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!

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Localization Based Systems and Intelligent Spaces

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SUMMARY OF THE FINAL PROJECT

Title of the project:	*Are U Query-ous? A Web-Based Platform for Democratizing Open Geospatial Data Access*
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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 above, but the author also expects to describe some fundamental principles underlying web apps development and data science.

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01
INTRODUCTION

1.1 Context and motivation

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.

Additionally, if time permits, the project will explore the integration of a natural language processing model, such as **those available from Hugging Face**, to enable users to interact with the data using natural language queries. **This feature is considered an enhancement rather than a core requirement and will be evaluated based on project timelines** and feasibility.

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.

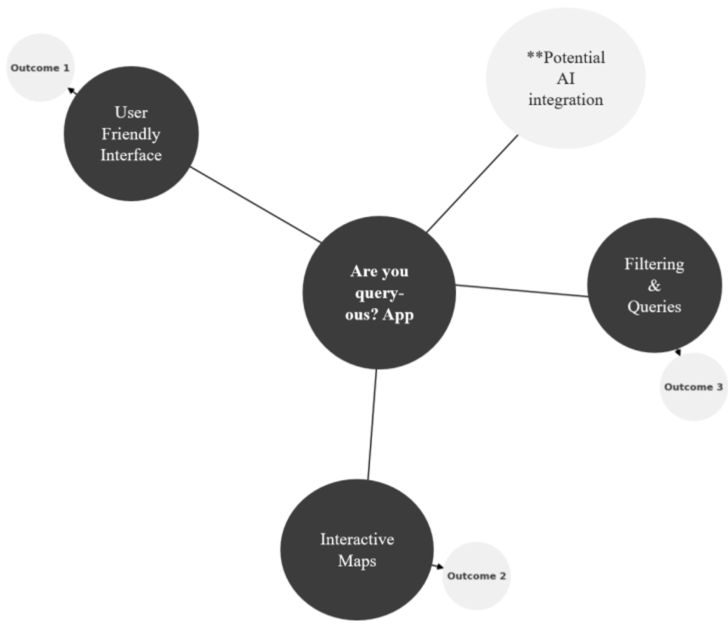

Figure 1 1: Conceptual Representation of Project Summary

Scope

This project focuses on developing a web-based platform that allows users to explore and analyze open geospatial data in an intuitive way. The platform will integrate publicly available datasets from Barcelona and Madrid, two cities with well-structured open data portals that provide reliable and detailed information.

The scope includes the following key aspects:

- **Cities Covered:** The platform will use **open data from Barcelona and Madrid**, ensuring access to urban mobility, economic activity, and demographic datasets for meaningful analysis.
- **Data Integration**: The system will collect and process geospatial, economic, and mobility-related data, allowing users to filter and visualize insights interactively.
- **User Interaction**: The web application will feature an interactive map where users can explore regional trends, compare different areas, and extract useful insights without needing technical expertise.
- **Core Functionalities:**
    - *Mapping & Visualization*: Users will view geospatial data overlaid on maps, with filtering options.
    - *Urban & Economic Insights*: The system will present mobility trends, population density, and economic indicators based on selected areas.
    - *Accessibility & Usability*: The interface will be simple and user-friendly, ensuring that both professionals and non-experts can use it effectively.

By **limiting the project scope to Barcelona and Madrid**, the system will leverage well-organized open datasets while **maintaining a manageable level of complexity within the project timeline**. The structured data availability from these cities will support the development, testing, and validation of the platform, ensuring that it meets its intended objectives.

Rationale

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**.

Motivation

In the past eight 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.

