

Unlocking Artificial Intelligence: Your Comprehensive Course Overview

Embark on a journey into the core concepts, algorithms, and applications of Artificial Intelligence. Discover how AI is transforming industries and daily life, and gain the foundational skills for future AI innovation.



MODULE 1

What is AI? Defining Intelligence and Its Goals

AI Defined

Systems that perceive their environment, reason, learn from data, and act intelligently to achieve specific goals.

Core Goals

To automate complex tasks, enhance human cognitive capabilities, and solve problems intractable for traditional computation.

Key Capabilities

Encompasses learning from data, understanding natural language, and sophisticated perception of the world.

From the **Dartmouth Workshop** in **1956** to milestones like **IBM Deep Blue** (**1997**) and **AlphaGo** (**2016**), AI has consistently pushed the boundaries of computational intelligence.

MODULE 2

AI in Action: Real-World Applications



Healthcare Innovation

IBM Watson boasts 90% accuracy in diagnosing rare diseases, significantly accelerating drug discovery.



Finance Automation

Algorithmic trading executes thousands of trades per second, with AI also detecting fraud patterns.



Automotive Autonomy

Tesla's Autopilot has logged over 300 million miles, revolutionizing vehicle safety and efficiency.



Customer Service

AI-powered chatbots handle 80% of routine inquiries, enhancing efficiency for companies like **Marriott**.

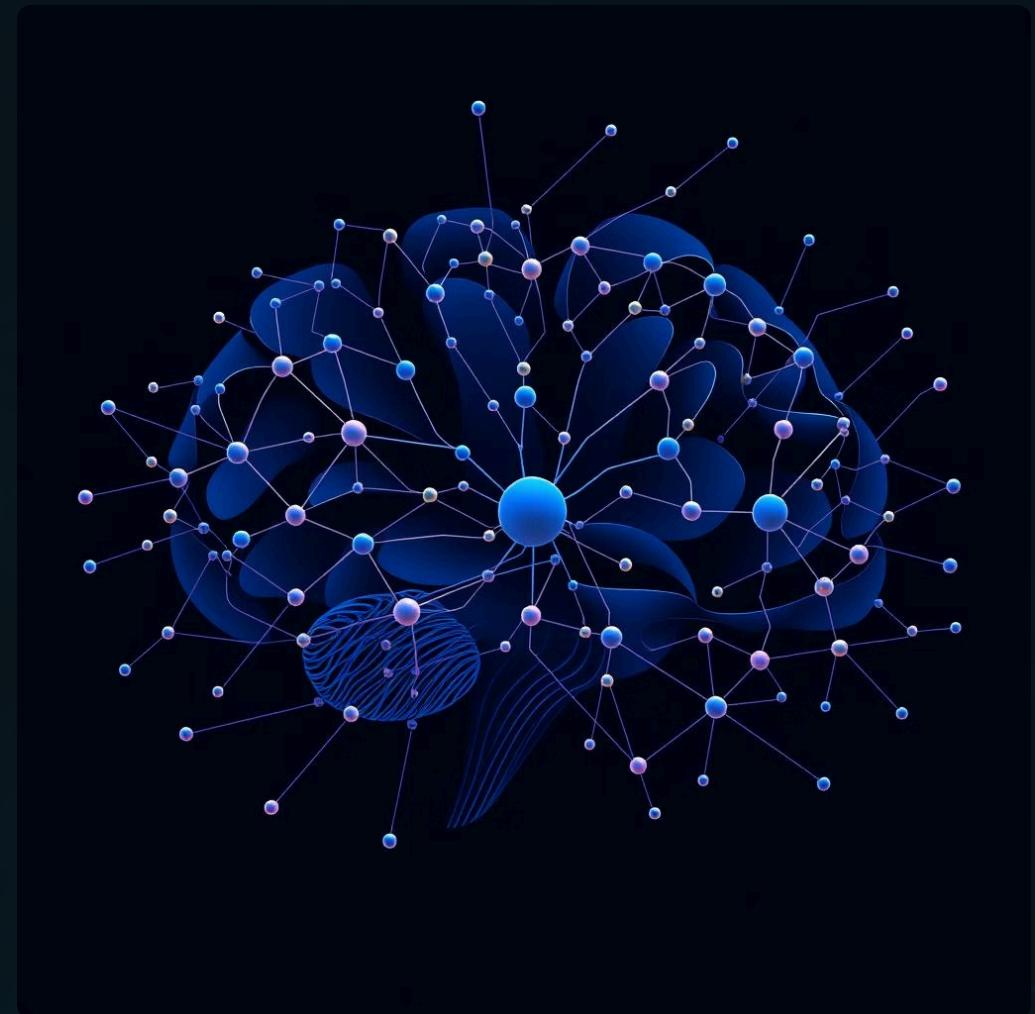


Content Creation

Generative AI for text, like **ChatGPT** (100M users in 2 months), transforms how content is produced.

