WizRD A Framework for Personalized Wayfinding

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MULTILAYERED URBAN SUSTAINABILITY ACTION

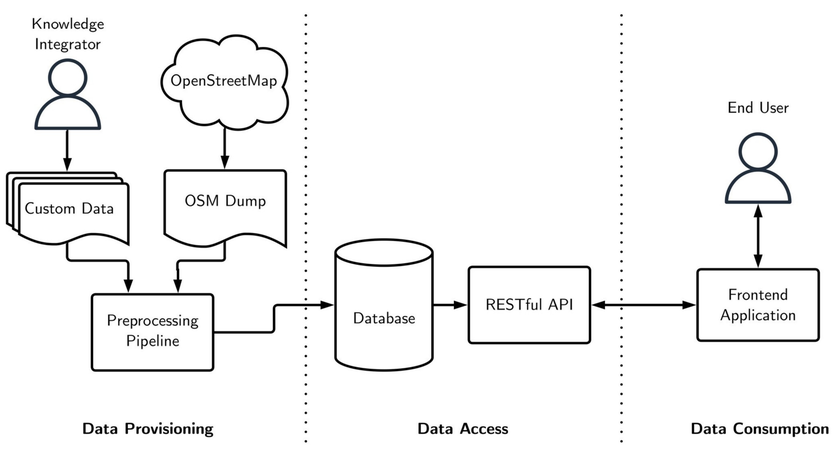
Rationale

Routing systems (e.g. Google Maps) usually strive to minimize "hard" metrics such as **distance** or **time**. Different people, however, may perceive a route differenly: a fast road might be unsightly, smelly due to smog, or insecure due to the lack of proper infrastructure. Our router takes into account the user's preferences and aggregates diverse data about the road infrastructure to provide personalized routes to specific users (e.g. impaired people, vulnerable categories, cyclists...)

Architecture

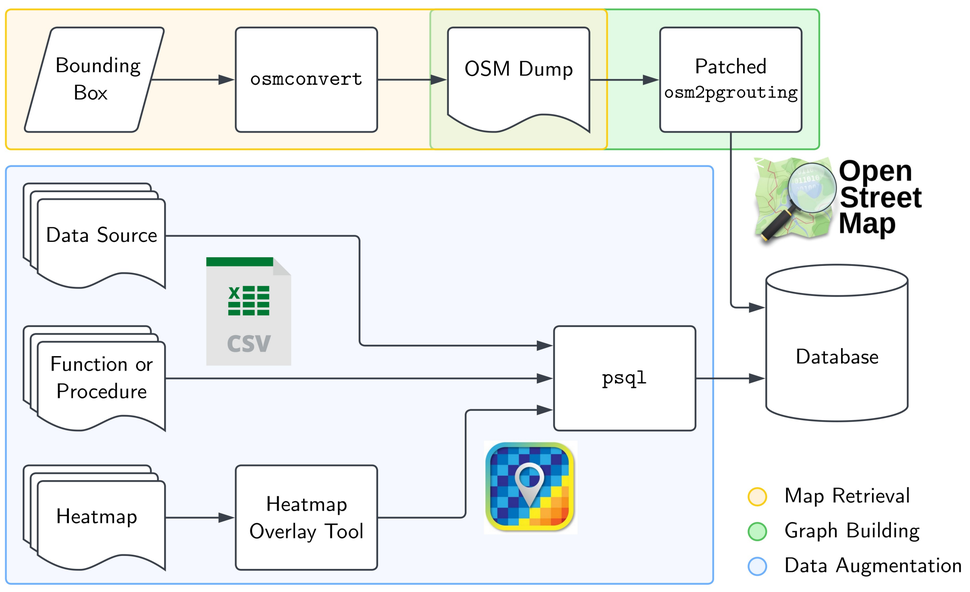
Personalized Router/Backend

The routing system uses **PgRouting** to build a graph of the road network and **customizable Cost Functions** to calculate routes. The backend exposes a **RESTful API** for development, on which our demo application is based