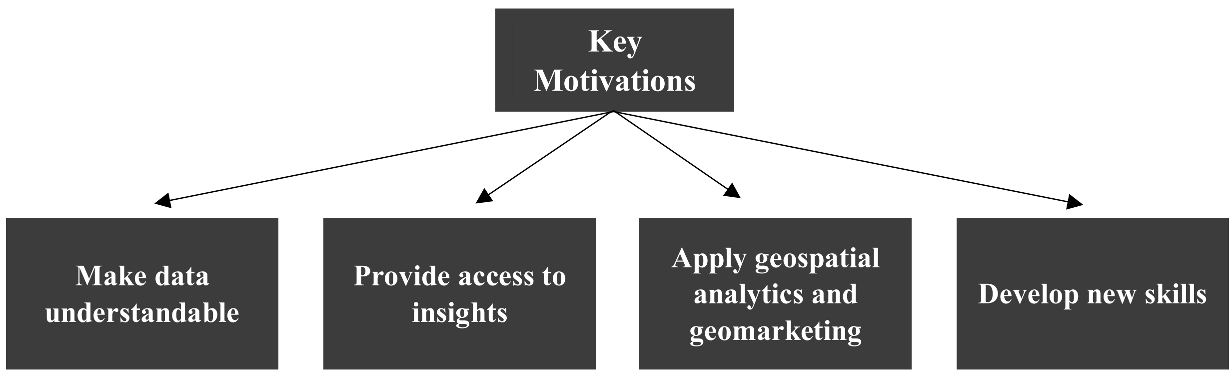

Figure 1 2: Key Motivations for the Project

1.2 Goals

Main Goal

- 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.

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.
- **If time permits, experiment with integrating an NLP model** to allow natural language queries for filtering and searching data. This is considered a potential enhancement and <u>not a primary project requirement</u>.
- **Validate the effectiveness of the platform** through user feedback and iterative improvements.

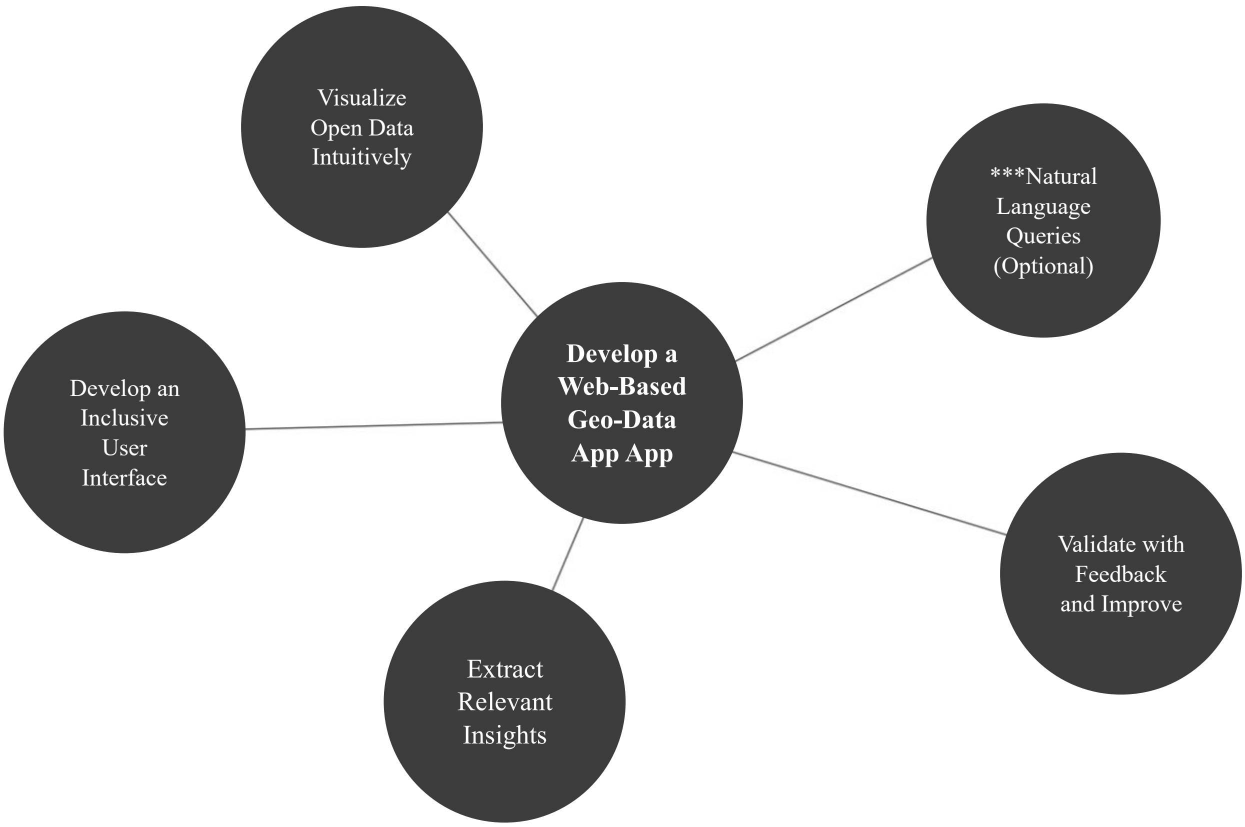

Figure 1.3: Goals Breakdown

1.3 Sustainability, diversity, and ethical/social challenges

Sustainability

This project promotes sustainability by supporting the efficient **use of open data to improve urban and social planning**. By making geospatial information more accessible, individuals and organizations can make informed decisions about resource allocation, mobility, and land use, reducing unnecessary waste and inefficiencies. Additionally, the project aligns with the United Nations Sustainable Development Goals (SDGs), particularly Goal 11 (Sustainable Cities and Communities), by providing insights that encourage responsible urban development. The project has a minimal ecological footprint as it relies on existing digital infrastructure, avoiding additional resource consumption.

