Project Title

Project Scinegleuf: Electric Boogaloo

Project Summary

This project is a web application that will provide real-time insights into the availability and busyness of electric vehicle charging stations. The application will analyze data based on charging station locations, potentially user reviews, traffic conditions, and historical usage patterns. By including real-time traffic updates and providing a so-called forecast of an EV station's demand, this platform would help EV drivers plan their charging stops more efficiently while avoiding busy or congested stations.

Description

One portion of the project will be providing an option to input a starting location and a destination and help EV drivers navigate through networks of traffic and charging stations. One important problem that EV drivers face is determining which stations are available and not overly busy, especially in areas with high demand or during peak hours. This project helps address that issue through offering a data-driven solution using historical usage statistics, real-time traffic reports, and, most importantly, crowd-sourced reviews of EV stations.

Drivers should be able to search for nearby stations, check their availability, see the real-time traffic near the station as a rough estimate for the availability at that station, and read user reviews about the station and surrounding environment. The project should integrate multiple data sources and APIs to forecast the busiest times of each station and suggest a corresponding optimal route for the EV driver.

Creative Component

A creative component we are considering is visually displaying not just the nearest or cheapest EV station, but also including more information that a user may want to know. Things like expected wait time from traffic conditions, reviews of the EV station and compatibility with certain vehicles will provide much more information than just finding the closest EV stations. We believe that providing information about traffic volume in a useful visual overlay on top of the map will provide a very intuitive experience for determining whether or not someone may want to charge their car there.

We expect this traffic overlay to also act as a technically challenging component as we will need to estimate traffic conditions not just around the traffic stations themselves, but around the EV stations we are interested in. To do this, we will need to write both complex queries to perform

this estimation in the database itself as well as design a way to overlay our heatmap over something like Google Maps.

Usefulness

This application would be highly useful for EV drivers because it reduces the time spent looking for available charging stations and mitigates the risk of running out of charge before finding one. Viewing the real-time traffic around a station and busyness levels based on historical usage can help EV drivers make informed decisions on where to stop. Reading and submitting reviews can help others. This project also provides a solution to boredom through providing nearby attractions given categories of wants.

While there are other apps for finding charging stations, many of them do not offer real-time traffic or usage predictions. Our application will differentiate itself by providing all of this in one integrated package, that may or may not use machine learning-based demand forecasting given how much time remains when we finish the core of the project. However, it will give EV drivers a proactive tool to plan their stops more efficiently.

Realness

Our datasets consist of real data gathered by the US Department of Transportation and information about publicly available electric vehicle charging stations across the country. We intend to combine the main interesting parts of this data with our own generated tables for things like valid electric vehicles, user accounts, and reviews to produce a complex dataset that we can base our project on.

The US DoT traffic volume data consists of .csv files which describe the level of traffic experienced for any given traffic station at any hour of the day for every day of the year. This data will be combined with our data on the traffic stations that measured the volumes which also consists of a .csv file. By combining these two datasets, we will be able to estimate the traffic volume near any area and make real-time decisions about what the best EV charging station is.

Functionality

The website would allow users to provide their current location to the program. Users could also specify their own personal filters for the types of EV stations they are interested in including filters for things like nearby entertainment and prices. After providing their preferences (or loading stored preferences) users will be presented with a list of EV stations meeting their preferences along with their locations on the map. The map will also have a traffic overlay option on which we can display a heatmap of traffic in the area to help inform users on what the best choice for them may be.

Some database interactions that may be possible are verified users adding new charging stations, updating the traffic volume estimates or deleting defunct traffic or charging stations. Updates can include anything like reviews for a particular station, price changes, or updates to user preferences in the app.

Project Work Distribution

Nicholas Keriotis: Work on data pre-processing, database consistency, heatmap calculations and backend query support.
Michael Ko: Work on the UI interfaces, frontend backend integration, backend authentication and authorization (passwords, 2-factor authentication)
David Liang: Work on frontend, backend interoperability; External API interfacing; Maintain design pattern (MSVC)
Rajas Gandhi: Work on database management, advanced SQL queries, data post-processing

Low-Fidelity UI Mockup