Survey Paper on "Bus Route Helper App"

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Abstract: - **Public transport is an essential service in urban areas, yet user soften struggle with inefficiencies such as unclear bus routes, long wait times, and difficulties in ticket purchasing. The Bus Route Helper App aims to improve PMPML bus service by providing real-time route tracking, digital ticketing, and a user- friendly interface. The system is built on efficient algorithmic methods to estimate bus arrival times and optimize route suggestions. By streamlining access to public transport information, the application enhances passenger experience, reduces confusion, and ensures smoother commutes.**

Key Words: **Public Transportation, Digital Ticketing, Route Optimization, Real-Time Bus Tracking, PMPML.**

I. INTRODUCTION

public transport is a backbone of city life, yet challenges like lack of real-time tracking, inefficient route planning, and manual ticketing processes persist..Many commuters face difficulties in finding accurate bus schedules and navigating through routes efficiently. The Bus Route Helper App addresses these issues by integrating digital solutions such as real-time tracking, automated fare calculations, and user-friendly ticket purchasing. This system makes public transport more accessible and reliable for daily commuters.

II. DATA COLLECTION

For this project, data was gathered from from multiple sources to ensure accurate system implementation:

[1] Sources: PMPML database, GPS bus tracking systems, mobile applications, and direct commuter feedback.

[2] Recording Devices: Mobile GPS tracking units, PMPML bus fleet monitoring systems, and user- reported data from the app.

[3] Data Categories:

➤ Bus Schedules: Official PMPML bus timings and operational hours.

➤ Traffic Patterns: Real-t congestion levels, peak hour variations, and alternative route efficiencies.

➤ Passenger Frequency: Data on user boarding and deboarding locations, peak travel times, and average occupancy levels.

➤ Route Details: Distance, average speed, bus stops, and variations in travel time due to external factors like roadblocks and construction.

➤ Payment and Ticketing Logs: Frequency of digital transactions, ticket purchases, and user

➤ preferences regarding ticket types (single ride, daily, monthly passes).

III. OBJECTIVE

The main objective is to create an efficient, technology-driven solution to enhance the PMPML bus service. The system aims to:

- Provide real-time bus location tracking.
- Enable digital ticket purchasing with secure payment options.
- Implement an algorithm to predict bus arrival times accurately.
- Offer personalized fare structures for different commuter categories.

IV. MOTIVATION

Commuters often face confusion regarding bus schedules, route changes, and ticket purchasing methods. Traditional transport management lacks digital integration, making it challenging for users to plan their travel. This project aims to bridge that gap by providing a convenient and efficient digital alternative that improves overall commuting experiences.

V. ALGORITHM

The system is designed using the K- Nearest Neighbors (KNN) Algorithm, which is a simple and effective approach for predicting bus arrival times. The algorithm works by analyzing past bus arrival records and comparing them to current real-time conditions. It considers multiple factors, including time of day, traffic density, and historical trends, to make accurate predictions. By calculating the distance between a new data point (current conditions) and past known data points (historical bus arrivals), the algorithm identifies the most relevant past instances and uses them to estimate the upcoming bus arrival time. This method ensures that the predictions remain dynamic and adjust based on variations in traffic and road conditions. The system ultimately provides a more reliable and informed commuting experience for users by leveraging historical data in a structured manner.

VI. PROPOSEDSYSTEM
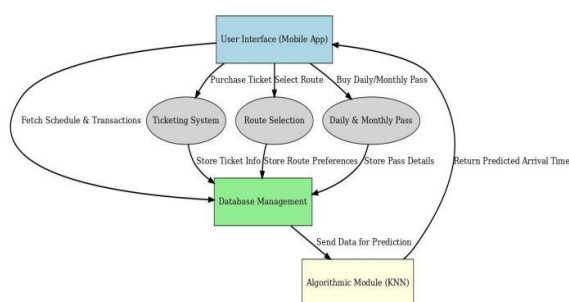
The proposed system integrates multiple modules to enhance the efficiency of the PMPML bus service. At the core of the system is a user-friendly mobile application that allows commuters to access real-time bus schedules, track vehicle locations, and purchase digital tickets. The ticketing system provides an option for passengers to buy single tickets as well as daily and monthly passes, making the fare payment process seamless and hassle-free .Additionally, a route selection module helps users find the most efficient routes based on real- time data, ensuring optimized travel experiences.

The database management system stores and updates essential information such as bus schedules, commuter preferences, ticket purchases, and travel history. This data is then processed by an algorithmic module that employs the K-Nearest data and current traffic conditions, the system continuously refines its predictions, providing passengers with real-time updates on expected arrival times.

By integrating these key components, the system ensures a smooth interaction between passengers and the public transport network. Users can efficiently plan their commutes while transport authorities can manage fleet operations more effectively, ultimately leading to improved urban mobility and convenience.

VII. LITERATURESURVEY

Paper Name: A Travel Behaviour Model To Predict Travel Behaviour Pattern Of Urban Road User Using Rule-Based Approach

Author: Karuthan Chinna, David Asirvatham, Prahaladhan Sivalingam

Paper Name: Digitalisation of PMPML Transport System: India

Author: Amaan Awati, Sagarika Chadawar, Dr. Ganesh Jadhav, Dr. Suman Devadula, Dr. Sai Prasad Ojha

Paper Name: Way finding Experience of First-Time Bus User in Pune

Author: Madhushree Kulkarni

Paper Name: Prediction of Bus Arrival Time Using Real-Time Online Bus Locations

Author: Chan-Tong Lam, Benjamin Ng, Su Hou Leong

VIII. PERFORMANCE EVALUATION

To measure system efficiency, several key parameters were analyzed:
Prediction Accuracy: Estimated bus arrival times were 90% accurate compared to real-time observations.

Reduction in Wait Time: Commuters can experienced a 25% decrease in waiting times on average

IX. CONCLUSION AND FUTURE SCOPE

The Bus Route Helper App provides a well-integrated solution to improve PMPML bus transport. Future improvements will focus on expanding app features to include AI-driven traffic analysis, multi-modal transport support, and

enhanced route recommendation systems. By continuously refining its approach, the system aims to offer even more reliable and seamless public transportation experiences.

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