

Dynamic Ride Fare Tracker - AI-Powered Real-Time Fare Comparison & Surge Prediction

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ABSTRACT: Ride Fare Tracker is an AI-powered platform that provides real-time fare comparison across multiple ride-hailing services such as Uber, Ola, and Rapido. By integrating algorithmic fare data, the system predicts surge pricing and identifies the most cost-effective ride options using AI. With ride services often showing fluctuating fares and hidden surge rates, commuters face uncertainty in choosing the best option. This project addresses that challenge by integrating live fare data, applying predictive analytics and machine learning to anticipate price surges, and presenting users with transparent comparisons of cost, time, and availability. The system fosters a smarter, data-driven approach to ride selection, enhancing user experience and promoting competitiveness in the ride-hailing ecosystem. With its intuitive interface and intelligent AI recommendations, Ride Fare Tracker not only improves decision-making for individual users but also fosters transparency and competitiveness, ultimately redefining the urban commuting experience.

KEYWORDS: Ride Fare Comparison, Surge Prediction, Machine Learning, XGBoost, Real-Time APIs, React Native, FastAPI, Firebase, Predictive Analytics, Urban Commuting.

I. INTRODUCTION

In today's fast-paced urban world, ride-hailing applications such as Uber, Ola, and Rapido have become a vital part of modern transportation. They provide a convenient and reliable means of travel, making commuting more accessible and efficient. However, one of the major challenges faced by users is the unpredictability of ride fares due to factors like surge pricing, traffic congestion, and real-time demand fluctuations. Passengers are often required to switch between multiple applications to compare fares before booking a ride, which is both time-consuming and inefficient, leading to confusion and dissatisfaction.

To address these issues, the Dynamic Ride Fare Tracker has been developed as an AI-powered platform that provides real-time fare comparison and surge prediction across major ride-hailing services. By integrating live fare data and weather parameters, the system utilizes machine learning algorithms to predict surge pricing and AI to recommend the most cost-effective ride option. The platform acts as a centralized solution, offering users an intelligent way to compare fares, anticipate price hikes, and make better travel decisions all from a single interface.

The project aims to enhance fare transparency, save time and cost, and improve the overall commuting experience through the power of artificial intelligence, predictive analytics and machine learning. With its intuitive user interface and personalized recommendations, the Dynamic Ride Fare Tracker fosters trust, efficiency, and convenience in urban transportation.

II. EXISTING SYSTEM

In the present urban transportation landscape, ride-hailing services such as Uber, Ola, and Rapido have become the most preferred choice for daily commuters. Despite their convenience, these platforms have a common drawback — unpredictable fare variations that leave users uncertain about travel costs. Each service displays its own fare independently, requiring commuters to manually switch between applications to find the best deal. This process is not only time-consuming but also causes frustration among users, especially during peak hours when prices fluctuate frequently.

Another major issue is the lack of transparency in surge pricing mechanisms. Users often see sudden price hikes without any explanation regarding the influencing factors, such as weather conditions, or increased demand. The absence of detailed fare breakdowns and predictive insights leads to confusion.

A. Drawbacks of Existing System

1. No real-time fare comparison across multiple platforms.
2. No predictive features to forecast price surges.
3. Limited transparency of fare dynamics and surge mechanisms.
4. Static fare estimations disconnected from real-world variables such as traffic and weather.

III. PROPOSED MODEL

The Dynamic Ride Fare Tracker proposes a centralized, AI-powered recommendation system designed to overcome the inefficiencies of the current ride-hailing model. It collects and integrates real-time fare data from multiple services such as Uber, Ola, and Rapido through their public APIs. By combining historical demand data, the system employs machine learning algorithms to predict fare surges before they occur, ensuring that users always have access to the most accurate and affordable ride options available.

The system's intelligent recommendation engine analyzes fare trends and suggests the best ride based on cost, estimated arrival time, and route efficiency. Additionally, it features a user-friendly interface that enables commuters to view all fare comparisons instantly without switching between applications. By leveraging AI and data-driven insights, the proposed system enhances fare visibility, optimizes decision-making, and delivers a seamless and personalized commuting experience.

