Car parking

AOSE Project

Project idea

Develop a multi-agent system based on a parking system.

Each car have to park in a predefined slot.

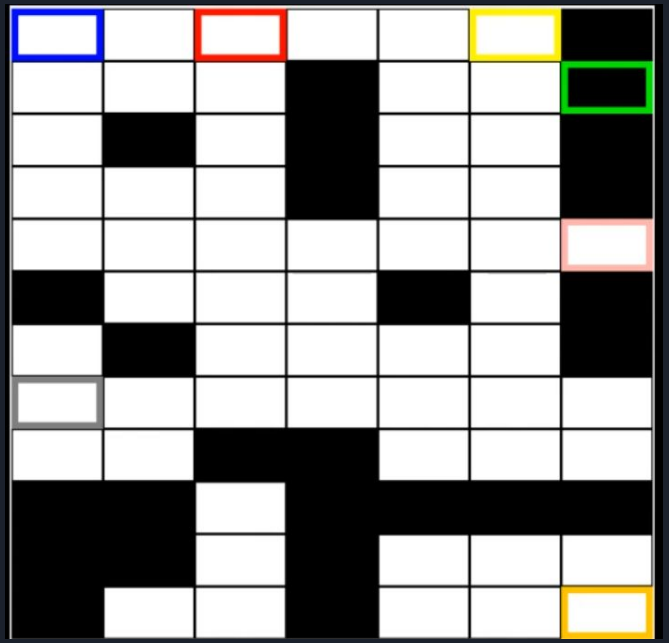
Each car does not know if there are other cars and where they are.

There are normal cars and slower cars.

Environment

The parking structure is defined as a grid and can contain:

- Fixed obstacles
- Cars
- Slow cars
- Parking slots



Agents - Car

A car is a type of agent which has to reach its goal.

The goal for a car is to park itself in a specified slot which has been defined inside the problem.

A car can:

- Move left
- Move right
- Move up
- Move down
- Check the environment

Agents - Slow car

A slow car is a special type of car which needs to wait before performing a move action.

The goal for a car is to park itself in a specified slot which has been defined inside the problem.

A slow car can:

- Move left and wait
- Move right and wait
- Move up and wait
- Move down and wait
- Wait
- Check the environment

Actions - Move (up down left right)

A move action consists in moving a car in a direction in order to reach its goal.

Before moving, a car has to check if there is enough space where it wants to move, in order to avoid crashes against cars.

Actions - Move and wait (up down left right)

A move and wait action consists in moving a slow car in a direction in order to reach its goal.

Before moving, a slow car has to check if there is enough space where it wants to move, in order to avoid crashes against cars.

After each move a slow car has to perform a wait action, in order to “slow” the car.

Action - Wait

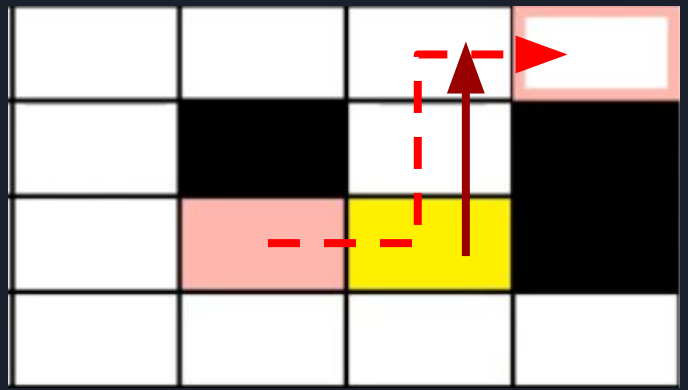
This action is used to “slow” a slow car in order to let “faster” cars perform more move actions.

Check the environment

Before moving, each car checks if there is no problem on moving in order to avoid crashes.

It is possible by checking the environment on the “next” position if there is another car.

What happens if a car cannot move?

