Document Title: **Surge Price Prediction Model**

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Problem Statement

To build a model to predict surge pricing in different parts of city to better balance driver supply with rider demand.

Business Goal

To build an ai model to Predict high-demand (surge) zones in real-time so the company can supply driver as per demand

Type of Problem

Since we need to predict the surge prices we can use regression algorithms like LinearRegression, RandomForestRegressor, etc.

Data Requirements

1. **User activity** (ride requests per area/time)
2. **Ride history** (pickup/drop location, time, price)
3. **Driver availability** (location, active/inactive status)
4. **Real-time location data** (GPS)
5. **Weather data** (rain, storms, temperature)
6. **Events** (concerts, sports, festivals)

Key Pre-Processing Steps

1. **Clean the data**: remove duplicates, handle missing values.
2. **Transform time**: Convert timestamps into hour-of-day, day-of-week, weekend/weekday.
3. **Tokenization:** Convert the text into small tokens so the LLM can understand

Modeling Approach

Type: Regression

Regression: since we need to predict prices its best approach

Possible Models:

- Random Forest
- Linear Regression
- Gradient Boosting Regressor

Try basic models first and scale to complex models as needed.

Evaluation Matric

Metrics:

- MAME/ RMSE/r2_score for surge value prediction

Deployment Idea

Deploy model via

- **Api Endpoint:** load the model in the server and create an api endpoint and use that to interact with the model