universidade de aveiro

# SNAKE Project

## SISTEMAS INTELIGENTES I

**2024/2025**

**Rafael Morgado 10427**

**Salomé Dias 118163**

**David Mendonça 107360**

# Objectives

universidade de aveiro

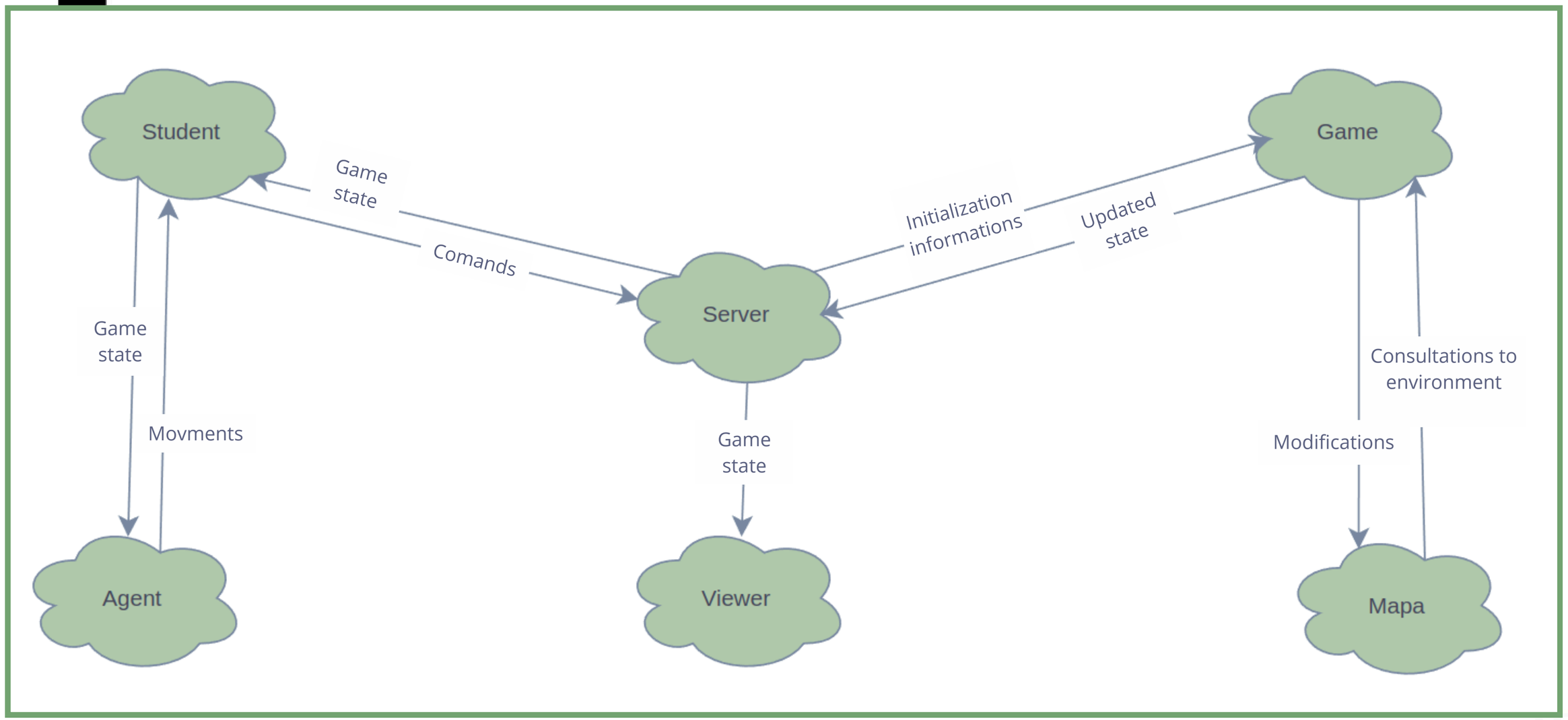
- Create an autonomous agent capable of maximizing your score in the Snake game, efficiently navigating the map and avoiding collisions.
- Use search AI algorithms to evaluate movements and find optimal solutions in real time.
- Adapt the agent's behavior based on partial map information, planning movements based on available data around the snake's head.
- Develop strategies to deal with superfoods and poisons, whose effects can vary positively or negatively, directly impacting the agent's performance.
- Ensure that the agent achieves an average score of at least 50 points in simulated games, with the aim of competing effectively against other agents in multiplayer games.

