Project Proposal: Traffic directing training

Team Members

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Project Goal (1A4 at most)

The goal of this project is to make a simulation game where the player's objective is to manage the traffic lights of a village so that cars traversing it reach their desired destination as soon as possible. In order to accomplish this objective, the player will have to change the traffic light times and make them depend on the size of the queue. Each individual car will try to get from a random starting point to a random goal point, following a route. Apart from showing the cars moving around the village map, the game will display a set of measurements to evaluate the proposed design.

Additionally, the user will be able to simulate the same scenario under different traffic volumes, preferred destinations, maximum allowed speed and proportion of type of vehicles (trucks and standard cars).

This game will allow users to simulate traffic plans that evade or minimize traffic jams in villages. The act of playing serves as training and testing. As the user becomes familiarized with the game, he/she will be able to 1) develop a sense of urban planning 2) design efficient traffic lights for urban zones 3) simulate already existing setups under different conditions.

Agents and AI aspects (1A4 at most)

The most important requirement for a traffic simulator is that drivers behave realistically. One might think that a driver can be simulated with just a departure location and a fixed route to follow. However, drivers possess individual wishes of mobility and manifest them in complex behaviors: they react to the surrounding cars, can replan their paths under inconveniences and become impatient if they get stuck in a traffic jam for a long time. Apart from including this set of behaviors, drivers need to be able to react to the elements that the user will change. We believe that modelling drivers as agents will allow us to achieve this level realism.
For the implementation, we will approach the problem on global and a local scale:

- **In the global scale**, a path planning algorithm will be used to calculate the routes of the cars. This will try to optimise the route similarly to how navigational software does. However, drivers may replan their route if a path is blocked, congested, or the driver feels impatient.

- **In the local scale**, drivers will react to their surroundings by making rule-based decisions. They will adjust their speed to maintain a certain distance to the car on the front, accelerate if the road is clear and stop if they encounter a red light or predict a collision. Drivers can also feel impatience. The impatience of a driver is determined by comparing the desired time of arrival versus the predicted time of arrival. Impatient drivers drive faster and more aggressively than normal drivers. Finally, drivers must be able to maneuver through traffic to change lanes or overtake slower cars.

We believe that the behavior resulting from joining these two algorithms will reach the desired level of realism for the simulator.

**Planning with Deadlines**

- **Requirements Identifications**: 9 May
- **Literature Research**: 9 - 15 May
- **Presentation preparations**: 15 - 21 May
- **Simulator development**: 10 May - 20 June
  - **Car movement**: 10-17 May
  - **Path planning (Global behavior)**: 10-20 May
  - **Driver Response (Local behavior)**: 21 May - 15 June
  - **UI development**: 10 - 20 June
  - **Scenario building**: 20 May - 1 June
- **Testing**: 21 - 24 June
- **Evaluation**: 25 - 26 June
- **Report Writing**: 10 - 28 June