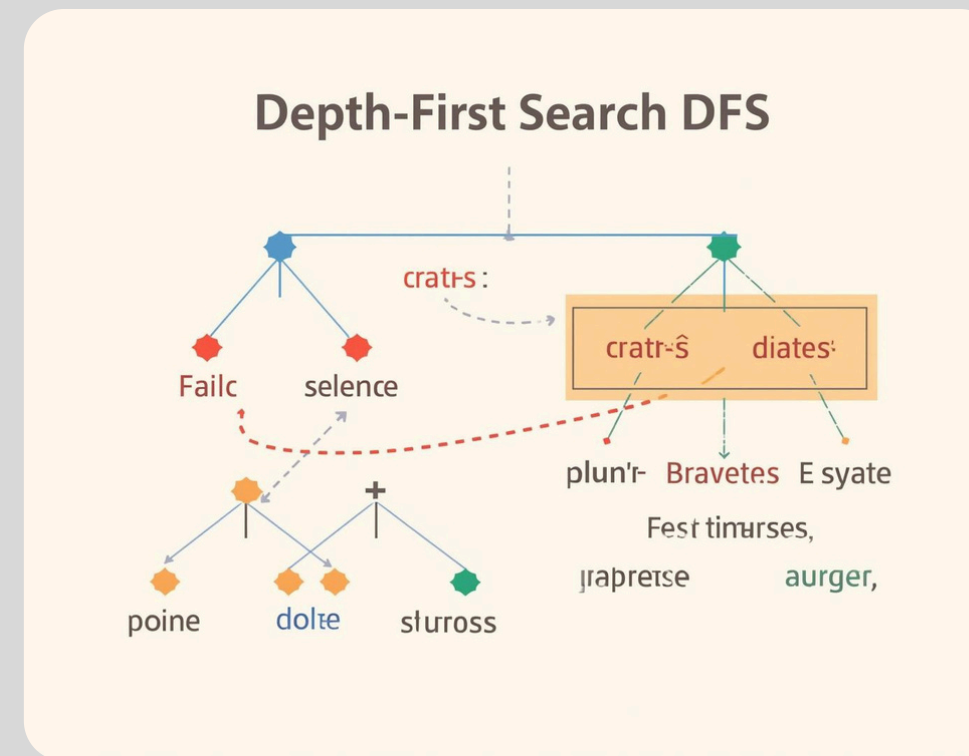
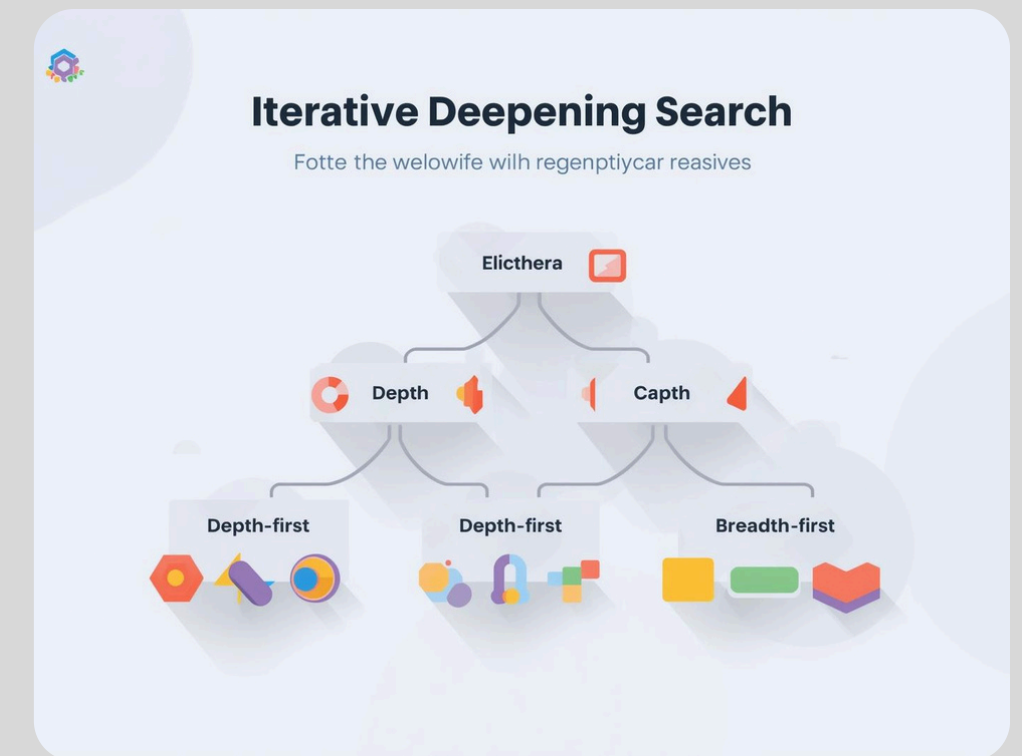# Search Algorithms

BFS

Breadth-First Search (BFS) explores nodes layer by layer, ensuring the shortest path is found.