# Main components

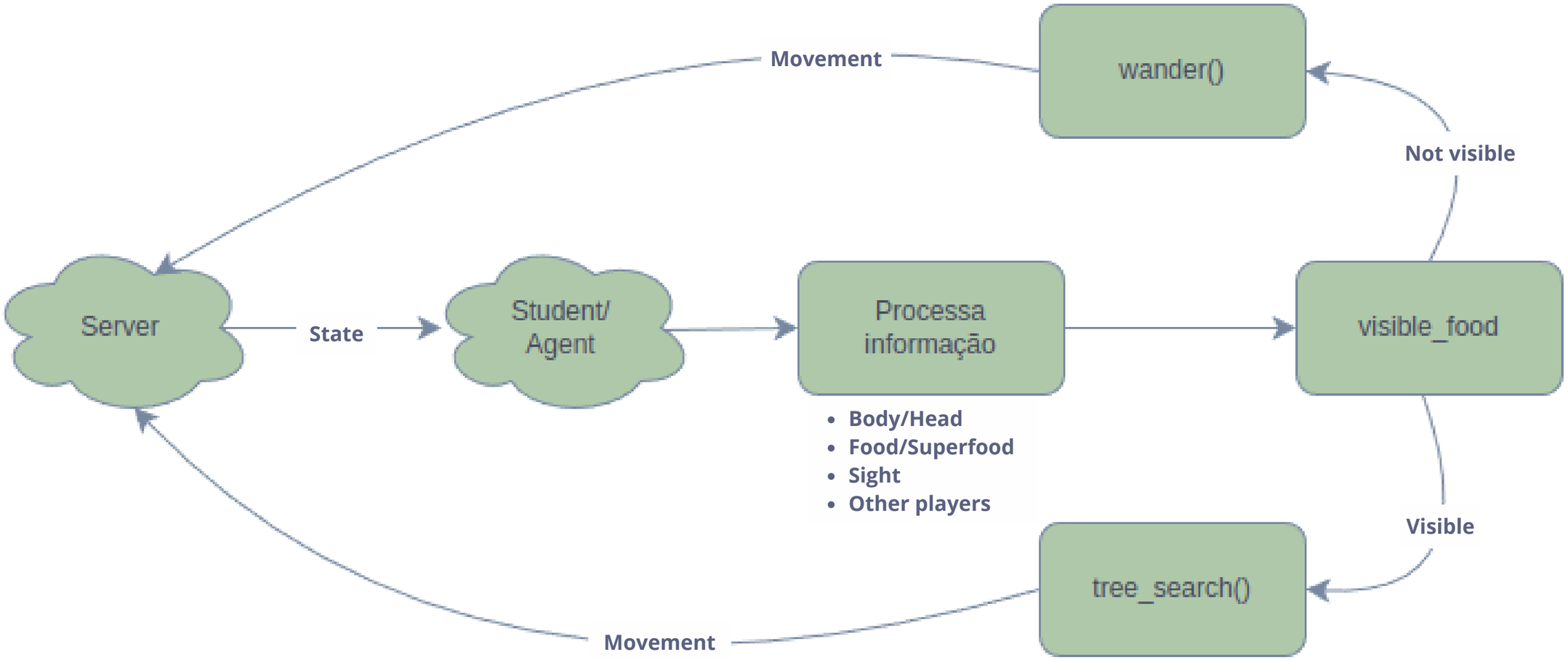
- **Server:** Controls the general flow of the game, receiving and sending data to other components.
- **Game:** Manages game mechanics, such as snake movement, collisions and food spawns.
- **Map:** Provides the game environment (such as obstacles, food, snake positions) and handles map logic.
- **Client/Student:** Connects the agent to the server and forwards the data.
- **Agent:** Makes strategic decisions based on the state of the game.
- **Viewer:** Visually displays the state of the game.