A. Advantages of the Proposed System

1. **Fare Comparison:** Integration of algorithmic APIs from multiple ride-hailing services to fetch and compare fares, travel durations, and availability in real time.
2. **Surge Price Prediction:** Machine learning algorithms analyze traffic, weather, and demand patterns for predicting surge pricing before booking.
3. **AI-Based Recommendations:** Intelligent recommendation system suggests the most cost-effective and time-efficient rides based on user preferences and travel context.
4. **User Authentication and Data Management:** Secure user login, ride tracking, and history storage using MongoDB-based backend services.
5. **Scalability:** The system architecture accommodates additional APIs, new cities, and other transport services in future extensions.

IV. METHODOLOGY

A. Data Collection & Preprocessing Module:

This module is responsible for collecting, cleaning, and preparing data required for accurate fare prediction and comparison. It integrates live data from multiple ride-hailing platforms through APIs, along with contextual information like traffic conditions, weather details, and demand-supply metrics. Once the data is collected, it undergoes preprocessing including cleaning noisy or incomplete data, normalizing values, and extracting relevant features for the machine learning model.

B. Predictive Analytics Module (XGBoost / Linear Regression):

This is the core AI/ML module of the project. It applies regression models and machine learning algorithms to predict future fare surges and estimate optimal ride prices. The model uses historical data, time-based trends, and environmental factors to forecast potential fare fluctuations. The output is a predicted fare along with a surge likelihood score.

C. Real-Time Comparison and Recommendation Module:

This module serves as the decision-making core of the system. It performs real-time fare comparison across multiple ride-hailing platforms and simultaneously provides personalized ride recommendations based on user preferences.

Using processed data and AI-based fare predictions, the module identifies the most affordable, efficient, and convenient ride option available. By combining real-time analytics with AI-driven personalization, it ensures that users receive accurate, relevant, and cost-effective ride suggestions instantly.

D. User Interface, Authentication, and Database Module (React Native + MongoDB):

The User Interface module acts as the interaction layer between the user and the system. It is developed using React Native with Expo, enabling cross-platform mobile application development for Android and iOS devices. The interface displays real-time fare comparisons, surge predictions, and intelligent ride recommendation.

V. SYSTEM ARCHITECTURE

The Dynamic Ride Fare Tracker follows a **modular client-server architecture** consisting of a React Native frontend, FastAPI backend, machine learning module, MongoDB database, and external ride-hailing service APIs.

The **React Native mobile interface**, developed using Expo, allows users to input ride details such as source and destination locations and view real-time fare comparisons.

The **FastAPI backend** processes incoming requests, communicates with ride-hailing APIs, fetches fare estimates, and executes the machine learning models for surge prediction and fare analysis.

All ride data, user profiles, and ride history are stored in **MongoDB**, which provides a flexible document-based storage system suitable for storing ride-related datasets and prediction outputs.

The architecture ensures:

- Efficient data flow between frontend and backend
- Scalable database management through MongoDB
- Seamless API integration for real-time fare retrieval