DFS

Depth-First Search (DFS) dives deep into nodes, prioritizing depth over breadth for exploration.
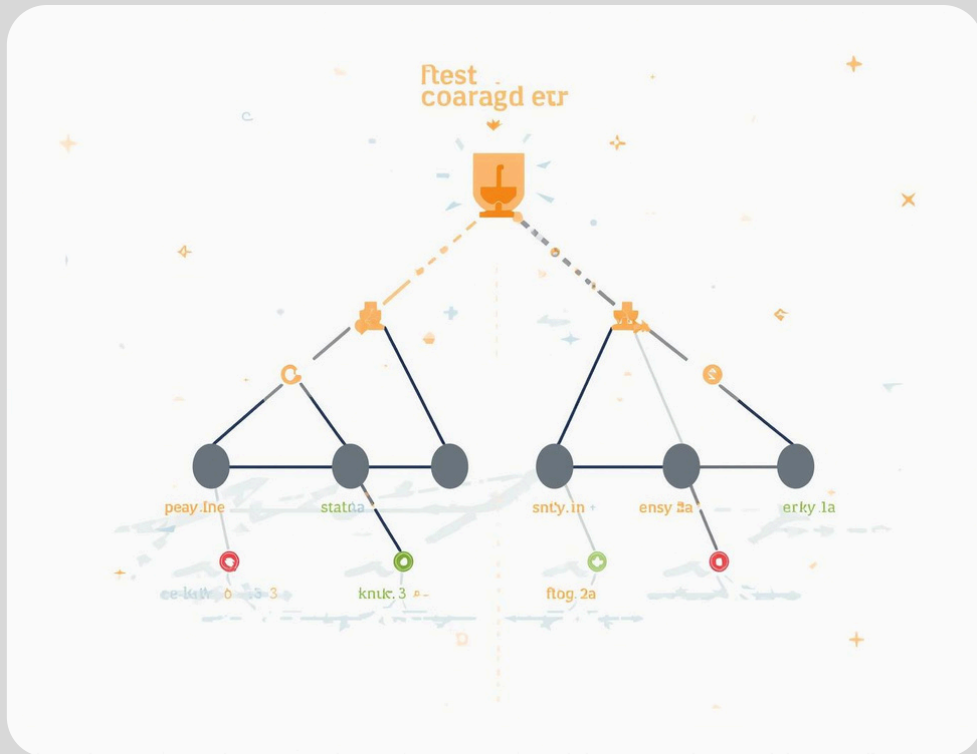
Iterative Deepening