# Overview

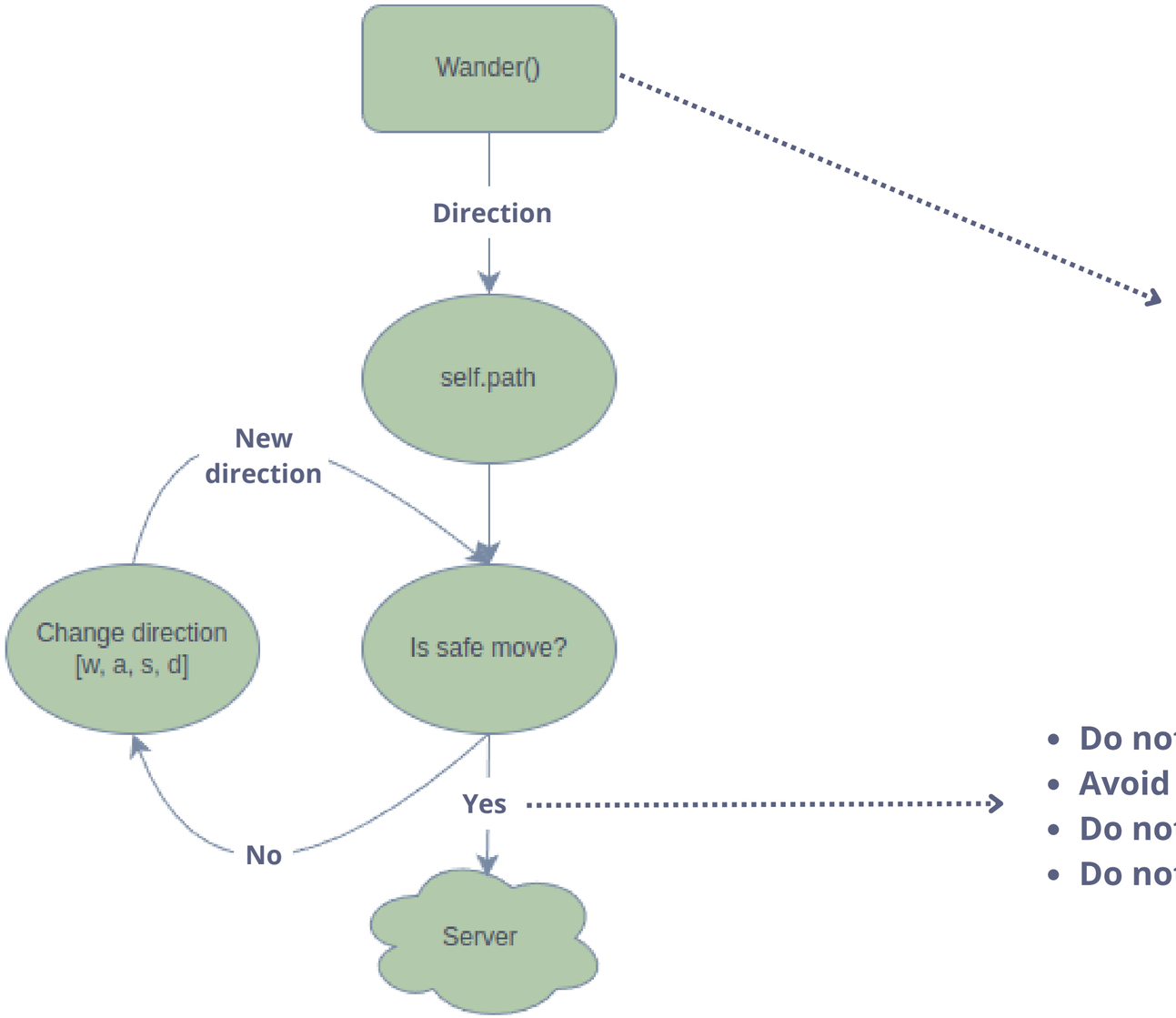
universidade de aveiro

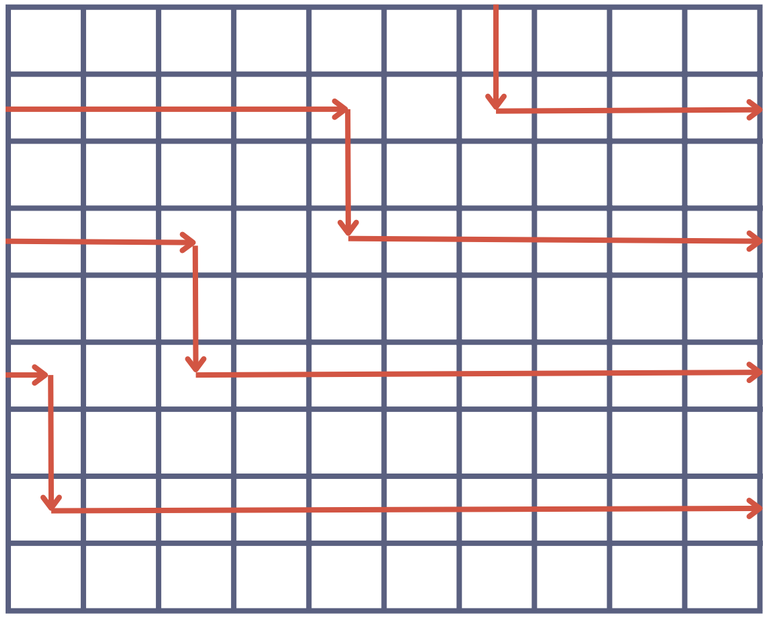


# Flow Chart


Movement
wander()
Not visible
Server
State
Student/
Agent
Processa
informação
visible_food
Body/Head
Food/Superfood
Sight
Other players
Visible
tree_search()
Movement

