laSalle
UNIVERSITAT RAMON LLULL

Assessment 5.
Search algorithms
GIA04 – Knowledge-based systems

Given a road map, find the path that goes from source A to destination B. It is requested that **you implement** the algorithms of **A* and CSP (Constraint Satisfaction Problem)**. Specifically, we want:

- In the case of **A*,** it is requested to find **the shortest path** to go from origin to destination.
- In the case of the CSP, find **a path** to go from origin to destination **respecting a set of restrictions**. The restrictions to be implemented are free but must make sense within the context of the problem: moving from one origin to a destination. An example could be to find a route that is not longer than a certain number of kilometers and that does not have any stage (travel between intermediate cities) of more than 90 minutes. It may be that there is no path between origin and destination that meets all the defined restrictions.

We provide you with a JSON file containing all the necessary information to represent the map (*Graph*). Feel free to create your own *dataset*, considering that this sample is the one that will be used for correction.

Deliverable

A **single .zip file must be submitted**, containing:

- **Implementation of the A* and CSP algorithms. It is necessary to explain in detail the implemented heuristics in the report.**
  The implementation of other search algorithms will be positively valued and, in this case, they will also have to be explained in the report.
- **Visualization of the results** in a graph indicating the solution path. You can also do this with a real map, indicating in a straight line the path followed between the different cities. In the latter case, you can also explore how to represent the path following real roads.
- **Readme** of the project to be able to execute it (version of Python and the libraries used).
- **Report**, which must contain at least the following points:
  1. Theoretical explanation of the algorithms and heuristics implemented.
  2. Results obtained and tests performed.
  3. Comparative report between algorithms:
     - Advantages and disadvantages (or limitations) of each algorithm.
     - Solutions found / not found and justification of the results.
  4. Bibliography / References

Considerations

- You will find the **sample dataset** uploaded to the **eStudy**.
- **To be implemented** with the **Python programming language**.
- **Groups of three people**.
- It is necessary that the **report** is **well written** and without spelling mistakes, and that the algorithms and comparisons between them are extensive and explained in as much detail as possible.