



AI-Based Snake Game

An Intelligent Pathfinding Approach

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OUR VISION

- ▶ At the core of our project lies the vision of enhancing the classic Snake game using Artificial Intelligence. We aim to create an intelligent, dynamic, and strategic gameplay experience by integrating AI-driven pathfinding.
- ▶ Smart Snake Navigation: Using the A (A-Star) pathfinding algorithm*, our snake intelligently finds the shortest and most efficient path to its target food while avoiding obstacles.

OUR MISSION

Our mission is to redefine the classic Snake game by integrating advanced AI-driven gameplay for a smarter and more engaging experience.



Innovation in AI Gaming 🧠 –
Implementing A pathfinding algorithm* to
enhance real-time decision-making,
making the snake more intelligent and
strategic.



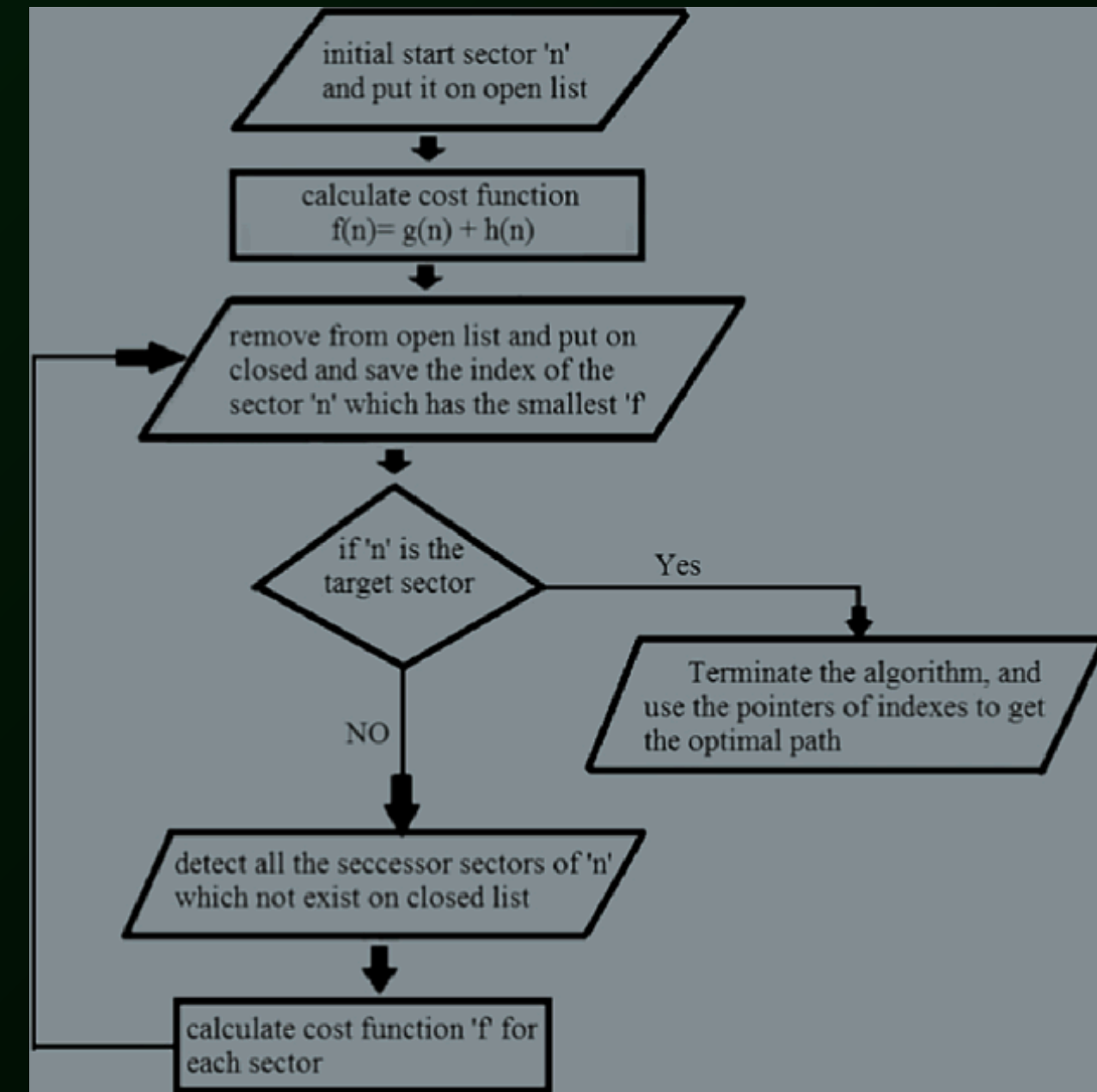
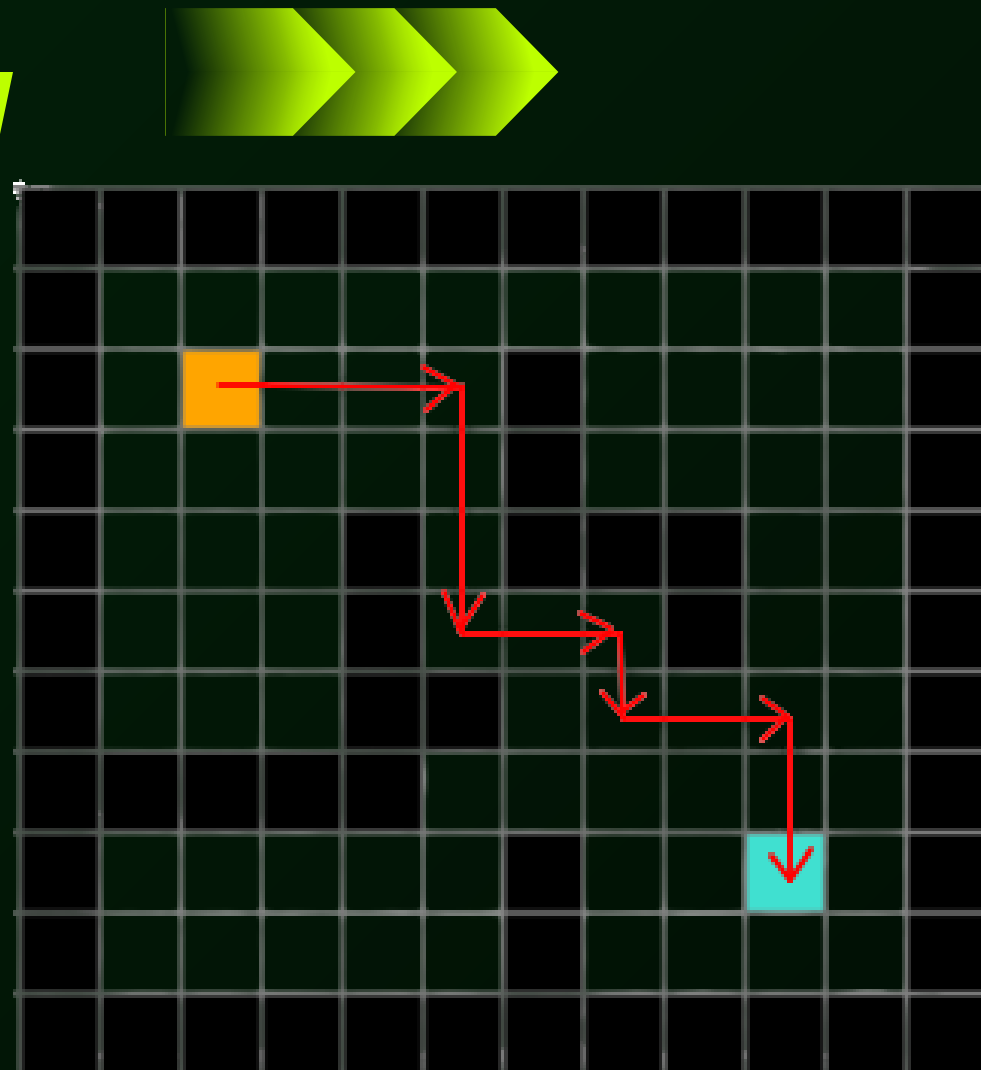
Future Scalability & Enhancements 🚀 –
Aiming to integrate deep reinforcement
learning (DQN), multiplayer features, and
power-ups for a more immersive gaming
experience.