# Wander()



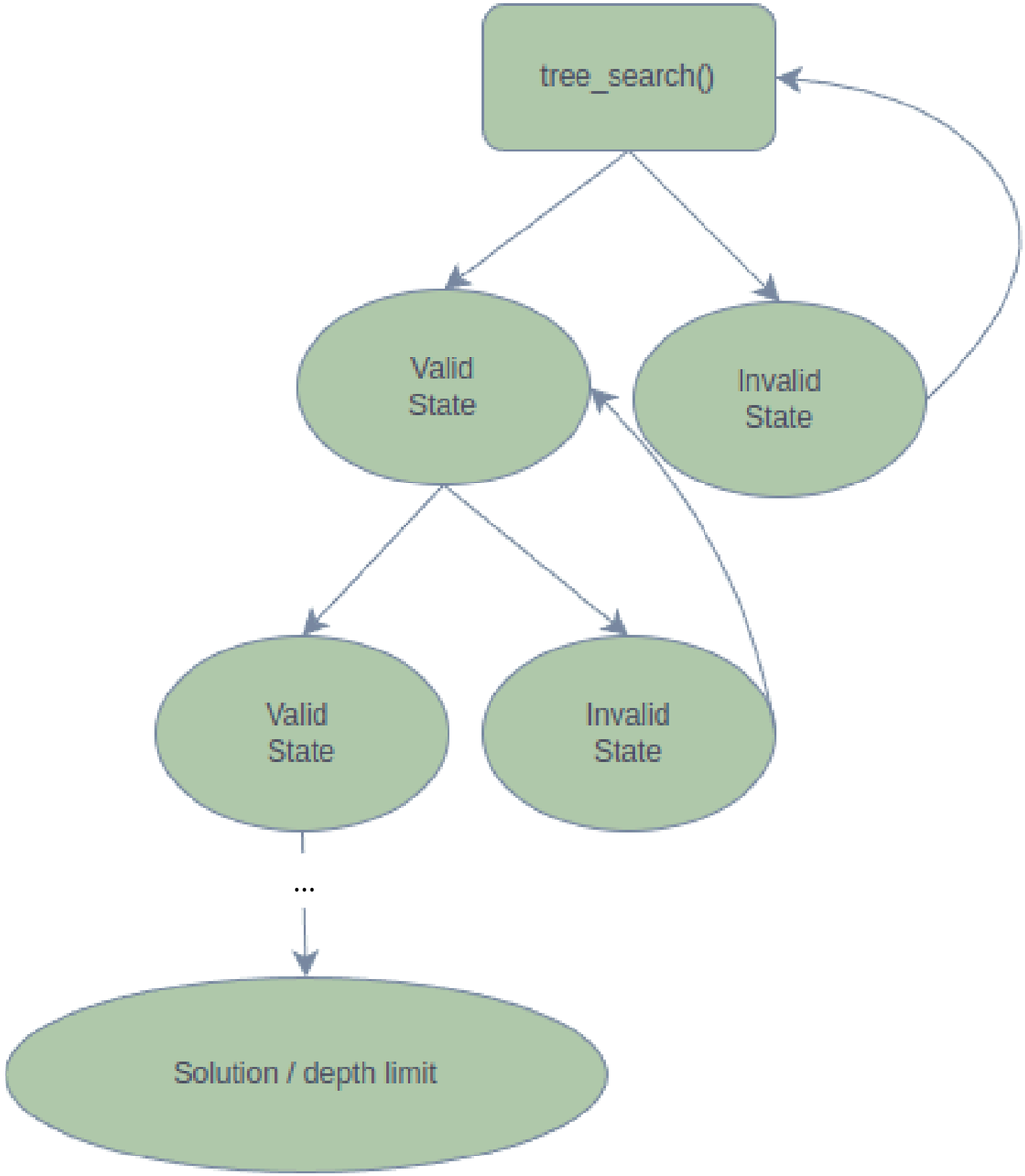



- Do not collide with your own body.
- Avoid Super Fruits.
- Do not make movements opposite to the current direction.
- Do not collide with other snakes (Multiplayer).

# Tree_searh()

universidade de aveiro

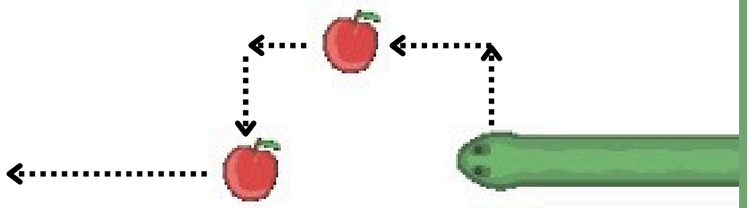
- **In this case the solution is the movement that takes the snake to the closest state to the nearest visible food.**



# Heuristic

universidade de aveiro

- **The implemented heuristic aims to guide the snake toward the nearest food, allowing the agent to maximize the score by prioritizing movements that reduce the distance to the food.**