Iterative Deepening combines BFS and DFS, optimizing both memory usage and search efficiency.
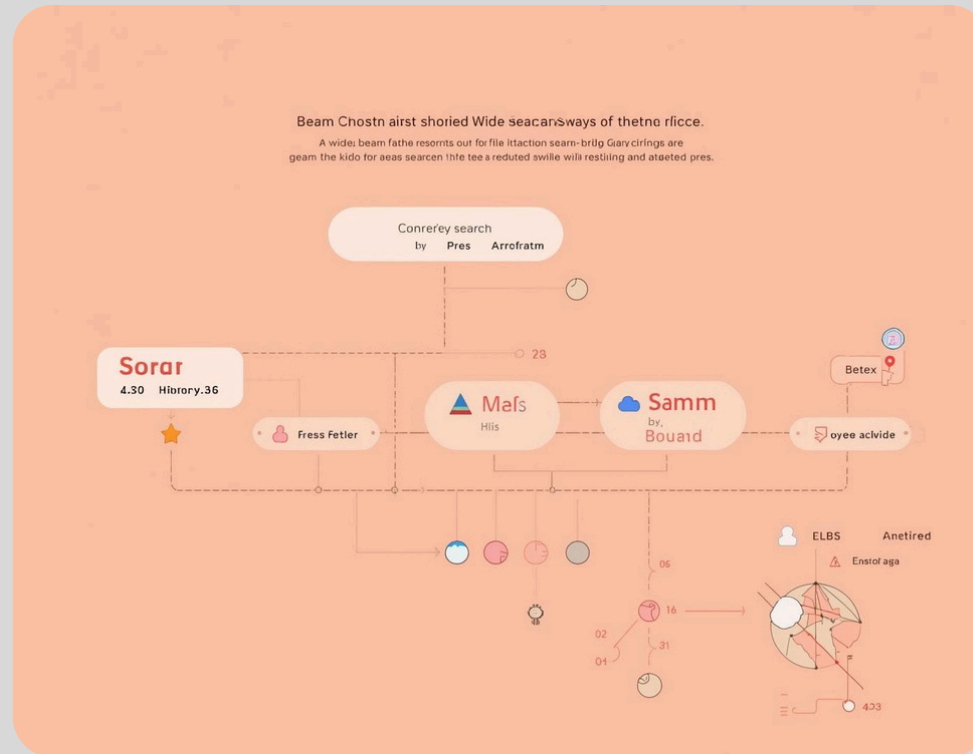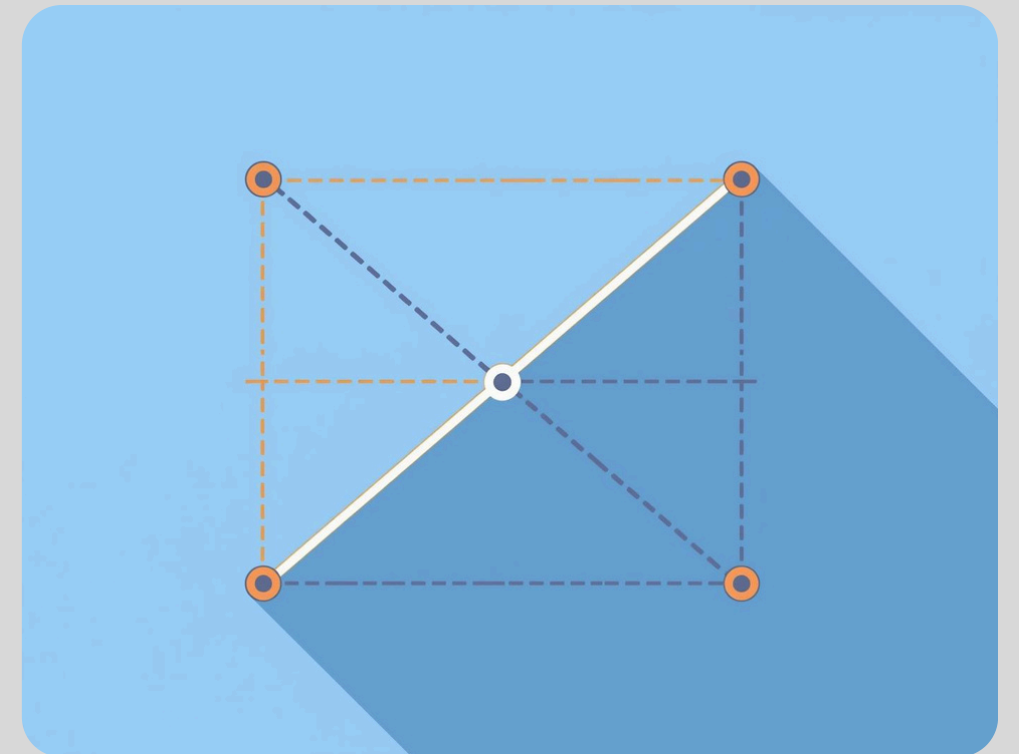
Search Algorithms

Best-First

Best-First search efficiently explores paths based on heuristics, prioritizing promising options first.
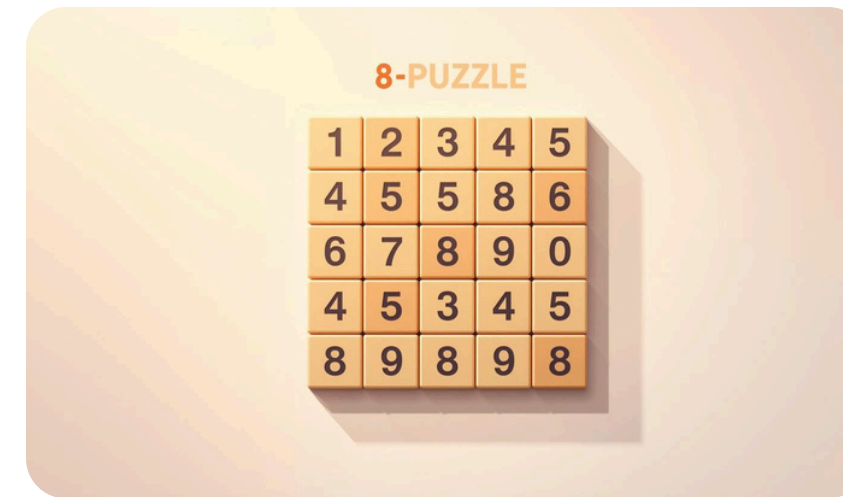
Beam

