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Ola Ride Request Forecast and Price Prediction

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ABSTRACT:

"This study presents a machine learning-based approach to forecast Ola ride requests and price prediction. The increasing demand for ride-sharing services necessitates accurate prediction models for better resource allocation and customer satisfaction. Leveraging historical ride data, and time-distance related factors, a predictive model is developed and trained. Various machine learning algorithms are explored, including decision trees, random forests, and gradient boosting, to identify the most effective approach. The proposed model demonstrates promising results in terms of prediction accuracy and efficiency, enabling Ola to optimize fleet distribution and enhance service quality."

INTRODUCTION:

We have collected the historical data from a project and now have a requirement to apply analytics for fare prediction. We need to design a system that predicts the fare amount for a cab ride in the city. There already existed a column of fare price which got dropped then we used various machine learning techniques. They are:

- Linear Regression
- Decision Tree
- Random Forest
- Gradient Boosting

On the basis RMSE and R Squared results a good model should have least RMSE and max R Squared value.

Below table shows the model results before applying hyper tuning

Model Name	RMSE		R Squared	
	Train	Test	Train	Test
Linear Regression	0.27	0.25	0.74	0.77
Decision Tree	0.30	0.28	0.70	0.70
Random Forest model	0.09	0.23	0.96	0.79
Gradient Boosting	0.22	0.22	0.82	0.81

Below table shows results post using hyper parameter tuning techniques:

Model Name	Parameter	RMSE (Test)	R Squared (Test)
Random Search CV	Random Forest	0.24	0.79
	Gradient Boosting	0.25	0.77
Grid Search CV	Random Forest	0.23	0.80
	Gradient Boosting	0.24	0.79

LITERATURE REVIEW:

1. "A Deep Learning Framework for Cab Fare Prediction" by Xia et al. (2019) - This study proposes a deep learning framework for cab fare prediction, which uses historical fare data and traffic data to make predictions.

2."Cab Fare Prediction Using Time Series Analysis and Machine Learning" by Agrawal et al. (2018) - This study uses time series analysis and machine learning techniques such as ARIMA and Random Forest Regression to make predictions of cab fare prices.

PROBLEM STATEMENT:

Having an online system that can book rides whenever necessary offers several advantages. Firstly, it provides convenience and saves time for passengers, as they can book a ride with just a few taps on their phone. No more waiting on hold or searching for a cab on the streets. Secondly, it ensures reliability and availability, as the system can connect passengers with nearby ride quickly. Inaccurate fare estimates can lead to unexpected costs and inconvenience for passengers. By developing a machine learning model that accurately predicts cab fares, we can help passengers plan their budgets, avoid overpaying, and have a more seamless and transparent cab booking experience. This project aims to solve the problem of uncertainty and provide a reliable tool for estimating cab fares.

METHODOLOGY:

Data Visualization:

Matplotlib or Seaborn: Visualizing patterns and relationships in the data.

Data Preprocessing:

Pandas: Cleaning, transforming, and aggregating data.

Scikit-learn: Preprocessing tools like scaling and splitting data into training and testing sets.

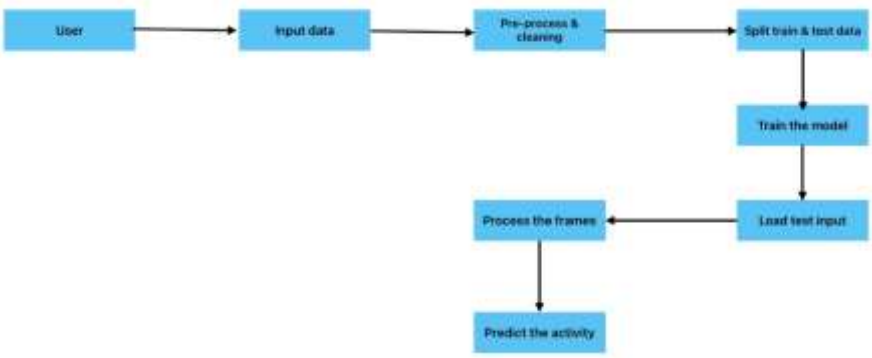
Model Evaluation:

Metrics like Root Mean Squared Error (RMSE), and R squared Error to evaluate model performance.

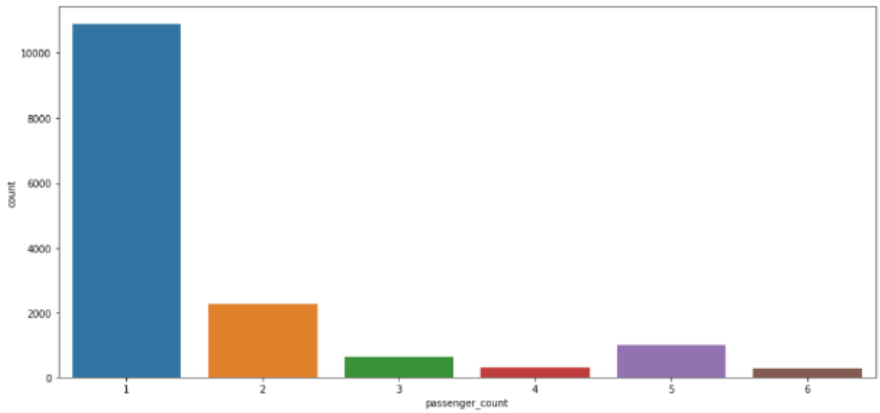
Hyperparameter Tuning:

Grid Search CV or Randomized Search CV to find optimal hyperparameters for the chosen algorithms.