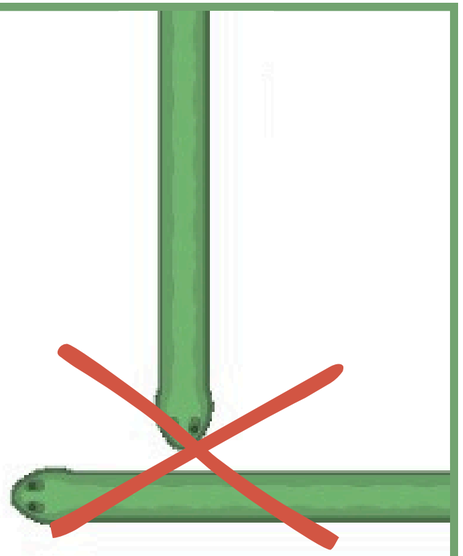


# Invalid state

universidade de aveiro

**Conditions that render a state invalid:**

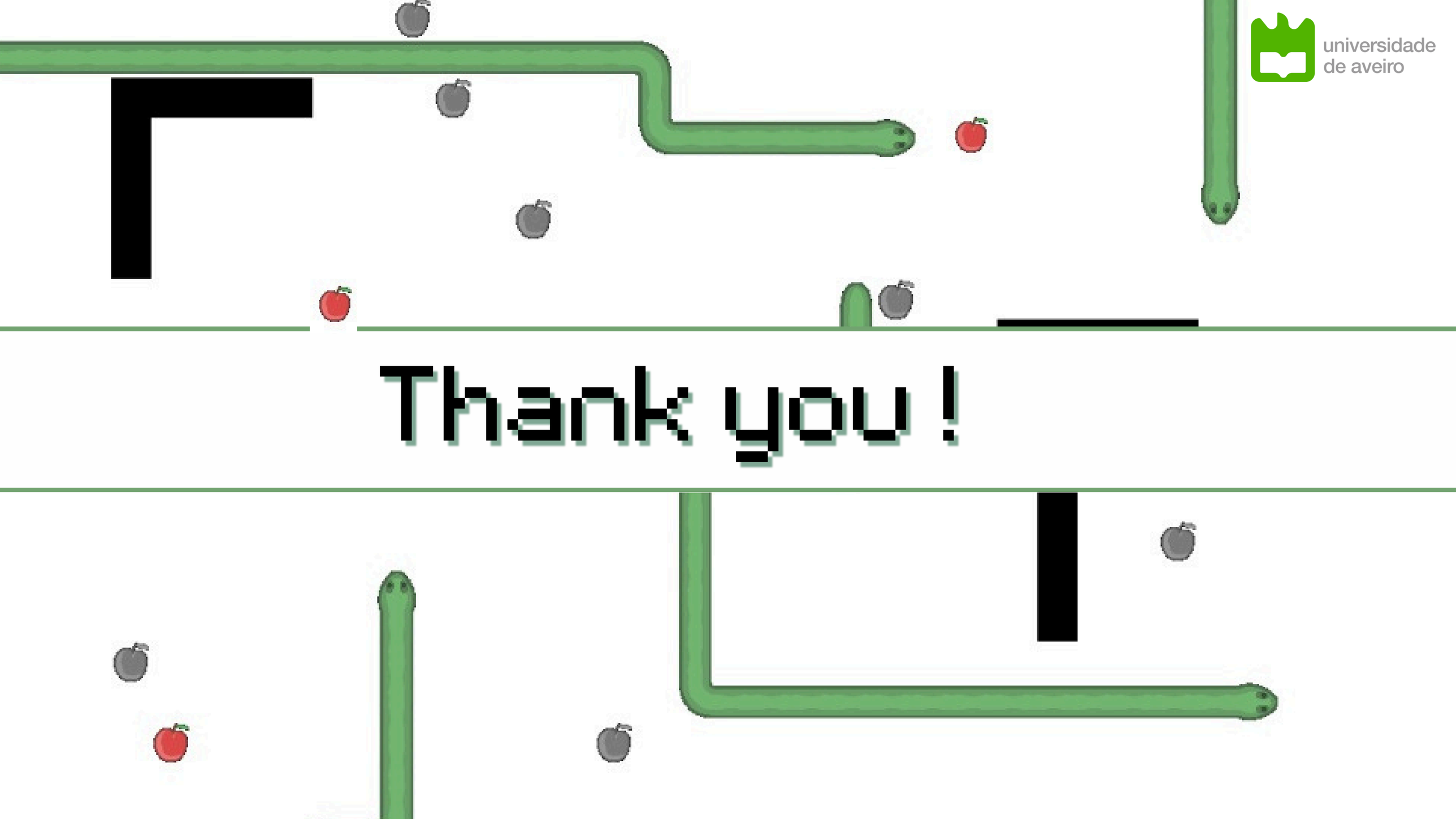
- Collisions with its own body.
- Collisions with Super Foods.
- Increase in distance to the nearest food.
- Reverse movements.
- Collisions with other snakes (Multiplayer).



# Conclusion

universidade de aveiro

- **In this work, we successfully developed an autonomous agent for the Snake game capable of reaching at least 50 points.**
- **The implementation focused on creating an adaptable system capable of safely exploring the environment, avoiding collisions, and maximizing the score by capturing visible food.**
- **The project also demonstrated how decision-making strategies can be applied in dynamic and real-time scenarios, providing a solid foundation for future improvements.**


Thank you !