Fare Enough:
Building ML Models for Predicting Uber Fare Amount

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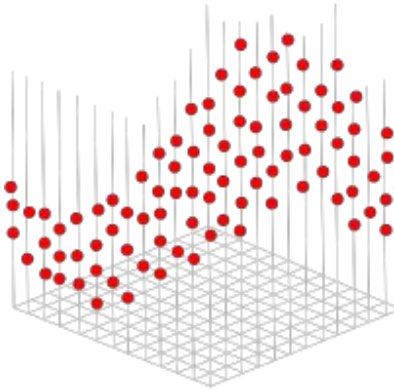
Github link: https://github.com/muchenzhong/data1030_midterm.git



Introduction

Intention: Predicting Uber Ride Fare Amount

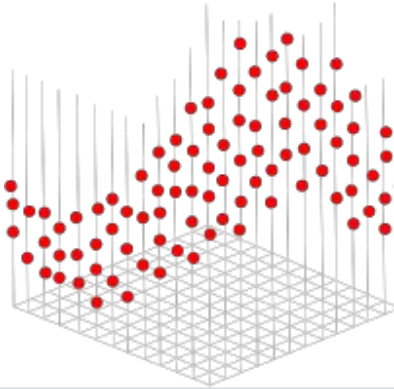
Why This Matters:

- Passengers: anticipating the cost → choose optimal times for rides → cost savings
- Company: strategize its pricing models to maximize revenue during high-demand periods
- Drivers: earning forecasting & optimize trip selection

Type of Problem: Regression

Data Collection:

- Source: Kaggle Platform
- Collected through web scraping from the Uber API.



Dataset Overview

- Large dataset: **190k+** rows, covering the period from 2009 to 2015.
- 6 features + 1 label
- No missing values

Pickup _datetime	Pickup _longitude	Pickup _latitude	Dropoff _longitude	Dropoff _latitude	Passenger _count	Fare _amount
2015-05-07 19:52:06 UTC	-73.999817	40.738354	-73.999512	40.723217	1	7.5
2009-07-17 20:04:56 UTC	-73.994355	40.728225	-73.994710	40.750325	1	7.7
...	...	...	...	...	...	...

6 Features

Label

Necessary Data Preprocessing Before EDA

Pick Up DateTime

- → Pickup_year
- → Pickup_month
- → Pickup_weekday
- → Pickup_day
- → Pickup_hour

A new column added: distance_km

- Calculate the distance between two geographic points (pickup and dropoff locations) using the Haversine formula.

Data Frame Now: 11 features

Pickup _datetime	Pickup _longitude	Pickup _latitude	Dropoff _longitude	Dropoff _latitude	Passenger _count	Fare _amount
2015-05-07 19:52:06 UTC	-73.999817	40.738354	-73.999512	40.723217	1	7.5
2009-07-17 20:04:56 UTC	-73.994355	40.728225	-73.994710	40.750325	1	7.7
...	...	...	...	...	...	...

Pickup _year	Pickup _month	Pickup _weekday	Pickup _day	Pickup _hour	Pickup _longitude	Pickup _latitude	Dropoff _longitude	Dropoff_ latitude	Distance _km	Passenger _count	Fare _amount
2015	May	Thursday	7	19	-73.999817	40.738354	-73.999512	40.723217	1.683323	1	7.5
2019	July	Friday	17	20	-73.994355	40.728225	-73.994710	40.750325	2.457590	1	7.7
					...	...	...	...		...	...

Exploratory Data Analysis

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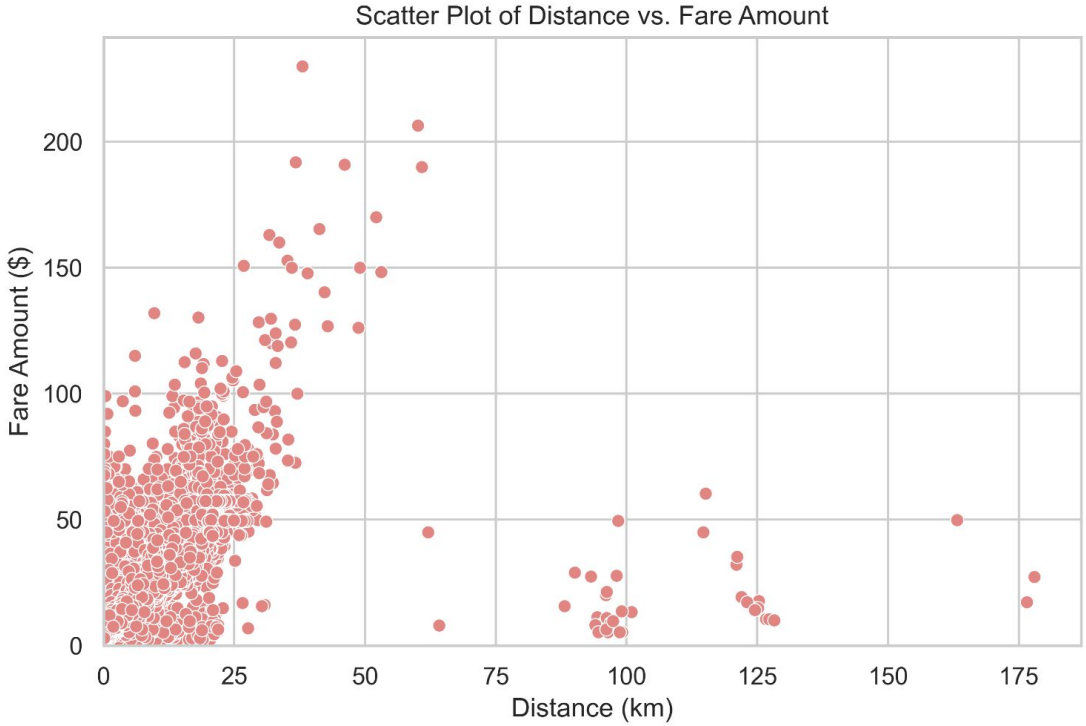
Exploratory Data Analysis



