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CS-340 Client/Server Development

**Project Two**

**Project Description**

The Grazioso Salvare Animal Rescue Dashboard is a comprehensive tool designed to aid in the management and analysis of animal shelter data. Its primary goal is to empower the organization with the ability to make informed, data-driven decisions regarding animal rescues and shelter operations. The dashboard features a filterable data table, interactive visualizations of breed distributions, and a geospatial map to track animal locations, creating a user-friendly interface for streamlined decision-making.

**Features**

The dashboard offers a range of key features to enhance user interaction and data analysis:

* **Filterable Data Table:** Users can search and filter animal data by type (e.g., Dog, Cat) or specific rescue categories like Water Rescue, Mountain Rescue, and Disaster Rescue.
* **Interactive Graphs:** A dynamically generated histogram visualizes breed distribution, adapting to the filtered dataset.
* **Geospatial Mapping:** An interactive map displays the geographic location of selected animals, providing spatial insights at a glance.

**Screenshots/Screencast**

Screenshots highlighting the core functionalities, such as the data table, filter dropdown, breed histogram, and map view, are included for reference.

A screenshot of a computer

Description automatically generated

**Tools Used**

**MongoDB**

MongoDB serves as the backbone of the data model, offering flexibility in handling semi-structured animal shelter records. Its schema-less design makes it ideal for storing diverse attributes. Key capabilities include:

* Seamless integration with Python for CRUD operations.
* Advanced querying for efficient data filtering and retrieval.

**Dash Framework**

Dash is utilized for creating an interactive and modular web application. It enables:

* Integration with Python for streamlined development.
* Dynamic data visualizations and responsive UI components.
* A structured approach to building user-friendly applications.

**Plotly and Dash-Leaflet**

Plotly simplifies the creation of dynamic and interactive graphs, while Dash-Leaflet allows seamless integration of geospatial mapping features. These tools enhance the overall visual and interactive quality of the dashboard.

**Pandas**

Pandas is pivotal for data cleaning, manipulation, and preparation, ensuring the data is ready for rendering on the dashboard. Its efficiency supports the seamless functioning of the application.

**Challenges and Solutions**

Two challenges were encountered during the development of this project, each requiring a tailored solution. The first challenge involved data cleaning, specifically the removal of unnecessary \_id fields from the MongoDB dataset. This issue was resolved by leveraging Pandas to dynamically drop unwanted columns, ensuring a clean and organized dataset for further processing.

Lastly, integrating geospatial mapping functionality was challenging, particularly in dynamically displaying animal locations based on user selections. This obstacle was overcome by incorporating Dash-Leaflet, which enabled the rendering of interactive maps with precise markers, ensuring accurate and real-time visualization.