Artificial Intelligence – Lab | CSE 412

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Introduction to AI

AI is the simulation of human intelligence in machines programmed to think and act like humans.

Reasoning

Logical deduction and inference

Learning

Adapting to new data

Perception

Interpreting sensory input

Problem Solving

Finding solutions to challenges

Course Topics Overview

A deep dive into fundamental AI concepts and practical applications.

Search Algorithms

Navigating complex problem spaces

Game Playing

Strategic decision-making

Constraint Satisfaction

Solving specific problem types

Real-world Tools

Practical AI applications

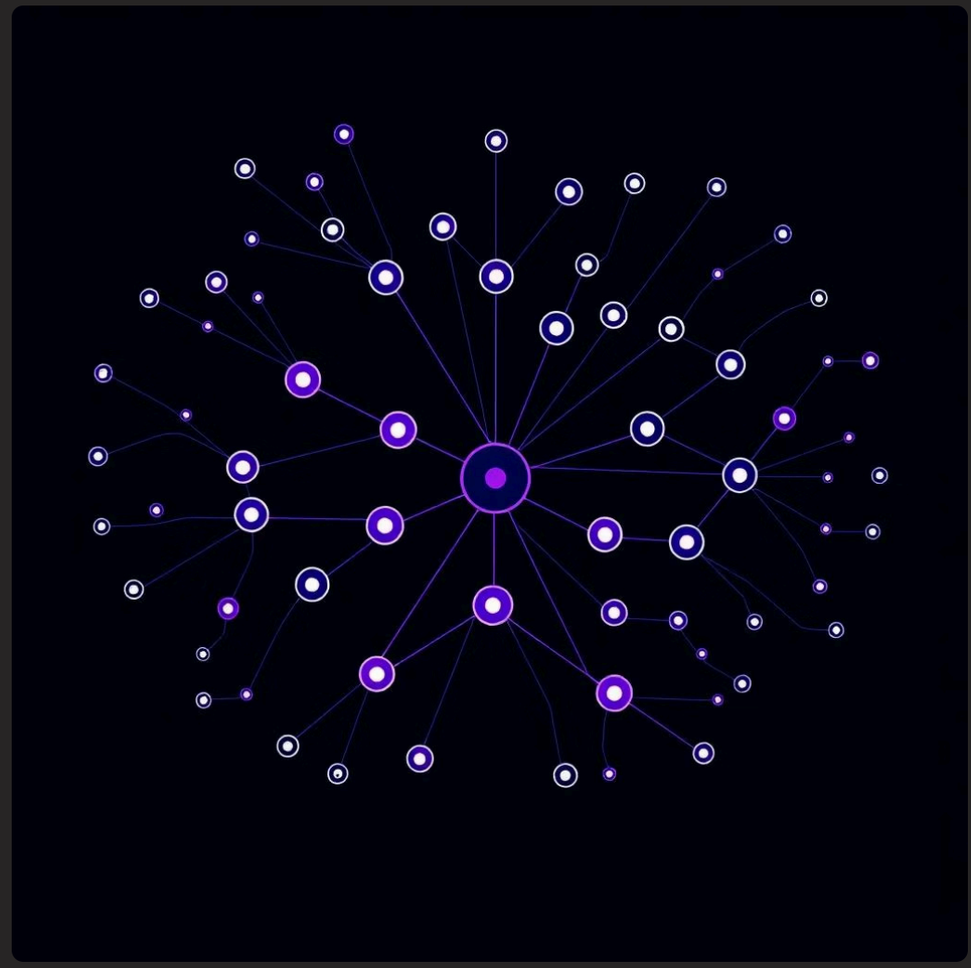
Uninformed Search Algorithms

Algorithms Explored

- Breadth-First Search (BFS)
- Depth-First Search (DFS)
- Depth-Limited Search
- Iterative Deepening Search
- Bidirectional Search

Key Characteristics

These algorithms explore the search space systematically without any domain-specific knowledge or heuristics. They are crucial for understanding basic search mechanisms.



Informed Search Algorithms

Utilising heuristics for enhanced efficiency.

