ENHANCING PUBLIC PASSENGER TRANSPORT ROUTE SELECTION METHODS. A COMPREHENSIVE REVIEW AND FUTURE DIRECTIONS

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ABSTRACT

Efficient public passenger transport systems play a pivotal role in addressing urban mobility challenges. The selection of optimal transport routes is a critical aspect of ensuring the effectiveness of these systems. This scientific article reviews current methods for selecting public passenger transport routes and explores avenues for improvement. By analyzing existing methodologies, identifying challenges, and proposing innovative solutions, this article aims to contribute to the advancement of public transportation planning.

Keywords: Public transport, route selection, geographic information systems, demand analysis, multi-criteria decision analysis, machine learning, predictive analytics, adaptive systems.

INTRODUCTION

Urbanization and population growth have intensified the demand for reliable and efficient public passenger transport. The selection of transport routes significantly influences the overall performance of public transportation systems. This article addresses the need for improved methods in this domain by examining existing approaches, their limitations, and potential enhancements.

Current Methods in Public Transport Route Selection

A. Geographic Information Systems (GIS) based Approaches

-Analysis of spatial data for route optimization

-Integration of real-time data for dynamic route adjustments

B. Demand Analysis and Modeling

-Utilization of historical data to predict passenger demand

-Incorporation of machine learning algorithms for demand forecasting

C. Multi-Criteria Decision Analysis (MCDA)

Evaluation of routes based on multiple criteria (e.g., cost, environmental impact, and accessibility)

Weighted scoring systems for route prioritization

Challenges in Existing Methods

A. Limited Adaptability

Inability to respond dynamically to changing urban landscapes and transportation patterns

B. Data Accuracy and Availability

Reliance on accurate and up-to-date data for effective decision-making

C. Integration of Emerging Technologies

Incorporation of artificial intelligence, Internet of Things (IoT), and advanced analytics for enhanced route planning

Proposed Improvements

A. Dynamic Route Planning

Integration of real-time data to optimize routes based on current traffic conditions and passenger demand

B. Predictive Analytics

Utilization of advanced algorithms to forecast future demand, allowing proactive adjustments to route planning

C. Machine Learning for Adaptive Systems

Development of intelligent systems capable of learning from past data and adapting to changing transportation dynamics

D. Crowdsourced Data Integration

Inclusion of data from passengers, such as preferences and feedback, to enhance route selection accuracy

Case Studies and Demonstrations

A. Successful implementations of improved route selection methods in select urban areas

B. Comparative analyses showcasing the advantages of enhanced methodologies

Future Directions and Recommendations

A. Research and development priorities for the advancement of public passenger transport route selection methods

B. Collaboration between researchers, policymakers, and industry stakeholders for comprehensive solutions

CONCLUSION

This article provides a thorough examination of current methods in public passenger transport route selection, identifies existing challenges, and proposes innovative improvements. The future of urban mobility relies on the continuous enhancement of route selection methodologies, and the insights presented here aim to guide further research and development in this critical field.

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