Ethical behaviour and social responsibility

The project considers ethical principles by **ensuring data privacy and security**. Since the system processes **publicly available open data**, it does not involve personal or sensitive information. However, the potential risks of misinterpreting data or using insights unethically are acknowledged. To mitigate this, the platform will provide **transparent data sources and disclaimers to ensure users understand the limitations of the information**.

Diversity, gender and human rights

The project is designed to be inclusive and accessible, allowing all individuals, regardless of background, gender, or technical expertise, to explore geospatial data. By offering a simple and user-friendly interface, it ensures that users with limited data experience can engage with geographic insights. Furthermore, **accessibility features will be considered**. The project aligns with the principle of equal access to information, promoting diversity and reducing barriers to data-driven knowledge.

1.4 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:

Data Collection and Processing

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

Backend Development

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

Frontend Development

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

Testing and Refinement

- **Gather feedback** to enhance usability and features.

Project Management and Development Workflow

To manage the development process efficiently, we will use a **Kanban dashboard in Trello**. The board will include the following columns:

- **To Do:** List of all planned tasks and ideas.
- **Doing:** Tasks that are ready to be worked on.
- **Deferred:** Tasks that are postponed for later stages.
- **Done**: Completed tasks.

This dashboard will include all the detailed tasks from the previous planning (Task 02) and will be updated regularly to track progress and keep the project on schedule.

1.5 Schedule

A detailed **schedule with milestones** has been defined, ensuring that the development process is structured, manageable, and aligned with the semester timeline following the structure of the phases defined in each CAT:

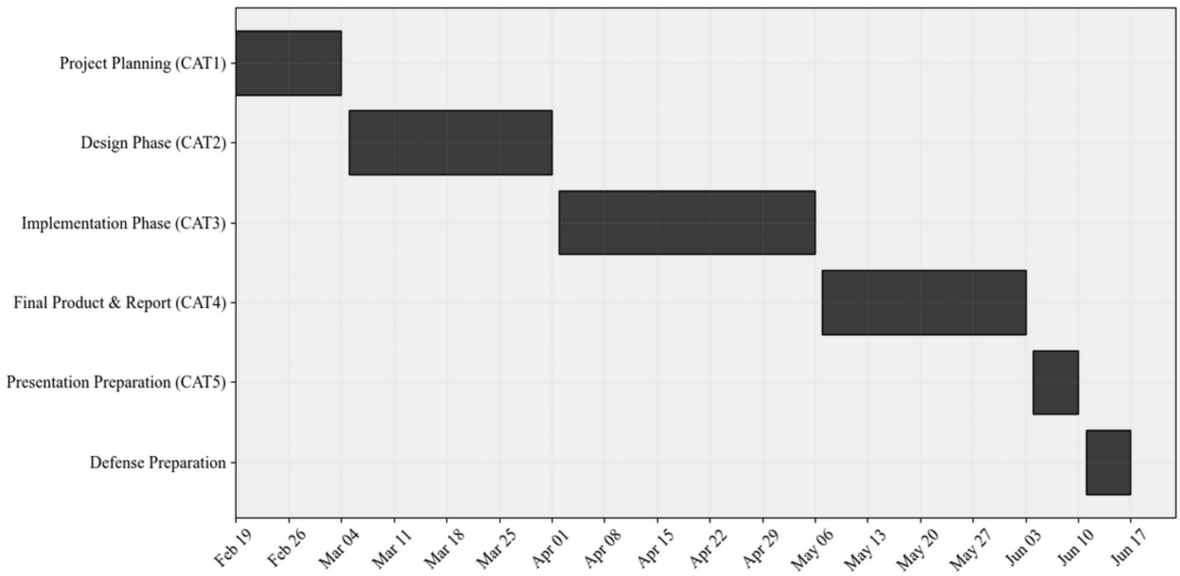

Figure 1 4: Process Diagram

CAT1: Project Planning Phase (Feb 19 - Mar 04)

