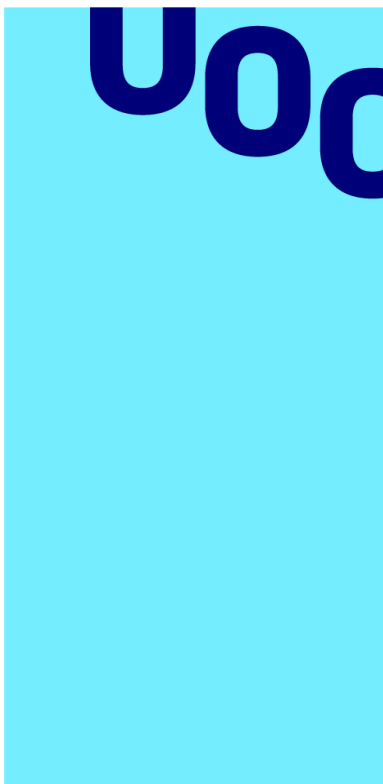# *Are U Query-ous?* A Web-Based Platform for Democratizing Open Geospatial Data Access

From Queries to Maps, A New Way to See the World!

Universitat Oberta de Catalunya

TFG - Localization Based Systems and Intelligent Spaces

Bachelor's degree in Techniques for Software Application Development

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Abstract

This study explores the challenge of making open data more accessible to the general public, addressing the gap between the availability of geospatial information and its practical use. *Are U Query-ous?* is a web-based application designed to enable individuals, regardless of their technical background, to explore and interpret geographic and demographic data intuitively. By integrating interactive maps and user-friendly visualization tools, the platform allows users to analyze regions based on economic activity, population distribution, and local trends.

Through a simplified interface, users can explore and filter publicly available data, identifying patterns relevant to their interests. The application is intended for individuals who are curious about urban development, seeking optimal locations for personal or professional activities, or analyzing demographic trends for research or decision-making. Additionally, the project examines the potential integration of artificial intelligence to facilitate data retrieval through natural language queries, further enhancing accessibility.

The development and results of the analyses in this data scientific report are intended to address all the concepts targeted in the foregoing. The author also expects to depict some fundamental principles underlying web apps development and data science.

Keywords

Index

List of figures

TODO: List of figures by adding captions

INTRODUCTION

1.1 Summary of the Proposal

This final project focuses on developing an intuitive **geo-analytics platform** that simplifies the exploration of open data through **interactive maps**. Many open data sources provide valuable insights into **urban planning, demographics, and economic activity**, but non-experts often struggle to extract meaningful information from them.

Are U Query-ous? aims to solve this problem by creating a **user-friendly interface** that enables individuals to explore and analyze spatial data without requiring technical expertise.

At the end of the project, the system will provide a **fully functional prototype** that allows users to:

- **Filter** and **visualize** location-based open data.
- Identify **regional patterns and trends** based on economic and demographic factors.
- Utilize **intelligent search capabilities** to access relevant insights more intuitively.

TODO: Figure 1.1

1.2 Justification

Access to open data has grown exponentially, yet many users struggle to transform this data into actionable insights. While businesses and government entities benefit from sophisticated **geo-analytics tools**, individuals and small organizations often lack the resources or expertise to use these datasets effectively. This project is relevant because it seeks to **bridge this gap**, making open data truly accessible and usable for the **general public, students, researchers, and small businesses**.

Moreover, the relevance of geospatial analysis has expanded in fields such as **smart cities, sustainable urban development, and socio-economic research**. By providing an easy-to-use tool, this project supports the broader goal of promoting **data-driven decision-making at all levels of society**.

1.3 Motivation

In the past 8 years I have been working and developing my professional career in the field of **data analysis**, so this project aligns with both academic and professional aspirations. The motivation for this project is coming from:

- A personal interest in **making complex data more understandable** for non-experts.

- A desire to provide **access to urban and economic and geomarketing insights** through intuitive visualization for the general public, students, researchers, and small businesses.

- The opportunity **to apply geospatial analytics in a real-world application**.

Additionally, the skills developed through this project, including data processing, backend development, frontend visualization, and user interface design, will be valuable in both academic research and professional settings.

1.4 Objectives

1.4.1 Main Objective

- To develop a web-based app that enables users to intuitively explore, filter, and analyze open geospatial data, making location-based intelligence more accessible to a non-technical audience.

1.4.2 Sub-Objectives

- Develop an interactive mapping system that allows users to visualize open data in an intuitive and engaging way.

- Implement filtering and querying functionalities to help users refine their search and extract relevant insights.

- Ensure usability and accessibility by designing a simple and intuitive user interface.

- Explore AI-powered search capabilities to allow natural language queries for easier data retrieval (optional feature).

- Validate the effectiveness of the platform through user feedback and iterative improvements.

TBD Figure 1.2

1.5 Hypothesis

Making geospatial data accessible through an interactive and user-friendly platform will enable a broader audience to extract meaningful insights from open data helping to make better decision-making and increased public engagement with geospatial information.

1.6 TODO: Sustainability, diversity, and ethical/social challenges

TBD This section should assess the positive/negative impact of the project in the following dimensions. It is not required to reach a positive impact in any/all dimensions, but it is necessary to consider and discuss whether there is an impact or not from the beginning of the project.

1.6.1 TODO: Sustainability

- In the development of the project or during its entire lifecycle (e.g., deployment, retirement), does the output of this project have an impact on sustainability and/or ecological footprint (energy/resource consumption/savings, waste, pollution, depletion of raw materials)? Is it affected by laws or regulations on this matter? Considering another perspective, does it affect any of the Sustainable Development Goals (SDG) related to these dimensions? (SDG 7 - Affordable and clean energy; SDG 9 - Industry, innovation, and infrastructure; SDG 11 - Sustainable cities and communities; SDG 12 - Responsible consumption and production; SDG 13 - Climate action; SDG 14 - Life below water; SDG 15 - Life on land;). If it does not have any impact, either positive or negative, you should explain how you reached this conclusion and justify your answer.