Beam search reduces the search space by limiting the number of nodes expanded at each level.
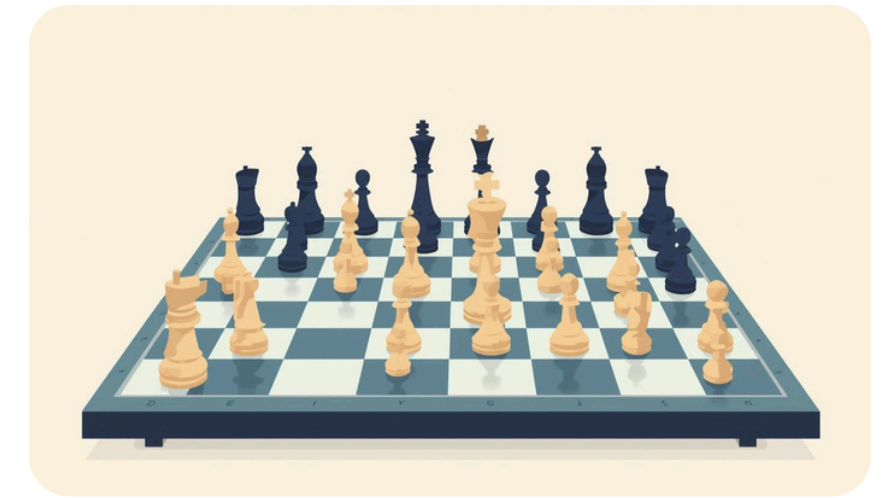
A*

A* combines path cost and heuristics, ensuring optimal solutions in search problems efficiently.
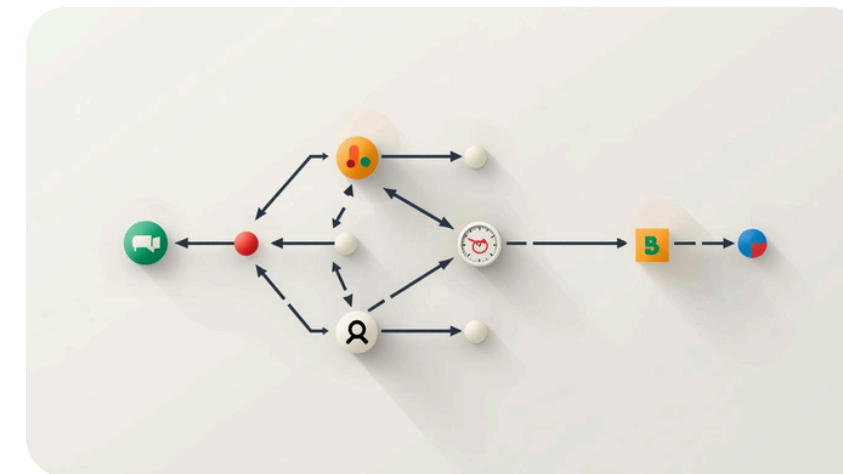
Search Algorithms and Problem Solving

8-Puzzle

Involves sliding tiles to achieve order.

N-Queens

Places queens without mutual attacks on board.
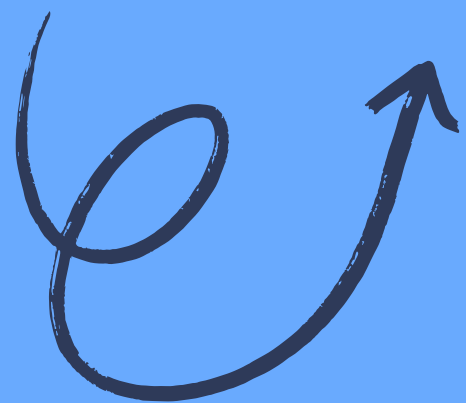

Backtracking

Systematic approach to explore possible solutions.