Task ID	Task Description	Week	Linked	Status
1.1	- **Define project scope, research open datasets, and identify visualization requirements.** - **Define technology stack, assess integration challenges, and create a detailed timeline.**	Feb 19 - Feb 23	-	Done
1.3	**Document sustainability considerations, set up development environment, and compile CAT1 documentation.**	Feb 24 - Mar 02	1.1	Done
1.4	**Review and finalize CAT1 documentation.**	Mar 02 - Mar 03	1.1, 1.2	Done

Table 1.1: Project Planning Phase

CAT2: Design Phase (Mar 05 - Apr 01)

Task ID	Task Description	Week	Linked	Status
2.1	**Define user stories, database schema, and UI wireframes for the mapping interface.**	Mar 03 - Mar 09	1.10	Done
2.2	**Design system architecture, research filtering algorithms, and create frontend class diagrams.**	Mar 10 - Mar 16	2.1	Done
2.3	**Develop API endpoints, implement login screen, and document state of the art in geospatial data visualization.**	Mar 17 - Mar 23	2.1	Done
2.4	**Compile and review CAT2 documentation.**	Mar 23 - Mar 31	2.1 - 2.3	Done

Table 1.2: Design Phase

CAT3: Implementation Phase (Apr 02 - May 06)

Task ID	Task Description	Week	Linked	Status
3.1	**Set up backend database and implement data ingestion pipelines for open data.**	Apr 01 - Apr 06	-	To Do
3.2	**Develop backend services, authentication, and frontend components for map visualization.**	Apr 07 - Apr 13	3.1	To Do
3.3	**Implement filtering, integrate Leaflet.js, and develop data visualization components.**	Apr 14 - Apr 20	3.2	To Do
3.4	**Conduct unit testing, perform integration testing, and deploy prototype.**	Apr 21 - Apr 27	3.3, 3.4	To Do
3.5	**Compile implementation documentation and finalize CAT3 documentation.**	Apr 27 - May 05	3.1-3.4	To Do

Table 1.3: Implementation Phase

CAT4: Final Product & Report (May 07 - Jun 03)

Task ID	Task Description	Week	Linked	Status
4.1	**Refine UI based on testing feedback.**	May 07 - May 11	3.14	To Do
4.2	**Implement advanced filtering, economic activity visualization, and optimize database queries.**	May 12 - May 18	4.1	To Do
4.3	**Implement (optional) NLP capabilities and conduct comprehensive system testing.**	May 19 - May 25	4.1	To Do
4.4	**Fix bugs, optimize performance, and prepare final deployment package. Create user documentation, write results and analysis, draft conclusions, and compile bibliography.**	May 26 - Jun 01	4.1	To Do
4.5	**Finalize and format the project report, then submit CAT4.**	Jun 01 - Jun 03	4.1-4.4	To Do

Table 1.4: final Product and Report

CAT5: Presentation Preparation (Jun 04 - Jun 10)

Task ID	Task Description	Week	Linked	Status
5.1	- **Create presentation outline, storyboard, and design slides.** - **Prepare demonstration script, record key platform features, and create a narrated presentation video.**	Jun 04 - Jun 08	4.14	To Do
5.2	**Review, finalize, and refine presentation based on feedback.**	Jun 08 - Jun 09	5.1	To Do

Table 1.5: Presentation Preparation Phase

Defence Preparation (Jun 11 - Jun 17)

Task ID	Task Description	Week	Linked	Status
6.1	- **Prepare defence presentation based on feedback.** - **Anticipate potential questions and prepare responses.** - **Practice presentation delivery**	Jun 11-Jun16	5.2	To Do
6.2	**Final defence presentation**	Jun 17	6.1	To Do

Table 1.6: Defence Preparation Phase

Ongoing Tasks Throughout the Project

Task ID	Task Description	Week	Linked	Status
7.1	**Gant Planning updates**	Feb 19 - Jun 17	-	Ongoing
7.2	**Weekly supervisor check-ins**	Feb 19 - Jun 17	-	Ongoing
7.3	**Documentation updates**	Feb 19 - Jun 03	-	Ongoing

Table 1.7: Ongoing Tasks Throughout the Project

For a detailed breakdown of the project plan, tasks, and timeline, please refer to the attached **are-you-queryous-planning.xlsx file.**

1.6 Summary of the outputs of the project

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**.