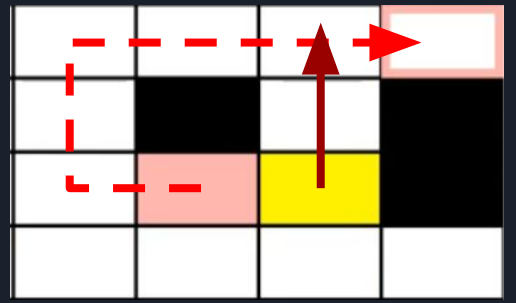


Recalculate path

If a car finds another car on its path, it stops and recalculates another path.

Then two option can occur:

- New path found → Follow the new path
- No path found → Try to recalculate again



Why recalculate again?

A car could have moved unlocking a new path. If no way are found it will recalculate at most 10 times before aborting if there are no options.

Pros and cons

Pros

Cars are independent

Car checks before moving

Car recalculates plan

Cons

Cars can check only near themselves

Car forgets about the others

Further useful implementation

Check further to find other cars.

Define directional routes.

Ask for shifting to active cars.

Summary

Environment agent notifies each car of the static structure of the parking system.

Each car receives its goal.

Each car calculates a plan to reach its goal.

Before moving (intention), each car checks if there is another car on its way (sensing).

If a car is found, updates beliefs and recalculates a new plan.

Slow car needs to wait before performing another move action.

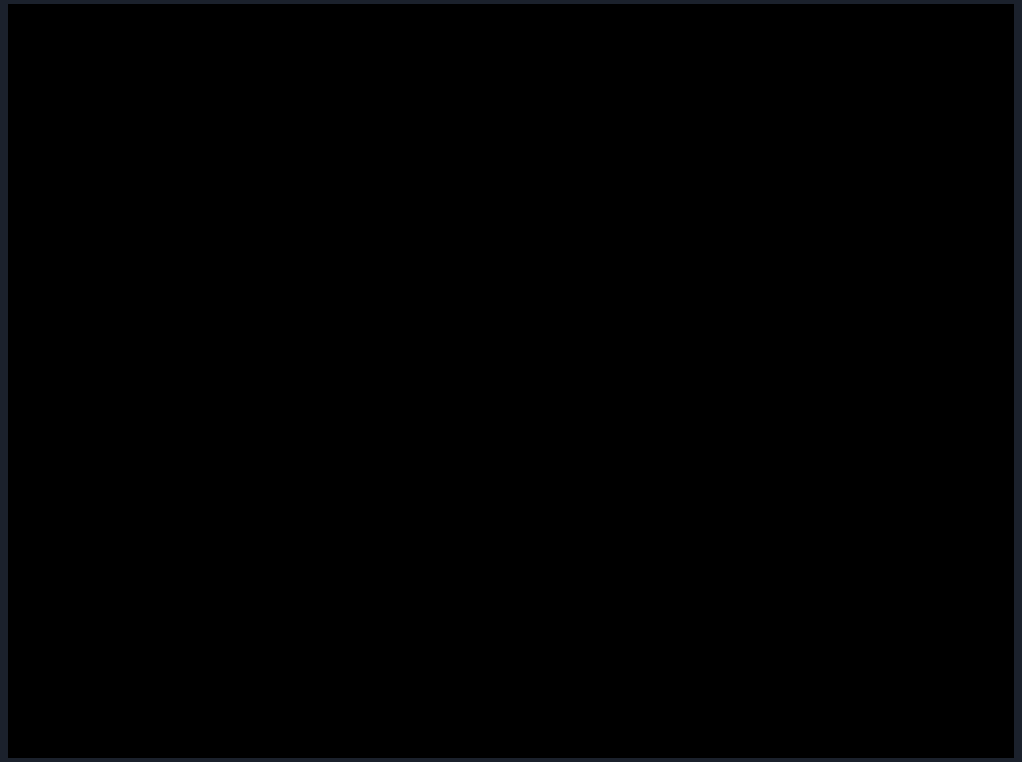
Video

Fast cars

c0

c4

c5



Slow cars

c1

c2

c3

c6

Thank you for the attention