

Sampa Transit

Project Summary

Sampa Transit is a dynamic tool designed for public transit users in Sao Paulo, integrating both essential and innovative features. It offers customizable route schedules, travel paths, and filter options such as transport type. The app suggests routes based on efficiency, cost, user behavior, and community preferences. With feedback options and adjustable visual modes, it seeks to streamline and enhance the public transit experience.

Project Description

Problem statement: Current public transit tools are often static, lack customization options, and do not consider user-specific needs. This leads to inefficient route planning and an overall less-than-optimal transit experience.

Solution: Our app will offer dynamic and customizable route planning, integrating filters like transport types. By incorporating user behavior and community feedback, the app will suggest optimized routes based on individual preferences, efficiency, cost, and community endorsement. Through this, we hope to revolutionize the public transit experience, making it more personalized, efficient, and user-driven.

Usefulness

Sampa Transit is able to provide its users with detailed route schedules and essential transit information, making it easy for them to plan their trips on their own or through our website. The users are given the choice to create their own preferred routes from places to places or rely on our route suggestion feature. If they link our application to their Transit Card to our application, we can keep track of their remaining card balance. Indeed, there are many other websites or applications that focus on transit information and planning, but our more user-centric and innovative features differentiate our website from others.

First of all, our route suggestion feature includes filters for preference of efficiency and cost, making it useful for a broader range of users. Moreover, we not only recommend stops and routes based on user location, like many other similar transit applications, but also on community preferences. Additionally, the feedback mechanism on users' transit experiences fosters community engagement and helps improve the overall quality of public transportation services. One notable difference from other similar applications is the emphasis on user controllability over their chosen routes. This feature addresses the common issue where automated algorithms may not always provide the most reasonable or preferred routes, giving users more agency in their transit planning.

Realness

Our dataset is the "Public Transportation Service", one of several datasets selected by the teaching staff. You can find it on Kaggle at this link:

<https://www.kaggle.com/datasets/mateuscoco/sao-paulo-transportation-service>

This dataset pertains to the transportation system of São Paulo, a major Brazilian city. It consists of ten TXT files provided in a format called GTFS (General Transit Feed Specification), specifically designed for modeling transportation schedules and geographic data. The dataset contains 40K records and 30+ columns. It includes information such as route details, schedules, fares, planned arrival and departure times, as well as itinerary paths.

Functionality

The Samba Transit is a transit tool designed to help optimize the public commuting experience. Users can view route timings, visualize bus routes on a map, and customize their trips by adding specific stops. Additionally, the application offers features like filtering routes, saving favorite routes or stops, and monitoring Transit Card balances. With an emphasis on user-centric design and innovative features, it aims to provide a seamless and efficient transit planning experience. The following is the detailed breakdown of its functionalities, all built around the implicit CRUD (Create, Read, Update, Delete) cycle:

Basic Functions:

1. Schedule Checker: Users can view the arrival and departure times for each route, ensuring they can plan their travel accordingly.
2. Maps with bus stops and routes: The application provides a visual representation of bus routes and their respective stops, allowing users to get a spatial understanding of their journey.
3. Trip Planner: This feature allows users to create and customize their own routes. They can manually add stops to design a journey from one place to another based on their preferences. The function also provides filtering features where users are able to select options like transport types. The optimal scheduling handler will be further implemented and discussed in Google Map Direction description under the complex functions section below.
4. Transit Card Balance Checker: The application allows users to conveniently view and maintain their remaining balance on their transit cards.

Complex Functions:

1. Route Creator: This function offers possible optimal directions from a starting point to a destination. The application uses an algorithm to suggest the best routes, giving options for the fastest, cheapest journey or preferred stops.
2. Close-by Stops Lookup: If users are unfamiliar with an area, they can use this function to find stops that are close to their current location.
3. Auto Suggestion: To further simplify the user experience, based on the location entered, the application will automatically suggest relevant routes or stops, reducing the effort needed to search.

Creative Functions:

1. Personalized Route Recommendations: The application offers a unique feature that tailors route suggestions specifically to individual users. By analyzing a user's travel history, the system can predict and suggest routes or stops that the user frequently visits, thereby streamlining the input process and delivering a more personalized user experience.

To achieve this, upon approval, we will maintain a record of each user's travel history, specifically noting their common start points and destinations. When a user begins to input a familiar start point or destination, the system will proactively suggest routes based on their past selections, making the planning process faster and more intuitive.

2. Community-Based Route Recommendations: For users unfamiliar with the city, the application offers, this feature suggests routes frequently used by the local community, ensuring newcomers can quickly find reliable and efficient paths.

We will utilize a database of the most commonly selected routes by all users. When a newcomer inputs a start and destination point, the system will automatically suggest the most popular route between those two points based on past user selections.

3. Comments System: Users can leave feedback on buses or stops, touching on factors like crowdedness, accessibility, temperature, and security, and we still store them in our created columns in the database.

When users access a specific bus route or stop within the app, they will find an option to leave a comment or review. These comments are stored and displayed to other users, offering real-time insights. Transit operators can also access an aggregated view of this feedback, helping them identify areas for improvement.

UI Mockup

The UI Mockup is in the files named Main Website Design.pdf, Route Information Website.pdf, and Trip Planning website that are in the doc folder in the github repo.

Work Distribution

By practicing Agile Development principles, our team is committed to iterative progress, flexibility, and collaboration. We understand that the journey to project deployment may present numerous unpredicted challenges, and thus we are prepared to adapt our work distribution plan accordingly. The following is our initial distribution of tasks, keeping in mind that this is a dynamic plan and may be revised upon the project's needs throughout each iteration:

0. Frontend Template Set Up

- a. Responsible: Wei, Dou, Vira, and Lin
- b. Tasks: Set up the basic frontend template where the application is built on.

1. Schedule Checker

- a. Responsible: Wei, Lin
- b. Tasks: Develop and maintain the backend logic to fetch and display route timings, integrating the frontend and backend database systems.

2. Maps with Bus Stops and Routes

- a. Responsible: Dou, Vira
- b. Tasks: Integrate the map API, and plot bus routes and stops for user interface.

3. Trip Planner

- a. Responsible: Dou, Vira
- b. Tasks: Design the user interface for manual route creation/update/deletion, allow users to add stops, and ensure the backend supports these custom routes.

4. Comments System

- a. Responsible: Dou, Lin
- b. Tasks: Design the user comment submission, develop the system to store, and display user comments.

5. Close-by Stops Lookup

- a. Responsible: Wei, Vira
- b. Tasks: Develop a feature to access the user's location, as well as find and display nearby stops by utilizing APIs.

The functions above would be our main focus, and if we have time, we will implement the functions below.

6. Auto Suggestion

- a. Responsible: Dou, Vira
- b. Tasks: Implement logic to suggest relevant routes or stops based on user input for starting and arrival points from the user travel history.

7. Route Creator

- a. Responsible: Vira, Lin, and Wei
- b. Tasks: develop the algorithm that suggests optimal routes based on user preferences, handle the integration of the algorithm with the frontend.

8. Recommendations System

- a. Responsible: Dou, Wei
- b. Tasks: Design a database capturing user travel patterns, develop an algorithm for tailored route suggestions, and collate and analyze route data from all users to suggest popular routes to newcomers.