Architecture of Project Diagram

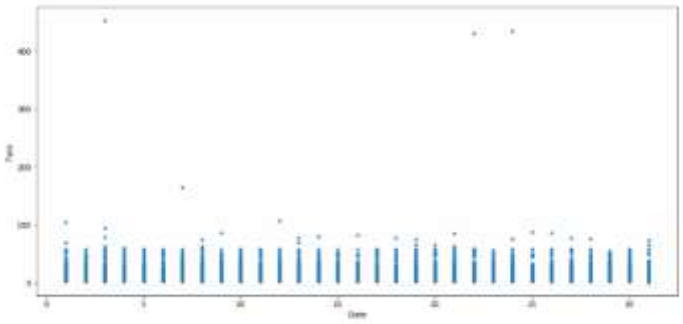


EXPERIMENTAL RESULTS:



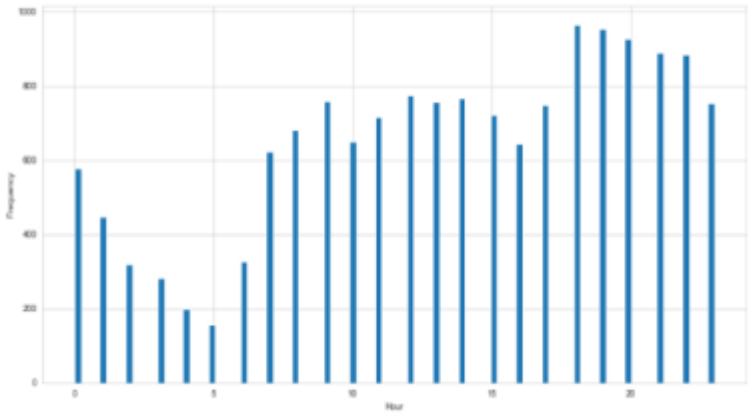
1. Number of passengers and fare :

We can see in below graph that single passengers are the most frequent travelers, and the highest fare also seems to come from cabs which carry just 1 passenger.



2. Date of month and fares :

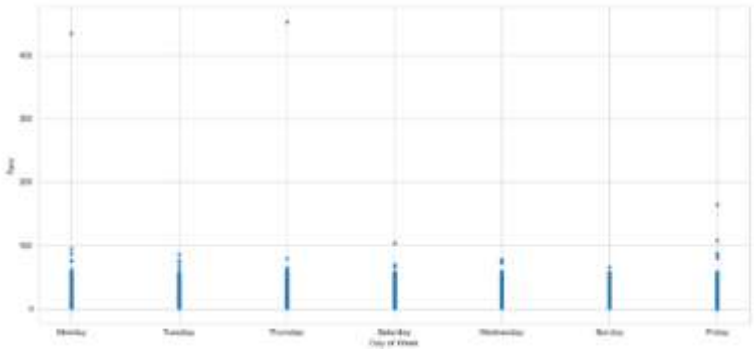
The fares throughout the month mostly seem uniform.



3. Hours and Fares:

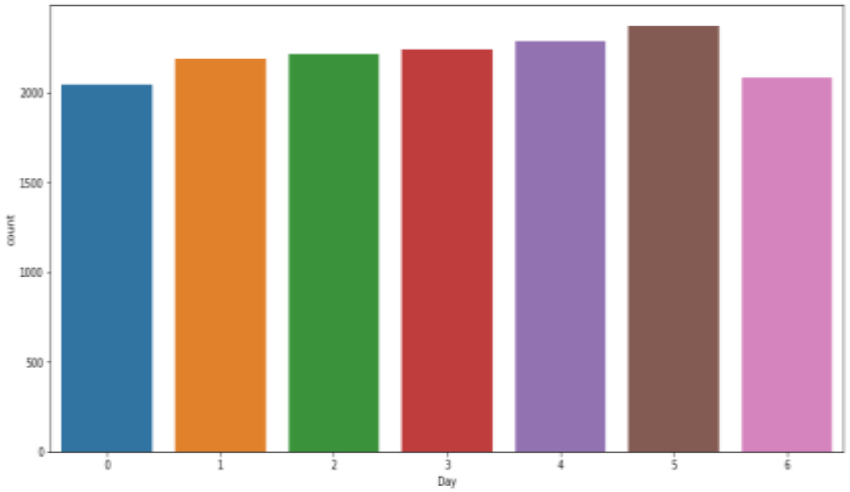
• During hours 6 PM to 11PM the frequency of cab boarding is very due to peak hours

• Fare prices during 2PM to 8PM is bit high compared to all other time might be due to high demands.



4. Week Day and fare:

• Cab fare is high on Friday, Saturday and Monday, may be during weekend and first day of the working day they charges



5. Impact of Day on the Number of Cab rides.

Observation: The day of the week does not seem to have much influence on the number of cabs ride.

CONCLUSION:

In conclusion, the ola ride fare prediction project successfully utilized machine learning algorithms to estimate fares based on various factors such as distance, time, and other relevant features. The model's accuracy and performance were assessed through rigorous testing, demonstrating its effectiveness in providing reliable fare predictions. Overall, the project contributes to the optimization of fare estimation in the price prediction industry.

FUTURE WORK:

User Interface (UI) Enhancement:

Design and implement a user-friendly interface for the fare prediction system. Include intuitive visuals and interactive elements to enhance user experience.

Real-time Weather Integration:

Integrate weather forecasting data into the prediction model. Consider variables like rain or traffic delays caused by weather conditions to improve accuracy.

Multi-city Support:

Extend the prediction model to cover multiple cities, considering unique traffic patterns and variables in different locations.

Mobile App Integration:

Integrate the fare prediction feature directly into the Ola mobile app for a seamless user experience. Allow users to access fare estimates before confirming their ride.

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