Heuristic Search

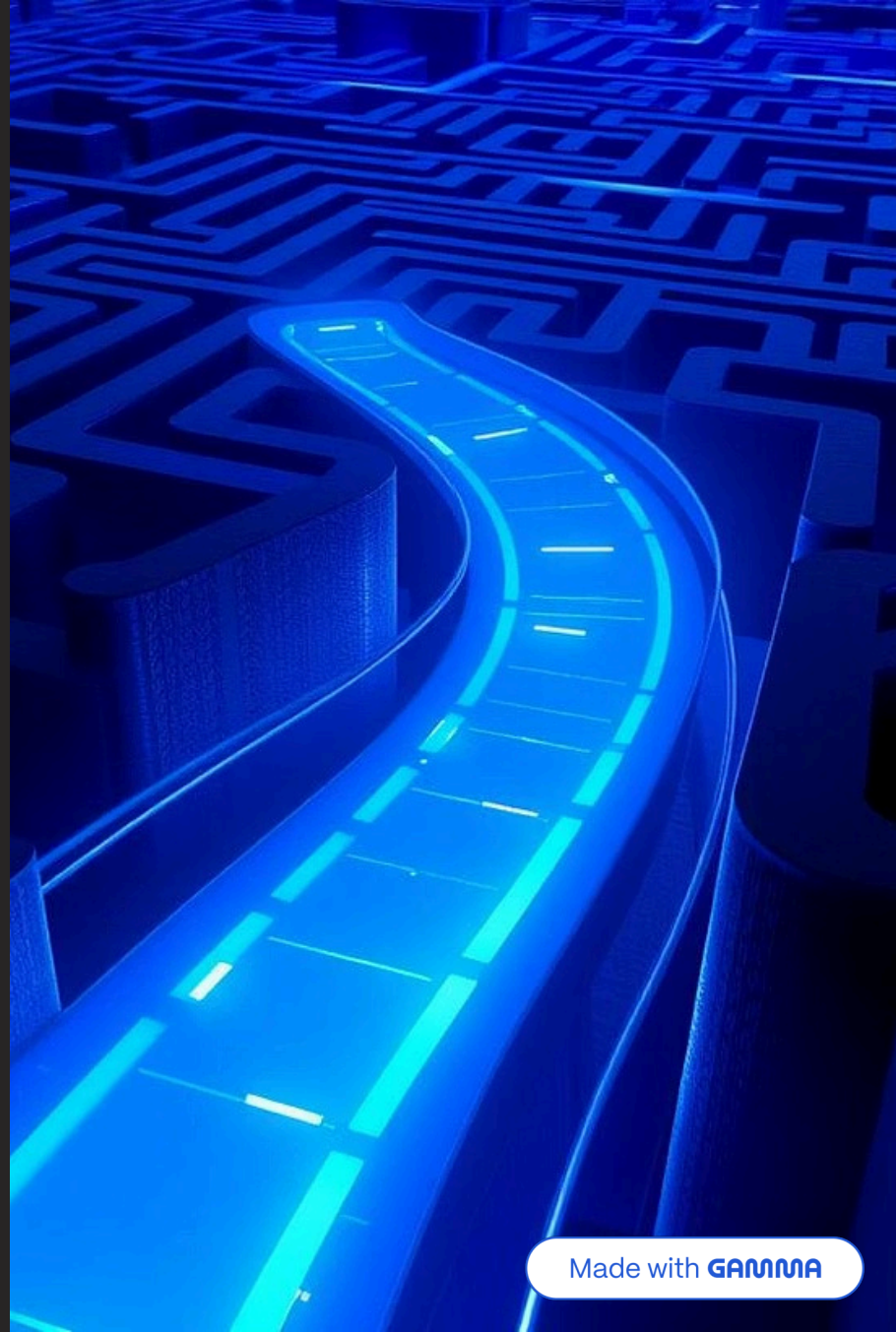
Guiding search with estimated costs

A* Search

Optimal and complete pathfinding

AO* Algorithm

For AND/OR graphs



Game Playing with AI

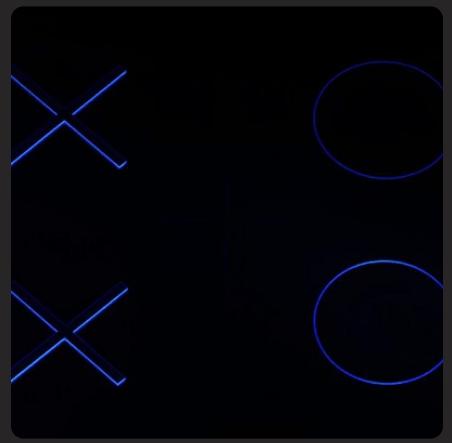
AI strategically chooses optimal moves.