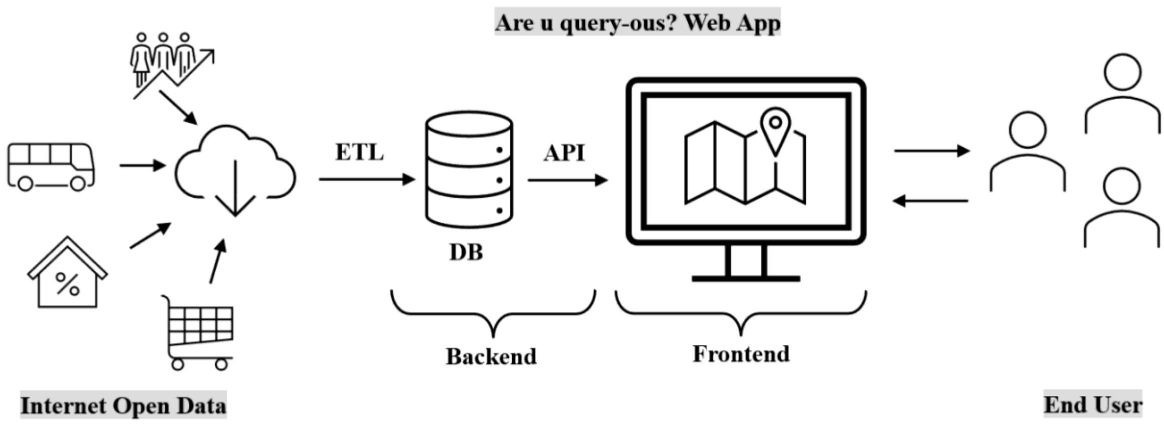

Figure 1 5: Expected Outcome Visual Representation

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

Frontend:

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

Backend:

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

Data Processing & Integration:

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

Deployment & Hosting:

- **Docker** for containerized development and deployment.
- **GitHub Codespaces** for cloud-based development and collaboration.
- **Vercel** for frontend deployment and **Fly.io** or **Heroku** for backend deployment.

Potential AI Integration (Time-Permitting Feature):

- The project may experiment **with integrating a pre-trained NLP model from Hugging Face** to process natural language queries.
- If implemented, a small widget will allow users to enter queries in plain text (*e.g., "Show me the most populated districts in Madrid").*
- This AI-based functionality is considered an exploratory addition, meaning <u>it will only be developed if time and resources allow</u>.

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.

