GIS²: A GEOGRAPHICAL INFORMATION SYSTEM AS A HELP AGAINST THE GENDER INEQUALITY SOCIETY

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Problem

Goal 11 of Agenda 2030 is to make cities and communities inclusive, safe, continuous and sustainable, with special attention to the needs of people most vulnerable, as women, children, people with disabilities and the elderly [1]. Particularly relevant to this issue is the gender inequality, highlighted by the Feeling Safe at Night feature of the How's Life - Well-being dataset, offered by OECD.Stat [2].

The idea underlying GIS²

To increase the feeling of safety, we integrated a functionality, named GIS², into the existing application ExploreUNISA initially developed to let people learn more about our campus, in terms of services and shortest routes to reach given locations [3]. The feature GIS² is addressed to calculate the safest route by performing an analysis, which takes into account additional parameters, such as lighting, presence of cameras, and presence of people in all areas of interest on campus, based on the time chosen.

Methods and materials

Previous papers [3, 4] have analyzed solutions that fit the proposed issue. This allowed us to determine the necessary data for such an analysis, which was processed by using QGIS on Open Street Map. Following that step, this data was used to construct a weighted graph to optimize the route calculation. Unlike the Bellman Ford algorithm, which reduces the number of nodes to reach the destination [4] and is therefore less secure, the Dijkstra algorithm was used, which passes through more nodes thus increasing the possibility of finding more people.

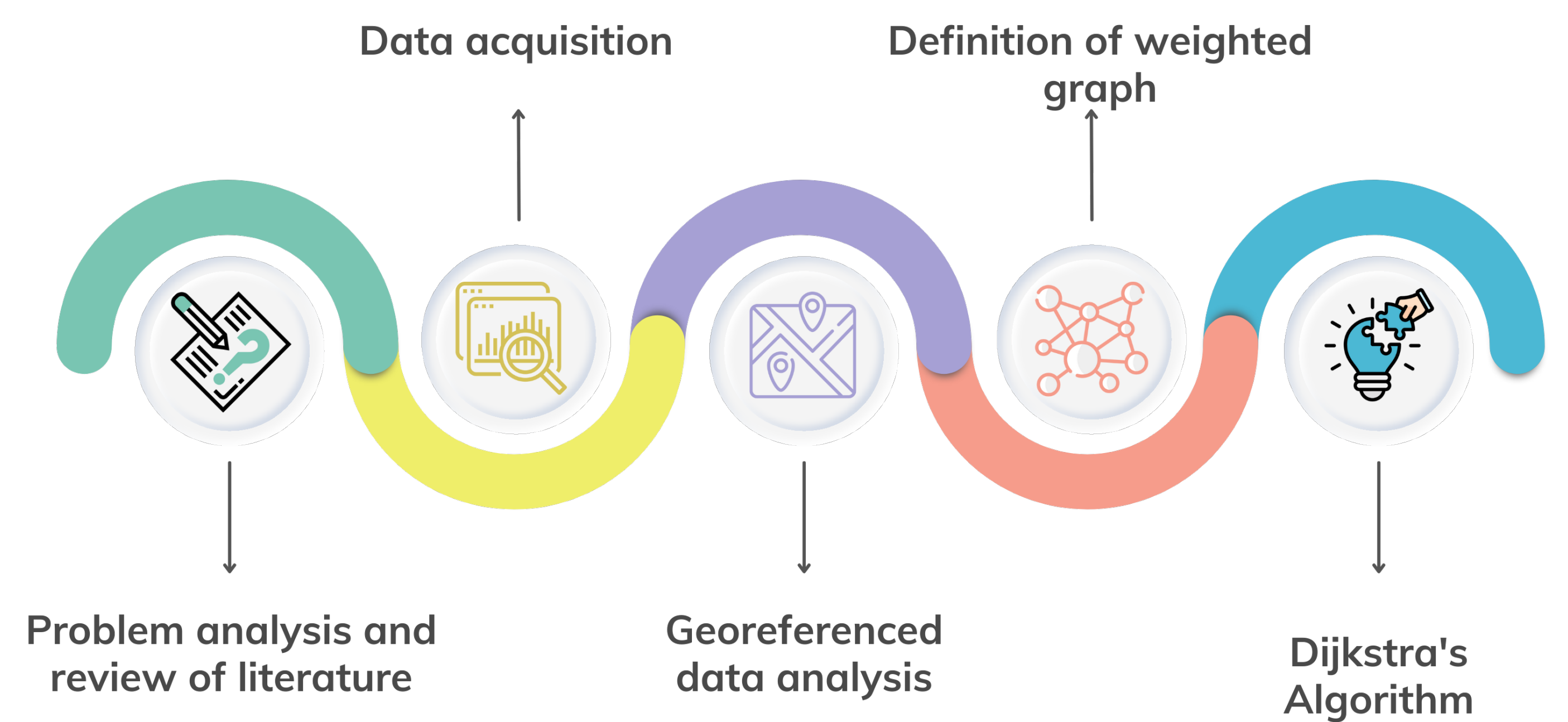Figure 1 shows the steps taken to accomplish these goals.