Longer Distance

Higher Fare Amount

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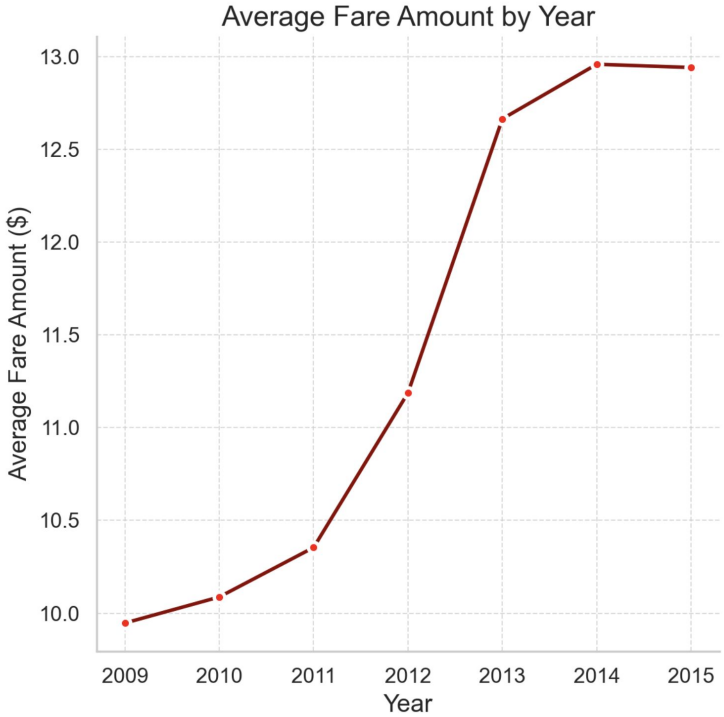
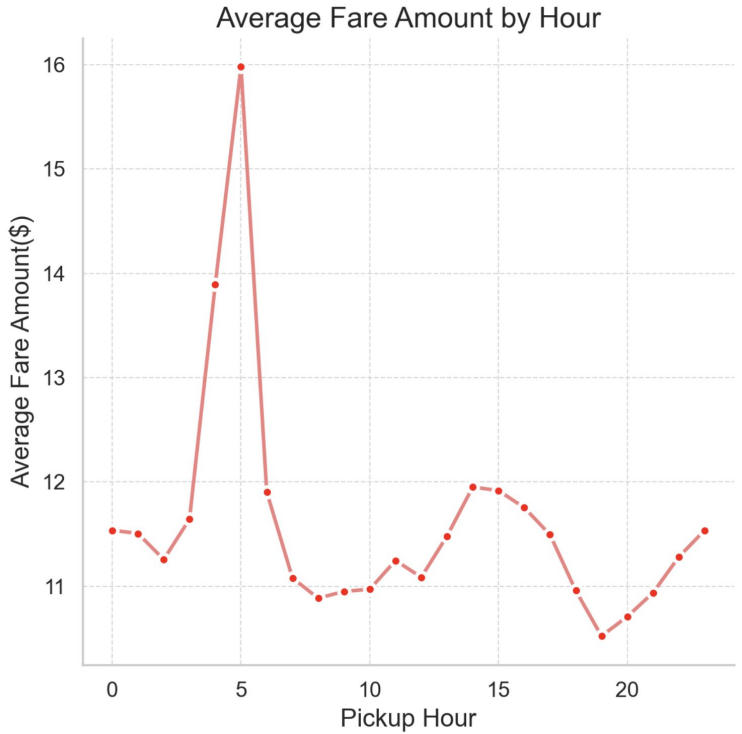
Exploratory Data Analysis