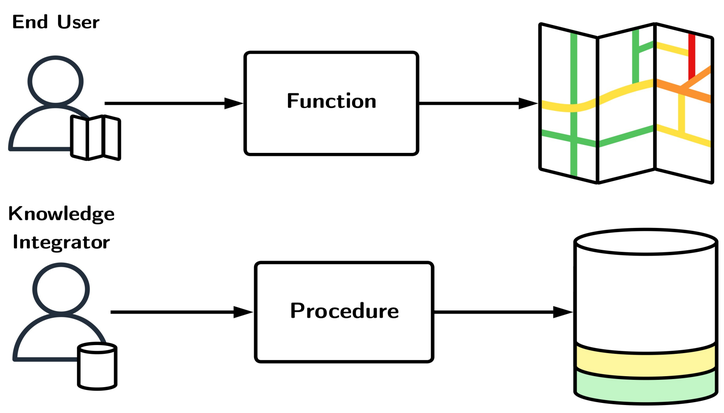
Data Augmentation Pipeline

Data from different sources is often formatted differently. The pipeline ingests an **OpenStreetMap dump** and geo-references other data from **CSV files** and **Heatmaps** onto it



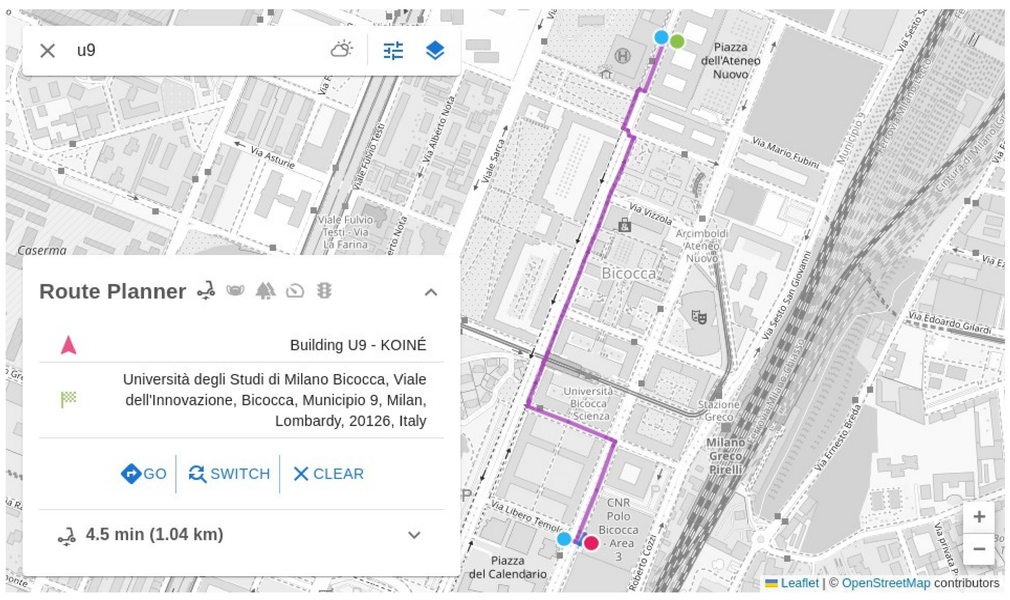
Visualization System

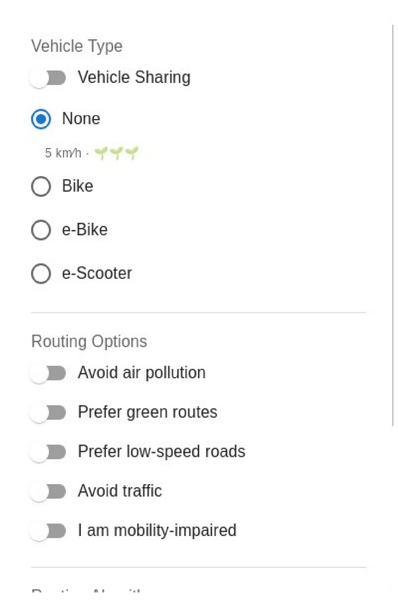
We have a lot of data, it might be useful to place it on the map. **Static** and **Dynamic Visualizations** – the latter are possible by using **Functions** (data computed on-the-fly) and **Procedures** (data stored in the Database)



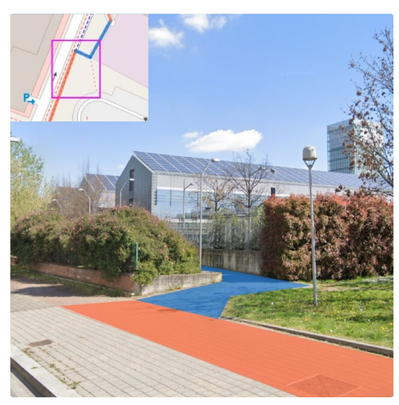
Routing

Customizable - the cost function can be changed at runtime. It supports **multimodal routing,** e.g. exchange points for **rental vehicles** (LUMIs), and **Points of Interest** (POIs). The router also takes into account the **type** and **properties** of the vehicle in relation to the type of road infrastructure (e.g., no bikes on stairs, no e-scooters on dirt roads)

