



Project 01 Guide (P01)

Artificial Intelligence, 2022-23

1. Introduction

This document presents two proposals for the development of project 01: mobility and class schedules. The goal of the project is to develop an intelligent agent, documenting the design and implementation steps. The requirements for documentation are included on the report template.

2. Mobility

The energy crisis and inflation have increased transportation costs. Since public transportation to the IPCA Campus does not always offer adequate schedules and access locations, it was decided to develop a platform that presents other solutions by dynamically sharing private vehicles. Whenever there are changes in the participants' schedules or vehicle availability, the platform should automatically reconfigure the travel plan.

Consider that all participants are assigned to a location and must register their address, vehicle capacity when available, and arrival and departure times from the Campus for each day of the week. A passenger interface location must have at least 10 passengers assigned to that location, or it is located at an access node to the Campus from another interface location. For each location a single base fare is defined for the trip to/from the Campus that covers the average costs of fuel and maintenance of a vehicle.

The return trip home can be made in a different vehicle than the trip to the Campus. To encourage car sharing and the use of their maximum capacity, usually 4 or 5 seats, the following table has been stipulated:

- trip with 2 occupants: passenger pays 40% and owner pays 60% of the base fare;
- trip with 3 occupants: passenger pays 30%, owner pays 40% of the base fare;
- trip with 4 occupants: passenger pays 25% and owner pays 25% of the base fare;
- trip with 5 occupants: passenger pays 20% and owner pays 20% of the base fare.

It is intended to minimize travels by maximizing the use of the vehicles capacity and minimizing costs for passengers and car owners. Waiting time on campus should also be minimized. Other specific constraints should be added to make this problem more realistic.

3. Class schedules

In the current scenario of energy crisis, it is intended to reschedule the schedules of classes of the undergraduate courses of the school of technology in order to reduce travel to campus and to lower the need for air conditioning.

Consider that all lessons, with a duration of 2 hours, take place on weekdays. All classes have 10 lessons per week, of which 1 or 2 lessons are online. A class should not have more than 3 lessons per day. Online lessons cannot be booked immediately or immediately after a face-to-face lesson. Only up to 2 lessons can take place in the morning and up to 2 lessons in the afternoon. Every class has 2 to 4 lessons in a specific classroom.

You must formulate and implement an agent that finds the best solution for class schedules, minimizing the number of days each class must travel to campus and the number of classrooms used. Solutions that have schedules with fewer holes should be valued. Other constraints should be added to make this problem more realistic.

4. Remarks about assessment

The project report should be submitted in the Moodle platform according to the schedule and the report template. The project report should include a **link to a Git repository** with the code developed under the project.

The project should be **later presented and defended** by the students. The code developed should be available in a repository. The working groups should be composed of **two or three students**.