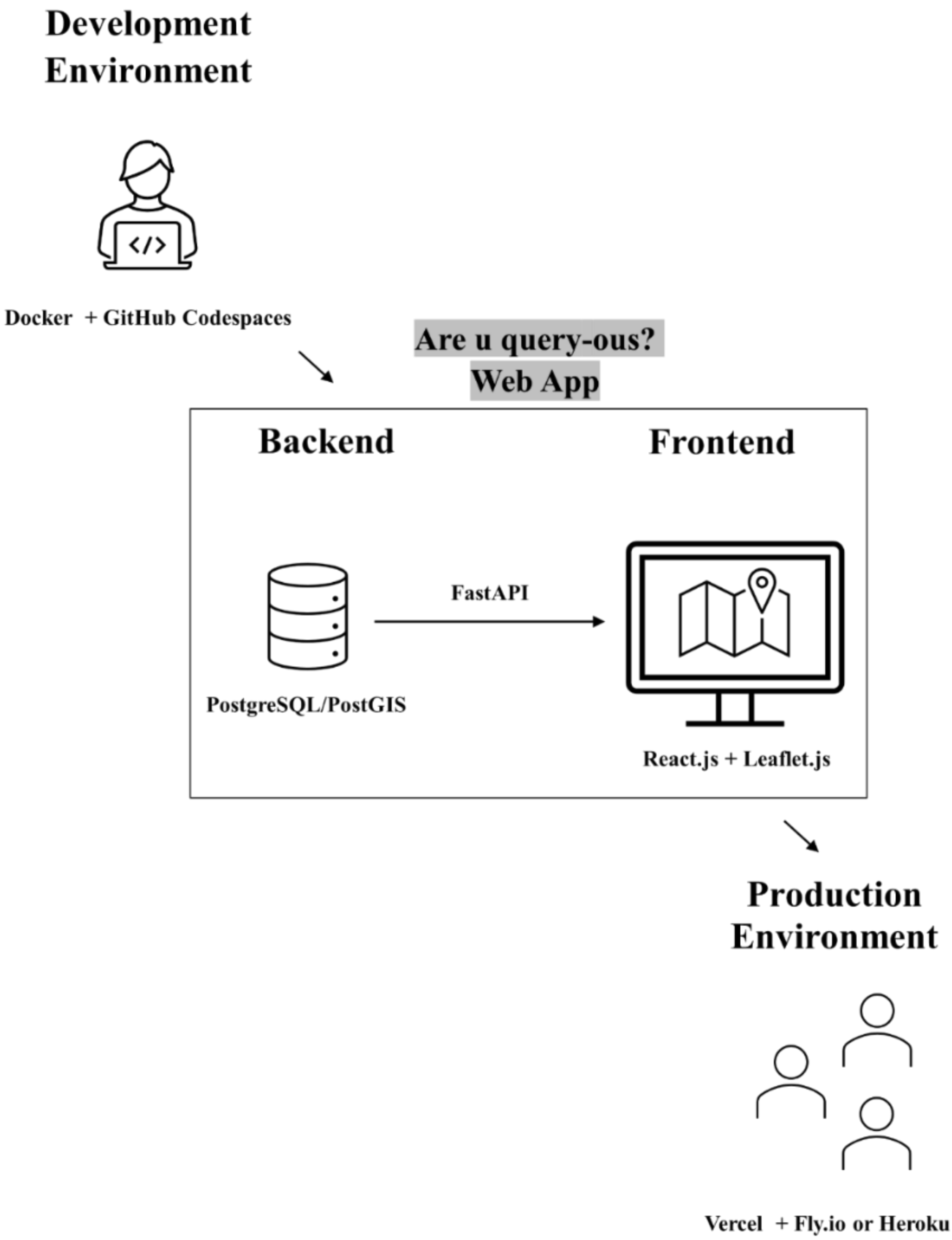

Figure 1 6: Technology Stack Used

1.7 Brief description of the remaining chapters of the report

This section provides a short overview of the chapters that follow in this report:

Chapter 2: Methods and Resources

This chapter describes the tools and technologies we used to build our web application. It explains our choice of React.js for the frontend, FastAPI for the backend, and PostgreSQL for the database. It also shows how we collected and processed the geospatial data from Barcelona and Madrid. This chapter covers our design decisions, development methodology, and includes an economic assessment of the project costs and viability.

Chapter 3: Results

This chapter presents what we accomplished in our project. It shows how the final web application works and how users can explore maps and filter data without technical knowledge. It includes screenshots of the interface and examples of how it makes open data more accessible. This section demonstrates the practical outcomes achieved through our methodology.

Chapter 4: Conclusions and Future Work

The final chapter looks at what we learned from this project and how well we met our goals. It discusses the challenges we faced and what we could improve in the future. It also suggests new features we could add later, like the natural language processing option for easier searching. This chapter evaluates our progress against our original timeline and objectives, and addresses sustainability, diversity, and ethical considerations.

Each chapter connects to the others to tell the complete story of how we created the "Are U Query-ous?" platform from start to finish.

02
STATE OF THE ART

Democratizing Geospatial Data Access: State of the Art

Making geospatial data available to everyone, not just experts, is called "*democratizing geospatial data*." In recent years, new tools, platforms, and AI have made it easier for regular people to use maps and location data (Bhoda, 2023a).

This section looks at the current progress in this field as is intended to cover the state of the art across key areas, including current platforms, visualization technologies, AI integration, challenges, applications, related technologies, and recent research findings.

2.1. Current Geospatial Data Platforms

Modern geospatial platforms help make data available to everyone. Today, we have both free and paid platforms that help people use map data.

A well-known open-source example is **OpenStreetMap (OSM)**, which allows people to create and edit maps (Glasze & Perkins, 2015). This has made mapping more open to the public. Other free tools like **QGIS**, **GRASS GIS**, and **GeoServer** allow users to analyze and visualize spatial data without expensive software (Bhoda, 2023b). These tools support many data formats, making it easier to share information.

On the commercial paid platforms side, **Esri's ArcGIS** is one of the most powerful platforms (Esri, 2023). It was originally a desktop software, but now it also offers cloud-based tools like **ArcGIS Online**. These allow organizations to create and share maps with the public. Another important paid platform is **Google Earth Engine (GEE)**. This popular tool provides satellite images and advanced analysis and also allows researchers to study changes in the environment, such as deforestation, using free satellite data (Gorelick et al., 2017).