UNDERSTANDING THE A* ALGORITHM

The A (A-Star) Algorithm* is a powerful pathfinding and graph traversal algorithm used in AI to find the most optimal route from a starting point to a target.

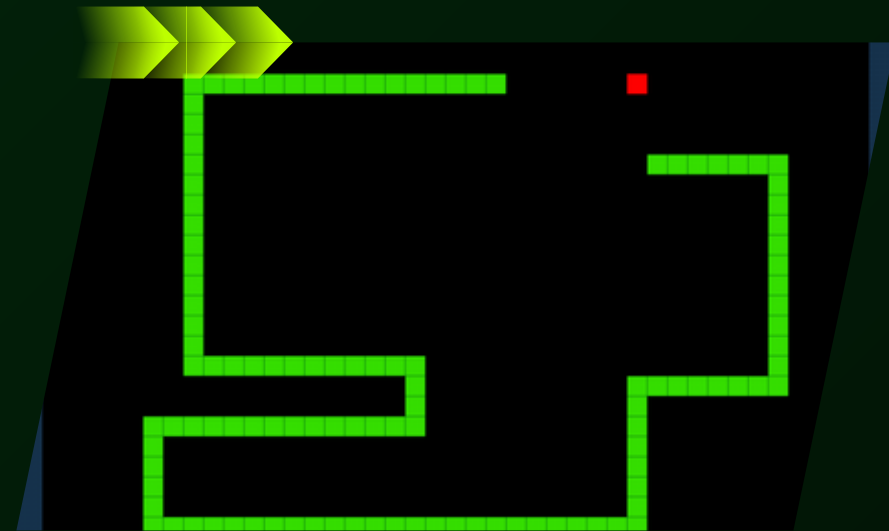
- Uses Heuristic + Cost Function → Finds the shortest path efficiently.
- $G(n)$ → Actual cost from the start to the current node.
- $H(n)$ → Heuristic cost (estimated cost from current node to goal).
- $F(n) = G(n) + H(n)$ → Prioritizes paths with the lowest total cost.