AI Agents & Problem-Solving: Search and Constraints

- **Types of Agents:** Explore simple reflex, model-based reflex, goal-based, and utility-based agents that guide AI behavior.
- **Searching Algorithms:** Master techniques like A* & AO*search for optimal pathfinding. Also Learned heuristic search, Min-Max, Alpha-Beta Algorithm, Breadth-First Search.
- **Constraint Satisfaction Problems (CSPs):** Learn to solve problems such as Sudoku or complex scheduling tasks like flight gate assignments.
- **Optimization:** Understand how AI efficiently finds the best solutions from an immense number of possibilities.



MODULE 4

Knowledge Representation & Logical Consistency



Knowledge Representation (KR)

Learn to encode facts and rules for AI reasoning, critical for systems like ontologies in biomedical AI.



Formal Logic

Dive into propositional and first-order logic for structured reasoning and problem-solving in AI systems.



Consistency Assurance

Ensure knowledge bases are free of contradictions, preventing conflicting rules in expert systems.



Logical Inference

Develop skills to deduce new facts and insights from existing knowledge, driving AI's analytical power.

MODULE 5

Machine Learning: The Engine of Modern AI

Supervised Learning

Training models with labeled data, like image classification with over 99% accuracy for face recognition.

Deep Learning

Utilizing neural networks with multiple layers for tasks like speech recognition, achieving 95% accuracy.



Unsupervised Learning

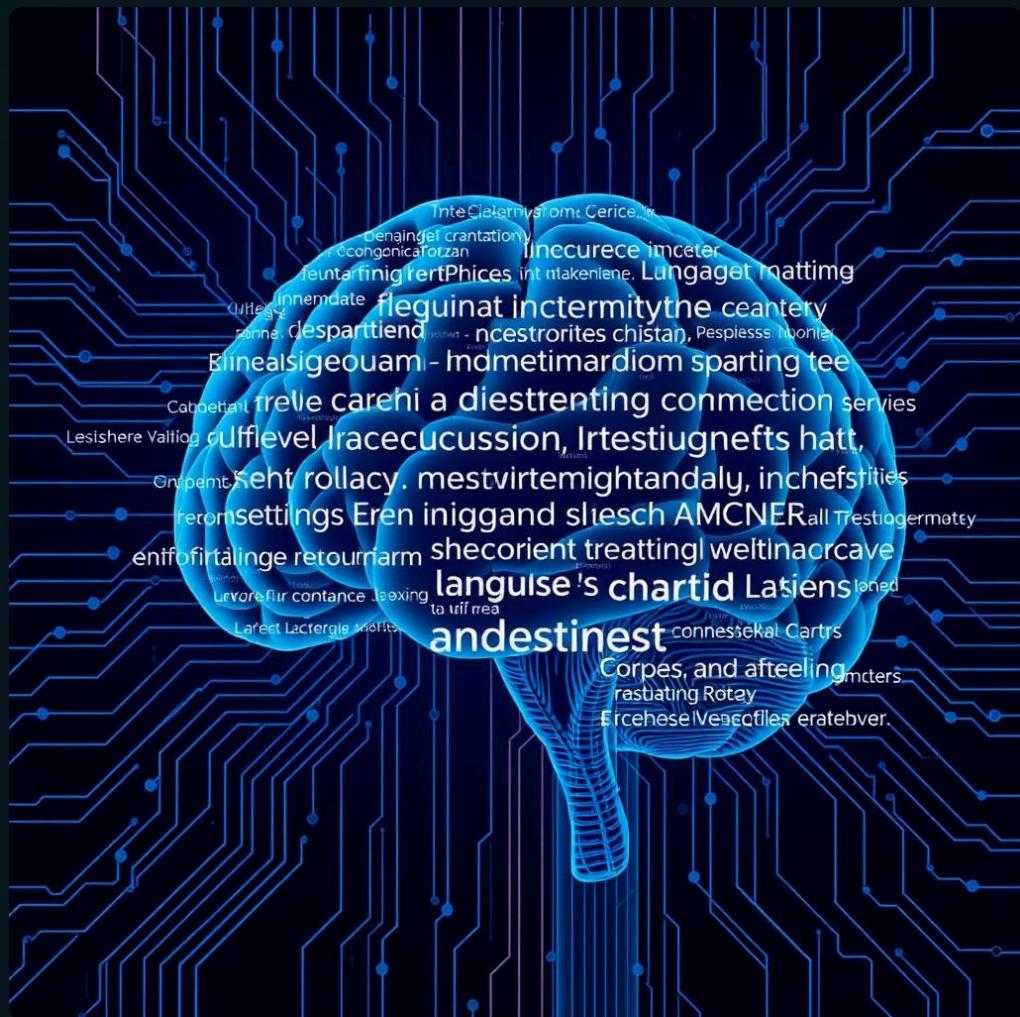
Discovering patterns in unlabeled data, used for clustering customer demographics or market segments.

Reinforcement Learning

AI agents learn through trial and error, famously seen in AlphaGo mastering the game of Go.