Data acquisition
Definition of weighted graph
Problem analysis and review of literature
Georeferenced data analysis
Dijkstra's Algorithm

Figure 1. Designing GIS²

GIS² Interface

GIS² improves the sense of safety of students at the University of Salerno and allows the university staff to identify areas where it can increase security, such as by setting up video cameras and lighting. Figure 2 shows the interface for interacting with the feature.
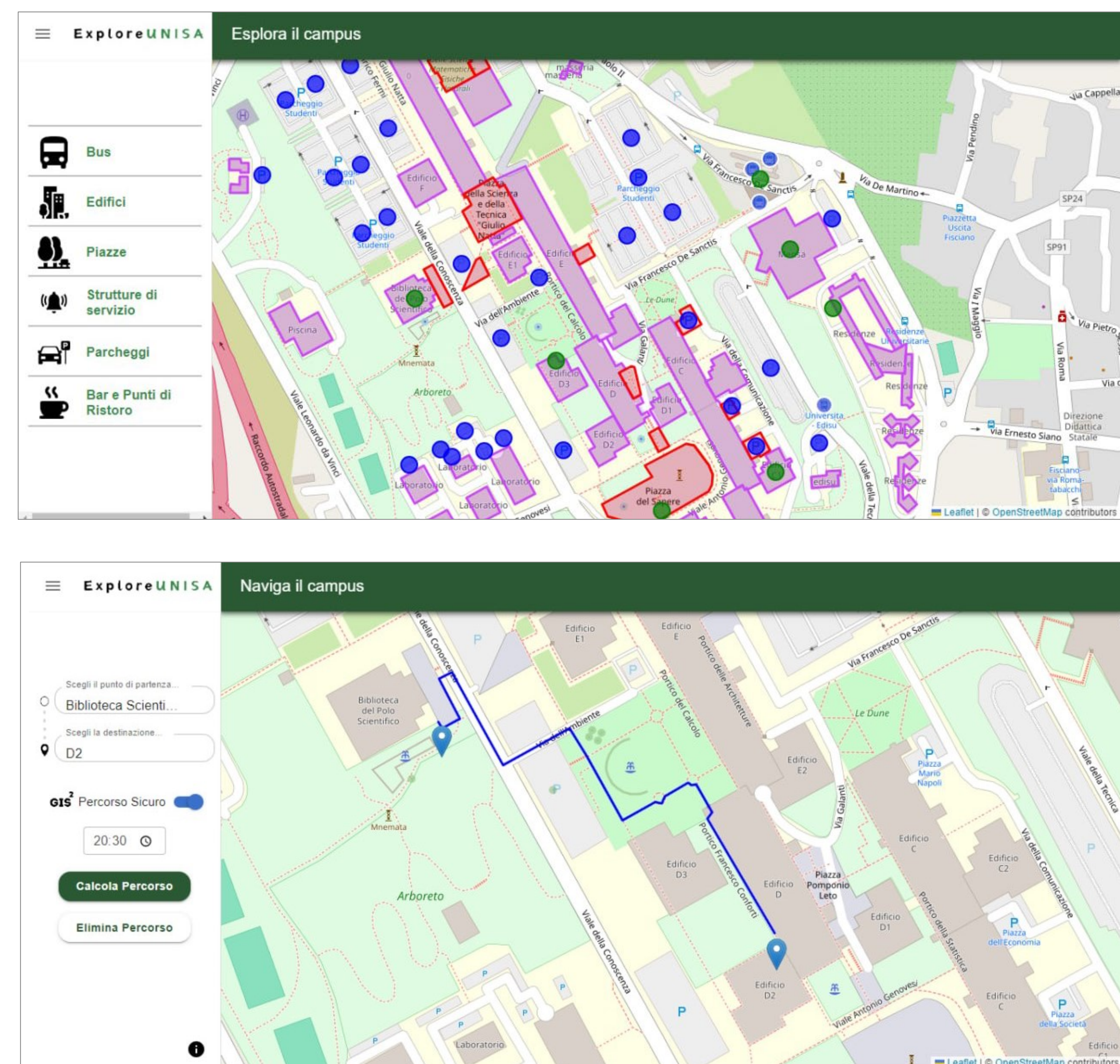

Figure 2. GIS² interface

References

1. https://sdgs.un.org/topics/sustainable-cities-and-human-settlements
2. https://stats.oecd.org/
3. TÜKEL, Ezgi, et al. A GIS-Supported Analysis on Accessibility in Women-Friendly Societies: Evaluation of Walking Routes at Night Hours. Eskişehir Technical University Journal of Science and Technology A-Applied Sciences and Engineering, 2023, 24.4: 275-288.
4. PRAMUDITA, Rully, et al. Shortest path calculation algorithms for geographic information systems. In: 2019 fourth international conference on informatics and computing (ICIC). IEEE, 2019. p. 1-5.

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