There are newer cloud-based web platforms like **CARTO** and **Mapbox** that make it simpler to connect map data with other information and also help developers and businesses to integrate maps into their applications (CARTO, 2024). These platforms provide tools that make geospatial analysis more accessible to non-experts. Finally, **Government and open data APIs** also allow users to access updated maps, weather data, and other statistics (Government of India, 2021).

Thanks to all these platforms, *geospatial data is now available to more people than ever before*.

2.2. Geospatial Data Visualization Technologies

User-friendly tools are key to making map data accessible. Web mapping tools like **Leaflet.js** and **Mapbox GL JS** allow people to create interactive maps in a web browser without advanced skills on *Geographic Information System (GIS)* software (Marten, 2019).

Tools like **Kepler.gl** let users drag and drop data files to create maps instantly. Business tools like **Tableau**, **Microsoft Power BI** and **Amazon QuickSight** now include map features, so business and data analysts can make maps without learning GIS software (Foursquare, 2023). **CesiumJS** is another useful tool that specializes in 3D geospatial visualization, allowing users to create 3D maps of cities and landscapes (Chamberlain et al., 2024).

These visualization tools turn complex data into maps that anyone can understand, hiding the technical details that used to require expert knowledge. Users no longer need advanced training in GIS to work with maps and analyze spatial data.

2.3. AI Integration in Geospatial Analysis

Artificial intelligence (AI) is transforming how we use geospatial data. **GeoAI** refers to the combination of artificial intelligence and geographic data to automate complex tasks (Esri, 2023). AI can quickly analyze satellite images and detect objects like buildings, roads, and forests, reducing the need for human analysis.

One of the most advanced developments is the use of Natural Language Processing (NLP) to allow users to ask questions about maps using everyday language. For example, instead of learning GIS commands, using tools like **ChatGeoAI** or **Chat2Geo** allow users to type questions like "show me areas with high tree loss in 2023" and get maps as answers (Mansourian & Oucheikh, 2024).

Companies like Esri are also developing AI assistants for GIS software. These tools allow users to get quick answers about geospatial data, using Machine learning models that can also predict future trends, such as traffic patterns, climate changes, or urban growth (Lartey, 2024).

As it is happening in other fields, the biggest advantage of AI integration in geospatial analysis is that it reduces the skill barrier. In the past, only experts could perform complex spatial analyses, but now, AI tools make it easier for anyone to work with maps and location data.

2.4. Challenges in Democratizing Geospatial Data

Despite progress, several problems still make map data hard to use for everyone:

- **Cost**: Some advanced data and tools remain expensive (Plunkett, 2019).
- **Complexity**: Working with map data still requires some technical knowledge.
- **Internet access**: Cloud-based tools need good internet connections .
- **Data formats**: Different map data comes in many formats that don't always work together (Hallas et al., 2022).
- **Large file sizes**: Map data files can be very big and hard to share (Gorelick et al., 2017).
- **Awareness**: Many people don't know how useful map data could be for them.

These challenges are being addressed through better education, open data policies, and more user-friendly tools.

2.5. Applications of Geospatial Data

Geospatial data is used in many industries, including:

- **Urban Planning**: Cities use geospatial data to plan infrastructure, transportation, and housing. Maps help identify areas that need better roads, public transport, or green spaces.
- **Transportation & Logistics**: Delivery companies use geospatial data to find the fastest routes. Ride-sharing apps rely on maps to connect drivers and passengers.
- **Environmental Monitoring**: Scientists track deforestation, pollution, and climate change with satellite images and GIS analysis.
- **Disaster Management**: Maps help emergency services respond to floods, earthquakes, and wildfires. Open-source mapping tools like **Ushahidi** allow local communities to share real-time disaster information.
- **Retail & Business**: Companies use geospatial data to find the best store locations, track customer movement, and optimize marketing strategies.
- **Agriculture**: Farmers use satellite images and AI-powered tools to monitor crop health and optimize irrigation.

By making geospatial data available to more people, we can solve real-world problems more effectively.

2.6. Similar Software & Related Technologies

Many technologies help make geospatial data more accessible:

- **Cloud Platforms**: Services like Google Earth Engine and Microsoft Planetary Computer allow users to access and analyze large-scale geospatial data online.
- **Geospatial APIs**: Tools like Google Maps API and Mapbox API make it easy to add maps and location services to applications.
- **Open Data Portals**: Governments and organizations provide free access to maps and location-based data through online portals.
- **Drones & IoT Sensors**: Drones help collect high-resolution aerial imagery, while IoT sensors track environmental changes in real time.