Tic Tac Toe (Minimax)

- Decision tree simulation
- Unbeatable AI opponent
- Project: Player vs AI

Chess AI (Minimax + Evaluation)

- Depth-limited Minimax
- Material-based evaluation
- Pygame UI: Player (White) vs AI (Black)



Maze Solver (BFS)

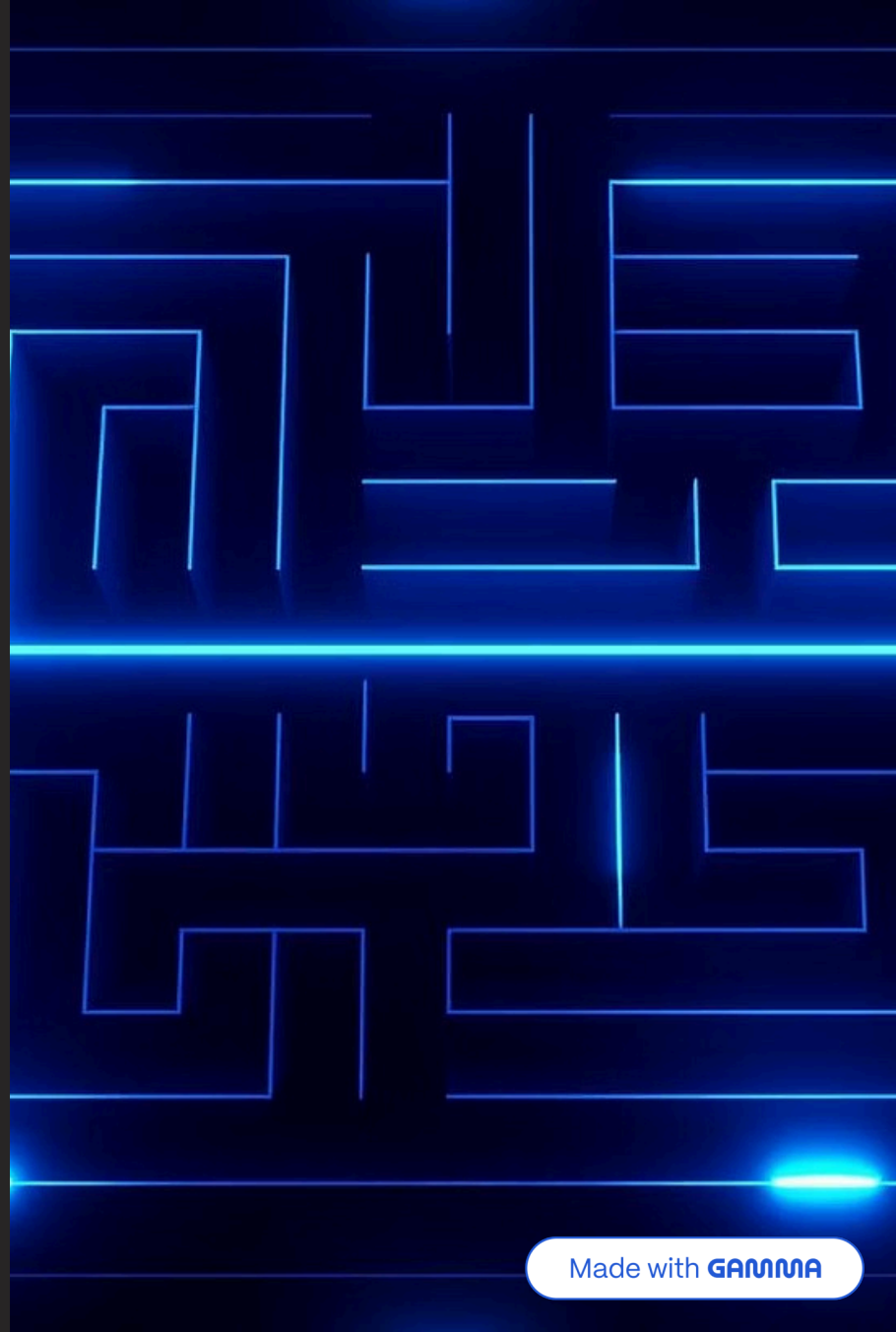
Finding the shortest path in an interactive environment.

BFS Algorithm

- Level-wise exploration
- Guarantees shortest path
- Efficient for unweighted graphs

Lab Project: Interactive 10x10 Maze

Users define maze walls, start, and end points. The AI then navigates the shortest path using the Breadth-First Search algorithm.



🚀 Where AI is Used Today:

- Self-driving cars (e.g., Tesla Autopilot)
- Voice assistants (Siri, Alexa, Google Assistant)
- Chatbots and virtual customer support
- Recommendation systems (Netflix, YouTube)
- Healthcare diagnostics and drug discovery

🎓 Key Takeaways:

- Understood how different search algorithms solve problems
- Learned how AI makes decisions in games and real scenarios
- Built hands-on AI projects (Maze Solver, Tic Tac Toe, Chess)
- Gained experience using AI tools for content creation
- Developed deeper interest in the field of Artificial Intelligence

Tools and Conclusion

AI unites theory and coding for practical problem-solving.

Development Tools

- Python (Core language)
- Pygame (Game UI)
- Python-chess (Chess logic)
- HTML, CSS, JavaScript (Web projects)

Presentation & Design Tools

- Canva
- Pictory
- Beautiful.ai