COMP4801 Final Year Project

Detailed Project Plan

OptiTrans - Real-Time Optimized Public Transportation Navigation App for Hong Kong

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1. Project Background

1.1 Introduction

In the vibrant and bustling urban landscape of Hong Kong, the efficiency of public transportation is crucial for the daily lives of its millions of residents and visitors. However, current transportation applications, both official and unofficial, fall short of providing a satisfactory solution to the multifaceted challenges faced by commuters. Unofficial applications lack reliability, leading to user frustration, while official apps, though more dependable, present usability issues. The OptiTrans project aims to address these gaps, aspiring to be an all-encompassing, user-friendly application that offers accurate real-time data for all modes of public transportation in Hong Kong.

1.2 Motivation

The motivation behind OptiTrans is deeply rooted in the shortcomings of existing solutions. Unofficial apps, like Moovit and Citymapper, lack accuracy, leading to user dissatisfaction and potential disruptions in travel plans. On the other hand, official apps, like HKeMobility, Citybus, and MTR Mobile, while being more reliable, suffer from usability challenges, often resulting in a less-than-optimal user experience. OptiTrans seeks to amalgamate the strengths of both types of apps, aiming to offer accuracy, comprehensiveness, and user-friendliness in a single, integrated platform.

1.3 Desirability

The desirability of OptiTrans lies in its potential to significantly enhance the commuting experience for residents and visitors in Hong Kong. By providing optimized routes, real-time data, and a seamless user interface, OptiTrans aspires to become the definitive app for anyone relying on public transportation in the city. The app's user-centric design and commitment to accuracy are anticipated to make it indispensable for daily commuters and occasional travelers alike.

2. Project Objective

The primary objective of OptiTrans is to develop a robust mobile application that optimizes public transportation navigation in Hong Kong. The key objectives include:

- **Accurate Real-Time Data:** The project aims to gather and process real-time information from major transportation operators, ensuring accuracy in arrival times, fares, and service status. This will involve establishing integration with the APIs of major transportation operators to ensure seamless access to up-to-date information. Developing robust and reliable connections with different APIs and maintaining these connections to ensure a steady stream of accurate data will be a key focus.

- **Route Optimization:** OptiTrans will implement algorithms to generate optimized routes based on user preferences, such as the shortest travel time, lowest fare, or

minimum transfers. The customization of routes based on user profiles and preferences will be a focal point of this objective.

- **Comprehensive Information:** The application will provide users with a user-friendly interface containing comprehensive and accurate details on arrival times, fares, and optimized routes for buses, MTRs, trams, and other public transportation services.

3. Project Methodology

The OptiTrans project will be executed through a systematic and iterative approach, with a series of stages and activities to ensure the successful development of the application.

3.1 Data Aggregation

- **API Integration:** Collaborate with major transportation operators to integrate their APIs into the OptiTrans platform for real-time data retrieval. This will involve negotiating agreements, understanding data formats, and establishing secure and reliable connections.
- **Data Structure Design:** Develop a robust data structure to efficiently store and manage the gathered information. The design should be scalable to accommodate the dynamic nature of real-time transportation data.

3.2 Real-Time Data Processing

- **Data Processing Algorithms:** Implement algorithms to process real-time data and ensure accuracy in arrival times, fares, and service status. The project will explore advanced techniques, possibly involving machine learning or AI, to enhance prediction accuracy and account for unforeseen disruptions.

- **Database Management:** Utilize databases to store and retrieve processed data efficiently. Consideration will be given to data security, integrity, and the speed of retrieval to enhance user experience.

3.3 Route Optimization

- **Algorithm Development:** Design and implement route optimization algorithms based on user preferences. This will involve considering various factors such as traffic conditions, service status, and historical data to enhance the accuracy of route recommendations.

- **User Profiles:** Allow users to set preferences for travel time, cost, and transfer preferences to tailor route recommendations. Develop a user-friendly interface for profile customization.

3.4 Mobile Application Development

- **Front-End Development:** Create a user-friendly interface that provides a seamless experience for users. This will involve adhering to principles of UX design and accessibility to ensure the app is inclusive and easy to navigate.

- **Back-End Development:** Integrate data processing and route optimization algorithms into the back-end of the application. Prioritize system efficiency and responsiveness to provide real-time information.

3.5 Testing and Iteration

- **User Testing:** Conduct thorough testing to identify and rectify any issues in the application. Gather feedback from users to understand pain points and areas for improvement.

- **Iterative Development:** Implement user feedback to enhance the app's functionality and user experience. Adopt an agile development approach, allowing for continuous improvements based on user input.

4. Project Schedule and Milestones (with learning hours)

4.1 Milestone 1: Project Initiation (60 hours)

- Define project scope and objectives

- Conduct a literature review on existing public transportation apps

- Identify and contact potential collaborators (transportation operators)

4.2 Milestone 2: Data Aggregation (90 hours)

- Establish API connections with major transportation operators

- Design and implement data structures for efficient data storage

- Test data retrieval and storage processes

4.3 Milestone 3: Real-Time Data Processing (100 hours)

- Develop algorithms for real-time data processing

- Set up databases for data management

- Test accuracy and efficiency of data processing

4.4 Milestone 4: Route Optimization (100 hours)

- Design route optimization algorithms

- Implement user preference settings for route customization

- Test route optimization functionality

4.5 Milestone 5: Mobile Application Development (110 hours)

- Develop the front end of the mobile application

- Implement back-end functionality, integrating data processing and route optimization

- Conduct initial testing of the integrated system

4.6 Milestone 6: Testing and Iteration (100 hours)

- Conduct user testing and gather feedback

- Implement iterative improvements based on user feedback

- Perform final testing before deployment

4.7 Milestone 7: Deployment and Documentation (60 hours)

- Deploy the fully functional OptiTrans app

- Document the development process, algorithms used, and user guidelines

5. Project Scope

The scope of the OptiTrans project includes the following key deliverables:

- **Mobile Application Development:** The OptiTrans project will deliver a fully functional mobile application that provides real-time optimized public transportation navigation in Hong Kong.

- **Real-Time Data Processing:** Implementing algorithms for processing real-time data from various transportation operators with a focus on accuracy and responsiveness.

- **Public Transportation Navigation:** Designing and optimizing routes for buses, MTRs, trams, and other public transportation services to provide users with efficient and reliable travel options.

- **User Experience Design:** Ensuring a seamless and intuitive user experience through effective interface design and customization options, with a keen focus on accessibility.

- **Route Optimization:** Implementing algorithms to generate optimized routes based on user preferences, considering factors such as travel time, cost, and transfer preferences.

The project scope is extensive, covering both front-end and back-end development aspects to deliver a fully functional and user-friendly public transportation navigation app for Hong Kong.

6. Conclusion

In conclusion, the OptiTrans project aims to revolutionize the public transportation experience in Hong Kong by addressing the limitations of existing apps. Through meticulous planning, systematic implementation, and continuous testing and iteration, OptiTrans aims to emerge as a reliable, accurate, and user-friendly solution for commuters in the city. The milestones and schedule outlined provide a clear roadmap for the successful development and deployment of the OptiTrans app, ultimately contributing to the improvement of the overall public transportation ecosystem in Hong Kong.