Assignment 1 - Problem statement, methods and tools

Brief description of the problem to be modelled

Parking lots are incentivizing the use of electric-vehicles by reserving a certain number of parking spaces for these clients. But what scheme is the best for choosing such spaces?

Goals of the simulation project

Simulate several schemes and evaluate them to understand how they are affected by some variables and figure out if there is a better scheme. The schemes to be tested are:

- Priority: Several parking spaces are set to be only available for electric-vehicles.
- On-Demand: The number of parking spaces for electric-vehicles changes depending on the need of the current system.
- Time-based: For a defined period, some parking spaces are only available for electric-vehicles.
- Membership: Several parking spaces are set to be only available for electric-vehicles, but premium membership vehicles have priority over their spaces.

Main entities of the system

- Parking Spaces
- Vehicles

Variables of the system

- Number of regular parking spaces
- Number of electric-vehicle parking spaces
- Number of regular vehicles
- Number of electric-vehicles
- Number of premium-vehicles
- Hour of the day
- Number of regular vehicles on a queue

- Number of electric-vehicles on a queue

- Number of premium-vehicles on a queue

Operation policies to be tested (scenarios)

How each scenario performs in several parking lot structures, in different ratios of regular/electric vehicles.

Key performance indicators and decision criteria

- Average wait time of a vehicle on a queue

- Maximum wait time of a vehicle on a queue

- Minimum wait time of a vehicle on a queue

- Use of parking spaces in relation to waiting vehicles: ((Total spaces - spaces in use) / vehicles in queue) - 1

Data requirements

- Create at least three common different parking lot structures based on used irl ones.

Simulation tools, environments, languages

- Python

- MESA