Heuristics

Guiding estimates expedite problem-solving processes.

Game Algorithms Overview

01   **Minimax**

Adversarial decision-making for optimal game strategy.

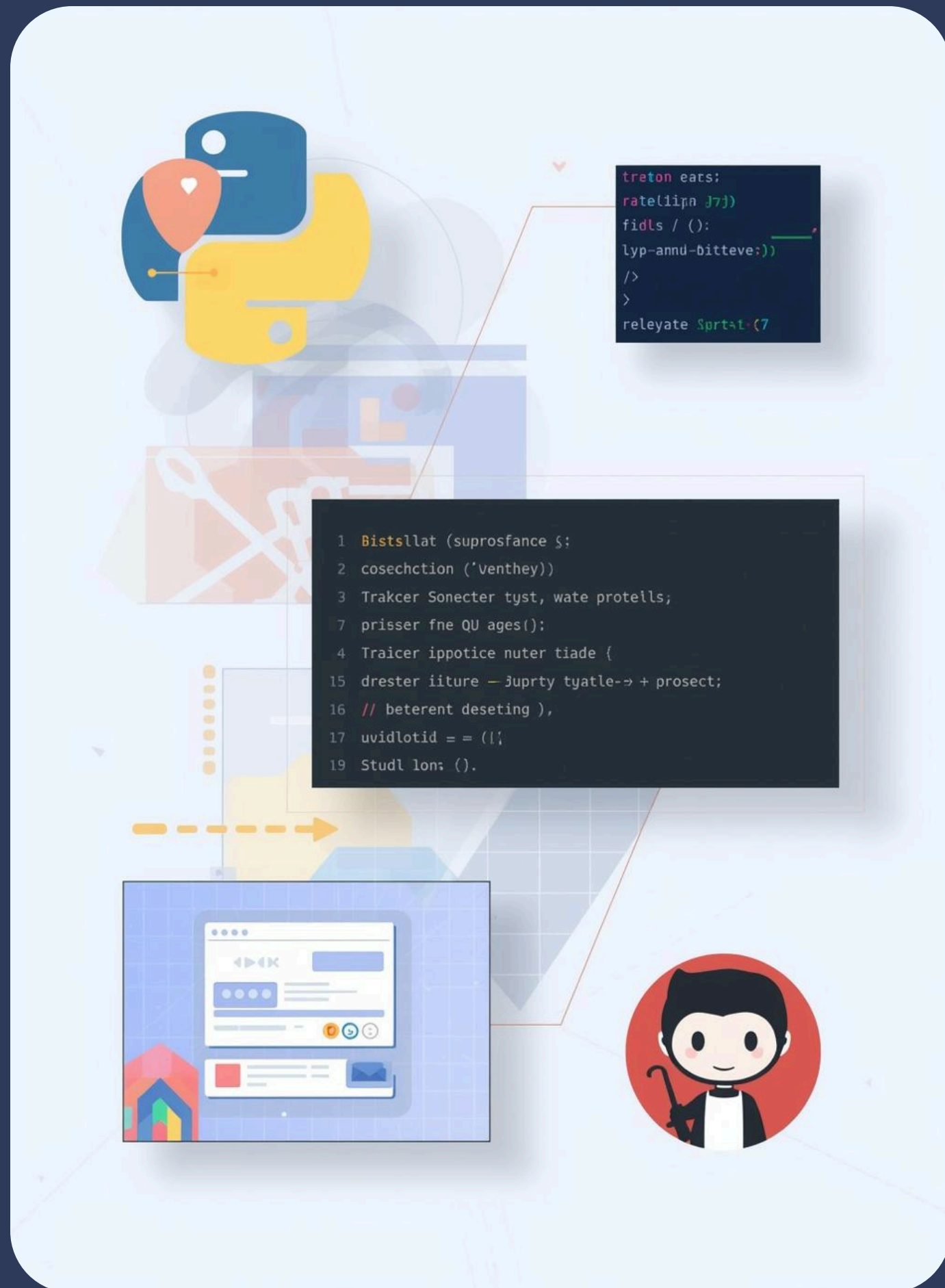**02**   **Alpha-Beta**

Pruning branches to enhance minimax efficiency.

03   **Implemented Games**

Includes **Chess, Tic Tac Toe, and Nim** for practice.