Why Use A* in Snake AI?

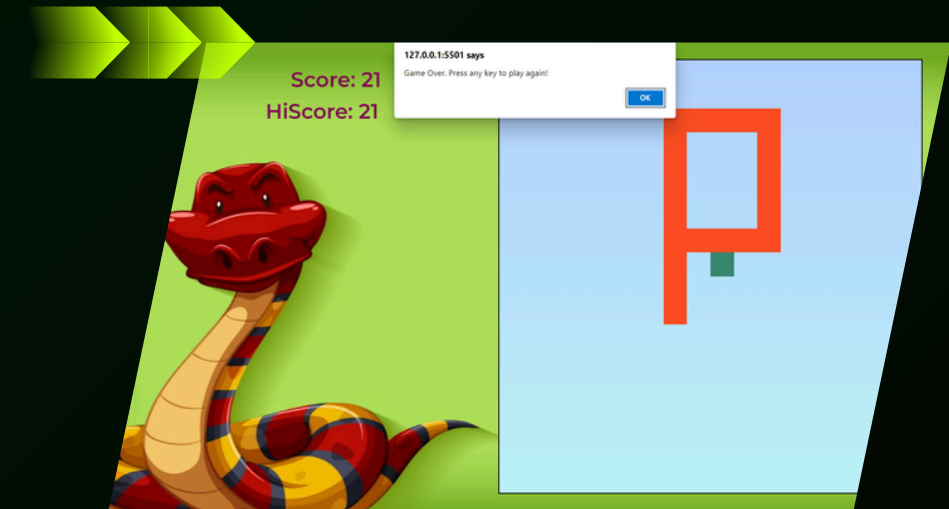
- Helps the AI snake find the quickest and safest path to food.
- Avoids obstacles like walls and itself for smarter navigation.
- Ensures smooth and optimized movement without random behavior.
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IMPLEMENTATION & FEATURES



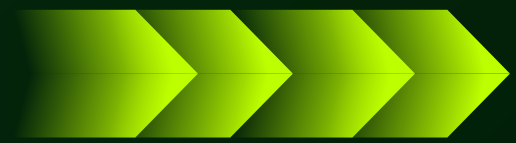
Game Features

- Implemented in Python using Pygame.
- Real-time A* path computation.
- Dynamic obstacles (snake's own body).
- Automatic path correction when obstacles appear.



Challenges Faced

- Handling edge cases like walls and dead-end paths.
- Optimizing performance for smooth gameplay.

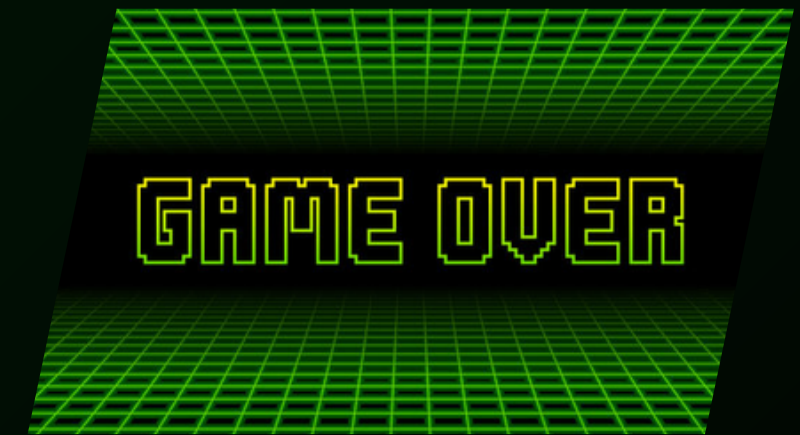


CONCLUSION

Successfully implemented AI-controlled Snake using A*

Future Enhancements:

- Integrate DQN-based AI for more advanced behavior.
- Add a toggle switch for algorithm selection.
- Implement online multiplayer for competitive gameplay.
- Introduce power-ups and additional game mechanics.



Bringing AI into gaming – one move at a time!

THANK YOU