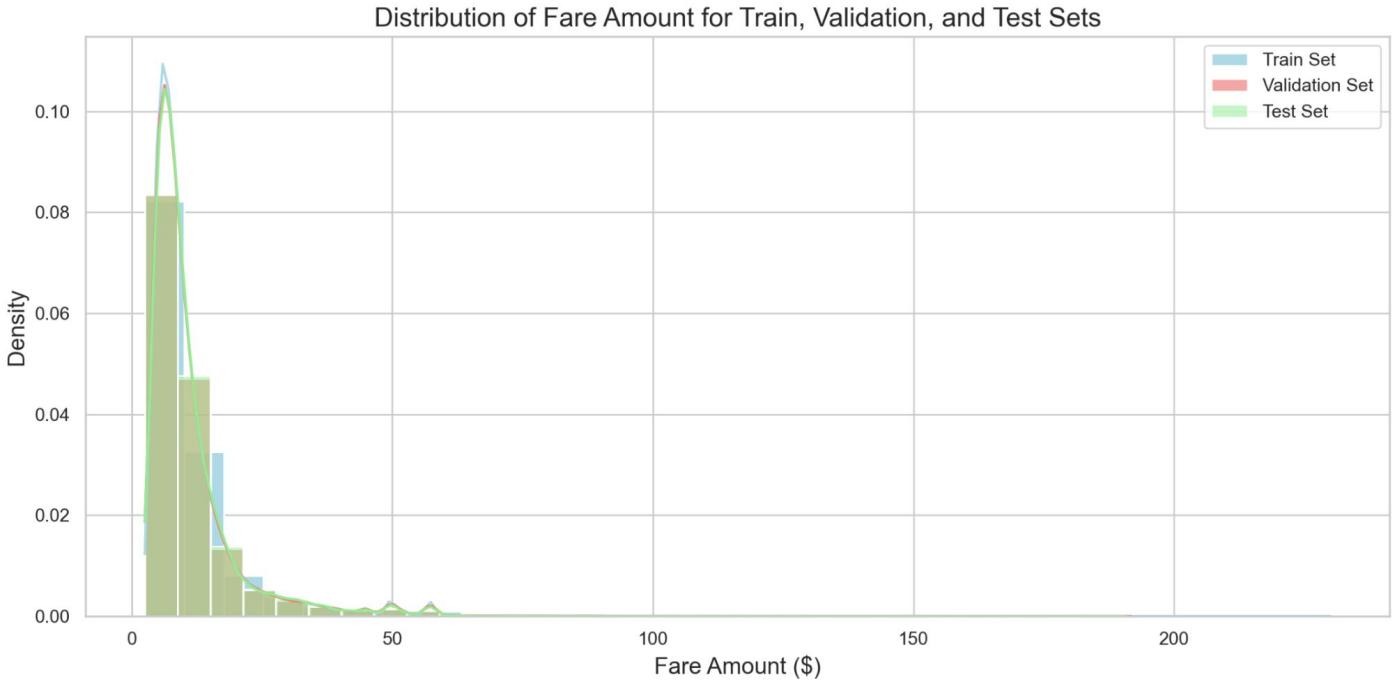
Data Splitting

- Shuffle and split out 15% for test set
- Perform a kfold cross validation to split train set and validation set


```
Test set size: 28806
Train and Val set size: 163230
Fold 1:
  Train set size: 130584
  Validation set size: 32646
Fold 2:
  Train set size: 130584
  Validation set size: 32646
Fold 3:
  Train set size: 130584
  Validation set size: 32646
Fold 4:
  Train set size: 130584
  Validation set size: 32646
Fold 5:
  Train set size: 130584
  Validation set size: 32646
```

Data Splitting

- Train, validation, and test set have similar distribution for fare_amount



Data Preprocessing: Categorical Feature Encoding

One-Hot Encoding:

- Pickup_month
- Pickup_weekday
- Pickup_day
- Pickup_year

11 features → 60 features

Data Preprocessing: Continuous Features Normalization

MinMax Scalar:

- Pickup_hour
- Pickup_longitutde
- Pickup_latitude
- Dropoff_longitude
- Dropoff_latitude

Standardized Scalar:

- Distance_km
- Passenger_count

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References

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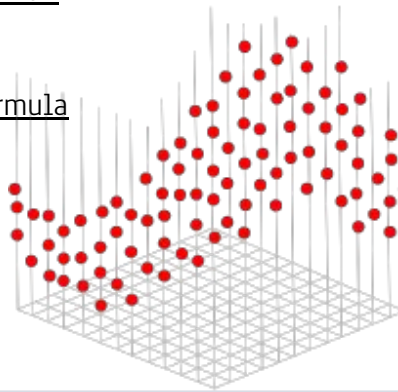

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Thank you