Development Tools in AI

This course utilizes **Python** for programming, integrating Jupyter Notebook for interactive coding, Tkinter for creating GUIs, and GitHub for version control and collaboration, enhancing practical learning in AI applications.

Learning Outcomes and Conclusion

01 **Fundamentals**

Understanding essential principles of artificial intelligence.

02 **Implementation**

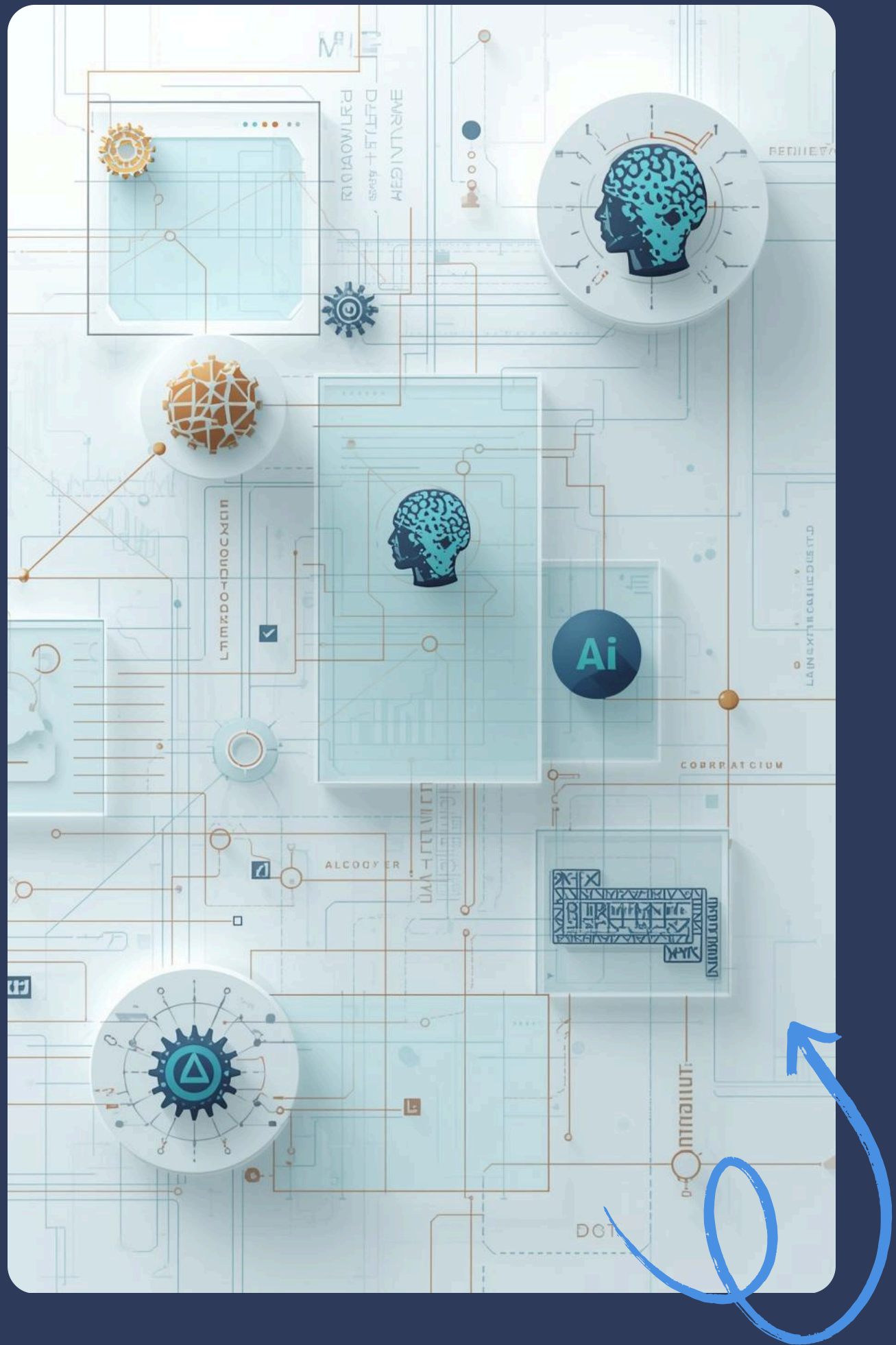Implementing algorithms effectively using Python programming.

03 **Development**

Developing engaging AI-based games to enhance learning.

04 **Tools**

Using AI tools for content creation and presentations.

Thank you for your attention!