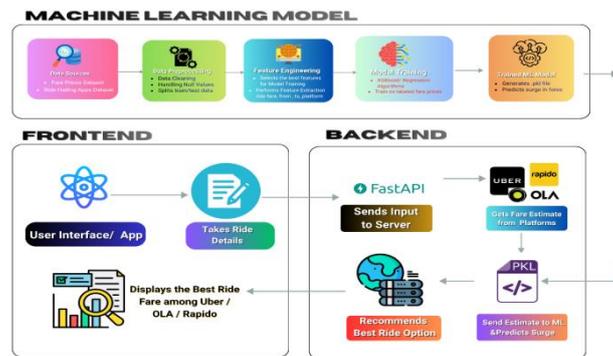


Fig 1. System Architecture

VI. RESULTS AND OUTPUTS

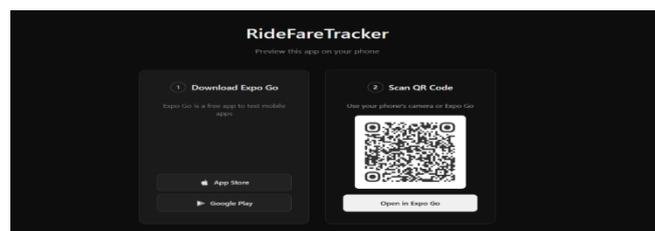


Fig 2. App Dashboard

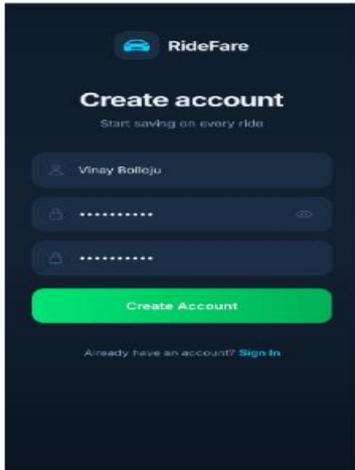


Fig 3. Signup



Fig 4. Profile Page

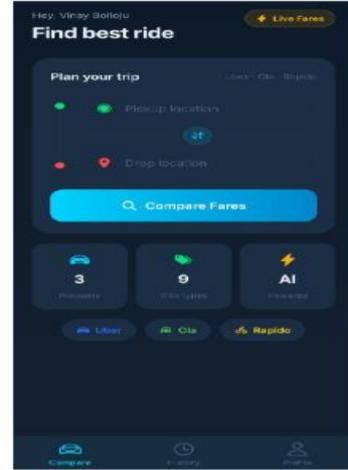


Fig 5. Home Page



Fig 6. Search Page - i

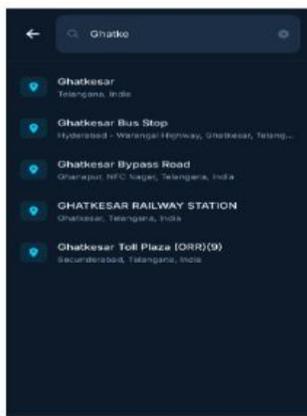


Fig 7. Search Page - ii

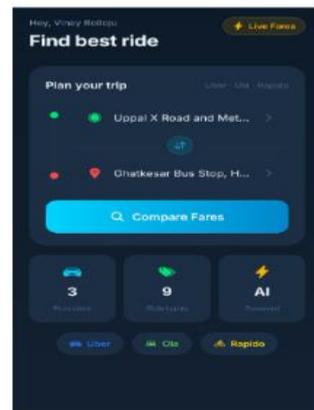


Fig 8. Selected Trip



Fig 9. Results Page - i

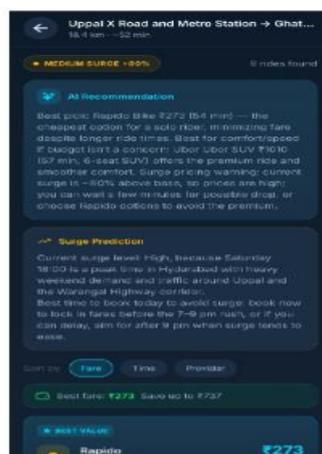


Fig 10. Results Page - ii

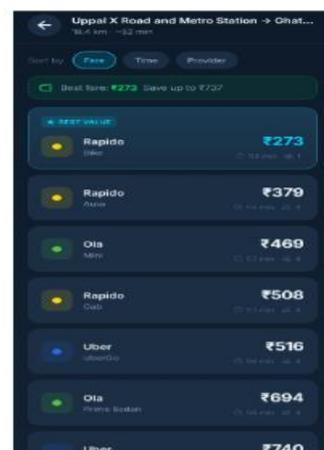


Fig 11. Fare Comparison

VII. CONCLUSION AND FUTURE SCOPE

The Dynamic Ride Fare Tracker project effectively tackles the issues of fare unpredictability and lack of transparency in urban commuting. By integrating AI-driven analytics and real-time data processing, it enables users to compare fares from multiple ride-hailing services such as Uber, Ola, and Rapido through a single, unified platform. Using machine learning models for fare and surge prediction, the system provides accurate, data-driven insights based on traffic, weather, and demand trends. Built with React Native, FastAPI, and Firebase, it ensures scalability, efficiency, and a smooth user experience.

The system can be improved by adding support for multiple languages and regional coverage, allowing users to receive fare comparisons in their preferred language and location. Advanced deep learning or hybrid recommendation models can be used to provide more accurate and personalized suggestions. The application can also include push notifications to instantly inform users about surge periods and important updates. Additionally, deploying the system on cloud platforms like AWS, Azure, or Google Cloud can improve scalability, reliability, and support for a large number of users.

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