These technologies work helps to bring geospatial analysis to more people, not just specialists.

2.7. Recent Academic Research & Case Studies

In the last five years (2019-2024), researchers have made important progress:

Natural Language Tools (2024)

Researchers created ChatGeoAI, a system that lets people use simple language to make maps and analyze data (Mansourian & Oucheikh, 2024). Users just type what they want, and the computer does the technical work.

Easy Access to Big Data (2020-2022)

CyberGIS projects made it simpler for non-experts to use powerful map tools:

- CyberGIS-Vis created easy-to-use web maps for COVID-19 data (Han et al., 2024).
- CyberGIS-Compute helped regular users run complex map calculations on powerful computers (Michels et al., 2024).

Community Mapping (2019-2023)

Studies on OpenStreetMap showed how regular people can create useful maps (Glasze & Perkins, 2015).:

- Communities developing countries built their own maps instead of relying on external ones
- When people can create maps themselves, it helps improve local government services

Policy Changes in India (2021)

India changed its laws to make map data free for everyone (Government of India, 2021):

- Removed strict rules about who could make and share maps
- Helped local businesses create new map services
- Increased the use of map data in business and farming

Easier Data Sharing (2019-2022)

Researchers worked on making map data easier to find and use:

- A Canadian project created a "Spotify for map data" where users only download what they need
- This helped Indigenous communities and park managers respond to emergencies

AI for Community Help (2022-2024)

Projects used AI to solve social problems:

- The RAMP project used AI and satellite images to help plan healthcare services
- Other studies used AI to spot patterns in citizen-reported issues to improve city planning

Democratizing geospatial data has made great progress, with open-source tools, cloud platforms, and AI making maps and spatial analysis accessible to more people (Bhoda, 2023b). Advances like **GeoAI**, web-based visualization, and natural language processing are lowering technical barriers, allowing non-experts to work with geospatial data more easily (Esri, 2023).

However, challenges remain. Many tools are still expensive, and some require technical skills (Plunkett, 2019). Data formats are not always compatible, making it difficult to share information across platforms (Gorelick et al., 2017). AI models improve geospatial analysis, but they need better transparency to ensure accuracy and trust (Lartey, 2024). In addition, limited internet access in some areas makes it hard to use cloud-based tools (Tula Foundation, 2024).

Future research should focus on standardizing data formats, improving user-friendly AI tools, and reducing dependency on high-cost platforms (Alamri, 2024). By addressing these gaps, geospatial data can become even more accessible, helping businesses, governments, and individuals solve real-world problems more effectively.

2.8. Future Trends in Democratizing Geospatial Data

Looking ahead, these are the trends that will make map data even more accessible to everyone:

- **AI Assistants**: New AI tools will let people talk to maps in normal language. Users will be able to ask questions and get answers without learning special commands.
- **Mobile Apps**: More map tools will work well on phones, helping people in areas with limited computer access.
- **Local Knowledge**: Communities will create their own maps that include cultural information and local knowledge not found in official maps.
- **Mixed Reality**: New technology will combine real-world views with digital map data, making it easier to understand location information.
- **Low-Code Tools**: New software will let people without programming skills create custom map applications.
- **Data Standards**: Better ways to share data between different systems will make it easier to combine information from many sources.

These trends show that geospatial data will become even more useful for everyday decisions. As technology improves and becomes simpler to use, more people will be able to benefit from location-based information in their daily lives, businesses, and communities.

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03
DESIGN

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03
RESULTS

This section will be further developed in future Continuous Assessment Tests (CATs) and project iterations. Additional details, refinements, and validations will be incorporated as the project progresses.

04
CONCLUSIONS AND FUTURE WORK

This section will be further developed in future Continuous Assessment Tests (CATs) and project iterations. Additional details, refinements, and validations will be incorporated as the project progresses.

05 GLOSSARY

This section will be further developed in future Continuous Assessment Tests (CATs) and project iterations. Additional details, refinements, and validations will be incorporated as the project progresses.

06
BIBLIOGRAPHY

This section will be further developed in future Continuous Assessment Tests (CATs) and project iterations. Additional details, refinements, and validations will be incorporated as the project progresses.

07
APPENDICES

This section will be further developed in future Continuous Assessment Tests (CATs) and project iterations. Additional details, refinements, and validations will be incorporated as the project progresses.