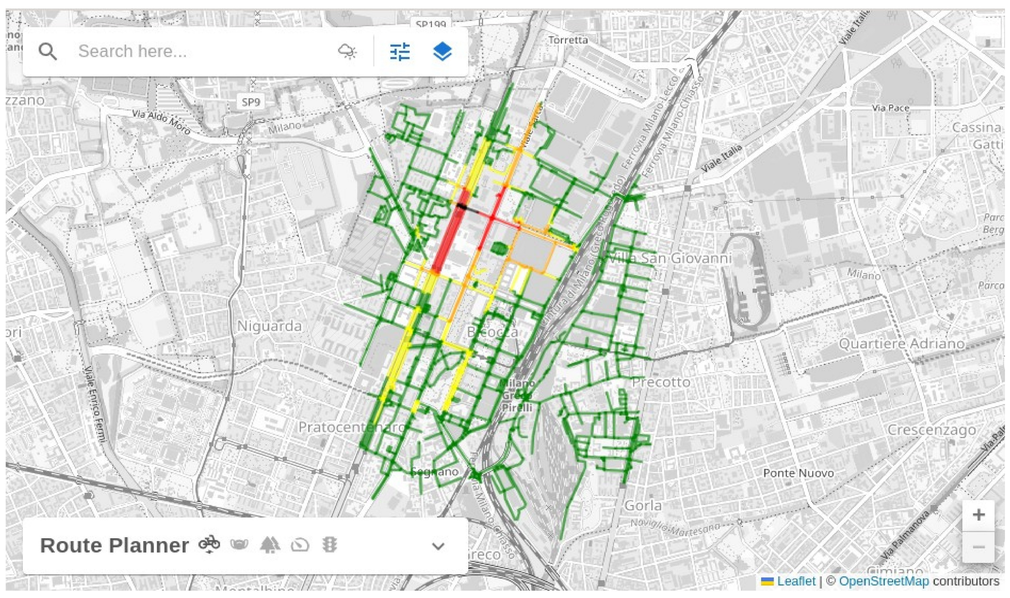


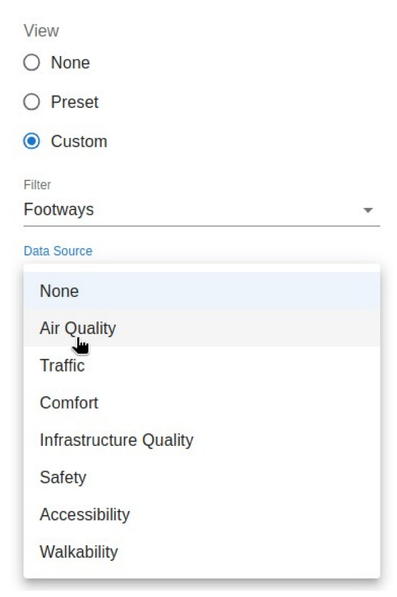


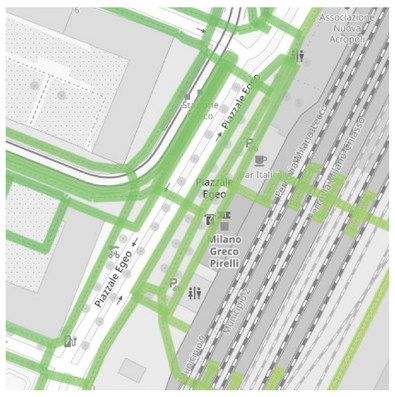
The Router complies with **road network constraints** (e.g. get off the bike at a crossing) and considers other factors such as **Green Areas**, **Air Pollution**, **Traffic**... The Router can be extended simply by changing the Cost Function and the Data Sources → No coding required in the BE! *The router can be further extended to support local transit systems (e.g., bus, tram, metro, train, taxi...) and fleet vehicles (e.g., randomly-placed rental bikes) and more data types (e.g., Walkability Index)*



Visualization







The visualization system is flexible and supports **complex Topologies**. Visualized topologies can be filtered by **Feature** (e.g., only show data pertaining to footways, cycling ways, etc.) and/or by **Data Source** (e.g., only show data related to traffic, comfort, etc.). **Transparency**, **line weight**, and **colors** can be changed to suit the type of data that is visualized. *The visualization component still needs to be extended to add support for Functions and Procedures*

References

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