- If it has negative outcomes, which are they? For whom? In which geographic location? Can they be measured (consumed resources, ecological footprint)? Have they been considered in the design of your solution to minimize them?

- If it has positive outcomes, which are they? Can they improve or even solve any existing sustainability/environmental problems (such as improving reuse, recycling or a circular economy)? Is this outcome inherent to the proposed solution or does it have to be led by the users/owners?

- Are sustainability concerns one of the motivations of the project?

1.6.2 TODO: Ethical behaviour and social responsibility

- Is the outcome of the project too technical to have any positive/negative impact in ethical/social aspects (for instance, fraudulent use of the product/output to achieve financial, reputational or privilege gains)? Does it have an impact on laws/regulations (data, privacy, labour, intellectual property, personal security, …)? Does it adhere to the deontological principles of the profession? Does it endanger/improve/worsen any job position? Considering another perspective, does it affect any of the Sustainable Development Goals (SDG) related to these dimensions? (SDG 1 - No poverty; SDG 2 - Zero hunger; SDG 6 - Clean water and sanitation; SDG 8 - Decent work and economic growth; SDG 16 - Peace, justice, and strong institutions). If it does not

have any impact, either positive or negative, you should explain how you reached this conclusion and justify your answer.

- If it has negative outcomes, which are they? Does the output of this project promote/facilitate unethical behaviour from the point of view of users/owners (with respect to society, organization, or individuals? Is the negative outcome inherent to the type of result/outcome or only to the user/owner? Which mitigation strategies have been used in this project to minimize this impact?

- If it has positive outcomes, which are they? Can the result encourage/facilitate ethical behaviours (addressing existing problems) in the users/owners? Does it contribute to the welfare of society? Does it produce benefits from a social perspective? Can it contribute to a reduction in social inequalities?

- Are ethical/social concerns one of the motivations of this project?

1.6.3 TODO: Diversity, gender and human rights

- Is the result of this project so technical that is has no positive/negative impact in terms of gender, diversity (race, religion, ethnicity, sexual orientation, functional, ideology, …) or human rights? And in any laws/regulations? And in terms of accessibility, disability, ergonomics and/or information security? Considering another perspective, does it affect any of the Sustainable Development Goals (SDG) related to these dimensions? (SDG 5 - Gender equality; SDG 10 - Reduced inequalities). If it does not have any impact, either positive or negative, you should explain how you reached this conclusion and justify your answer.

- If it has negative outcomes, which are they? For which groups? Have they been considered in the design or your proposed product to minimize them? Is this negative outcome inherent to the proposed solution or is it related to the users/owners?

- If it has positive outcomes, which are they? For which groups? Is this negative outcome inherent to the proposed solution or is it related to the users/owners?

- Are diversity, gender or human right concerns one of the motivations of this project?

2.1 Project Planning TBD

A detailed schedule with milestones will be defined in the next iteration, ensuring that the development process is structured, manageable, and aligned with the semester timeline.

TODO: Project plan detailed Gant

2.2 Expected Outcome

By the end of the semester, the project will deliver:

- A functional web application where users can explore and visualize geospatial data interactively.

- An intuitive filtering system allowing users to refine results based on key indicators.

- A structured API serving open datasets with a focus on usability and efficiency.

- A research report detailing the impact of accessible open data visualization.

This project contributes to the broader goal of making open data actionable and meaningful for a diverse audience, reinforcing the importance of geospatial intelligence in everyday decision-making.

METHODS AND RESOURCES

3.1 Approach and Methodology

This project follows a structured development process based on agile principles, allowing for iterative testing and feedback throughout the semester. The key steps include:

3.1.1 Data Collection and Processing
- Identify and integrate open datasets (demographic, economic, urban mobility, etc.).
- Clean and preprocess data to ensure usability in the application.

3.1.2 Backend Development
- Build a RESTful API to serve geospatial data.
- Store data in a database optimized for efficient queries.

3.1.3 Frontend Development
- Design a responsive user interface with map-based interaction.
- Implement data visualization tools for filtering and exploration.

3.1.4 Testing and Refinement
- Gather feedback to enhance usability and features.

TODO: Figure 3.1

3.2 Technology

The project will leverage a modern web technology stack to ensure efficiency, scalability, and a seamless user experience. The core technologies include:

3.2.1 Frontend:

- **React.js** for building a dynamic and interactive user interface.
- **Leaflet.js** for mapping and geospatial visualization.

3.2.2 Backend:

- **FastAPI** to handle API requests and serve processed geospatial data.
- **PostgreSQL/PostGIS** for storing and querying spatial data efficiently.

3.2.3 Data Processing & Integration:

- **Python** and **Pandas** for data preprocessing and transformation.
- **GeoJSON** format to represent geospatial data and serve it dynamically.

3.2.4 Deployment & Hosting:

- **Docker** for containerized development and deployment.
- **GitHub Codespaces** for cloud-based development and collaboration.

3.2.5 Potential AI Integration (Optional):

- **NLP Natural Language Processing** for AI-driven queries (future implementation).

These technologies will enable the development of a robust and scalable application that can effectively serve users with varying levels of expertise in data analysis and geospatial exploration.

TODO: Figure 3.2

04
RESULTS

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05
CONCLUSIONS AND FUTURE WORK

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BIBLIOGRAPHY

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APPENDICES