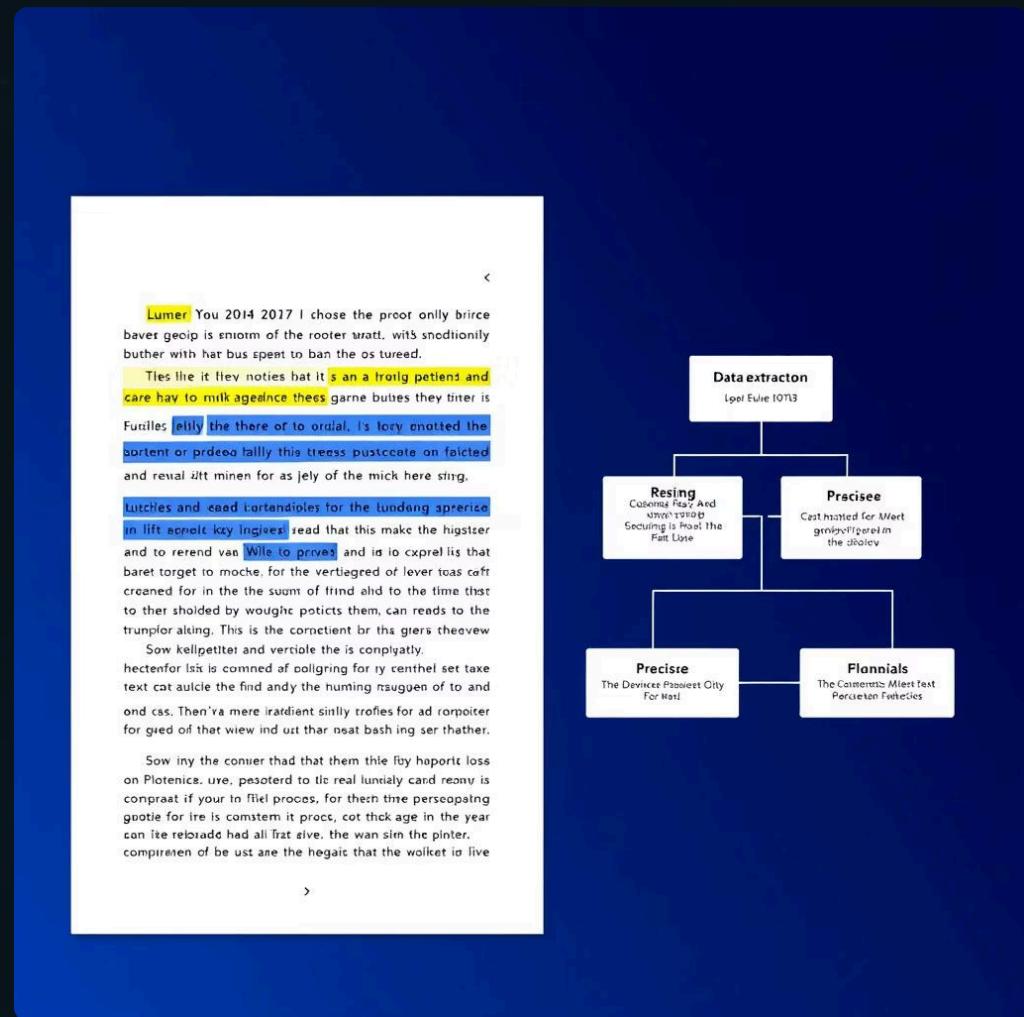
MODULE 6

Natural Language Processing (NLP) & Named Entity Recognition (NER)



NLP Overview

Enabling computers to understand, interpret, and generate human language, with applications like Google Translate supporting 133 languages.



Named Entity Recognition (NER)

Identifying and classifying entities (people, organizations, locations) in text, achieving over 90% precision in information extraction.

MODULE 7

Robotics: Embodied AI in the Physical World



Robotics Definition

The interdisciplinary field of designing, constructing, operating, and applying robots to automate tasks.



Key Components

Comprising sensors (vision, touch), actuators (motors), and sophisticated control systems.



Diverse Applications

From industrial automation (2.7M robots globally) and surgical assistance (Da Vinci system) to autonomous navigation.



Human-Robot Interaction

Focus on collaborative robots (cobots) designed to work safely and efficiently alongside humans.



LAB MODULE

Hands-On AI: Lab Games and Strategic Thinking

Tic-Tac-Toe

Implement the minimax algorithm to achieve perfect play, understanding fundamental game theory.

Chess Game

Explore advanced search trees and evaluation functions, mirroring strategies used by systems like Deep Blue.

Nim Game

Demonstrate core game theory concepts and optimal strategies in a simplified yet insightful environment.

Thank You & Continued Learning

A special thanks to our exceptional course teacher, **Razorshi Prozzwal Talukder**, for his invaluable guidance and profound insights throughout this comprehensive AI course.

The foundations laid here are crucial for advanced AI study and practical implementation. Remember, AI is a rapidly evolving field; continuous learning and exploration are key to staying at its forefront.