CDSS
Columbia University Data Science Society

2023 9th Annual Data Science Hacakthon

Make MTA Great Again

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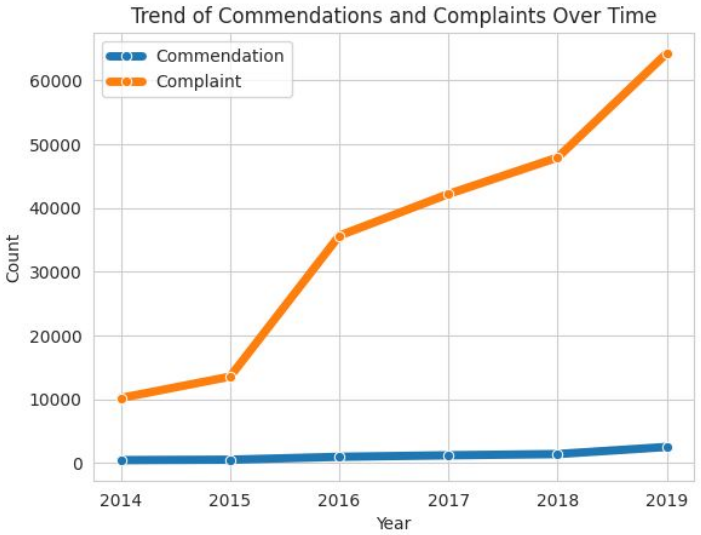
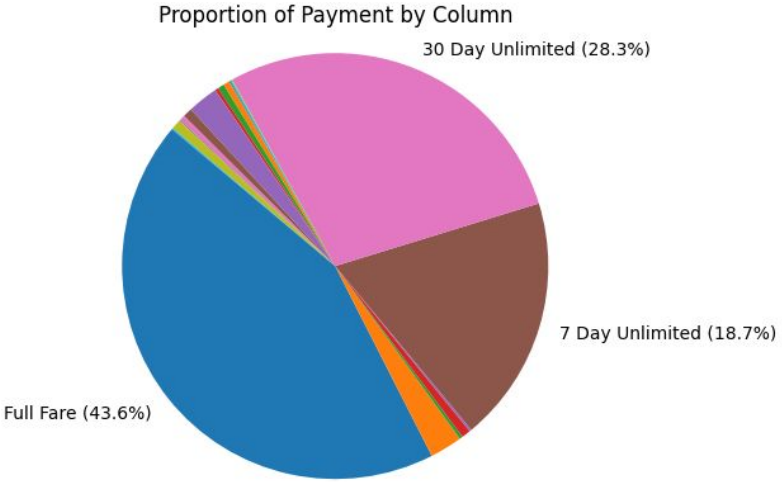
Contents

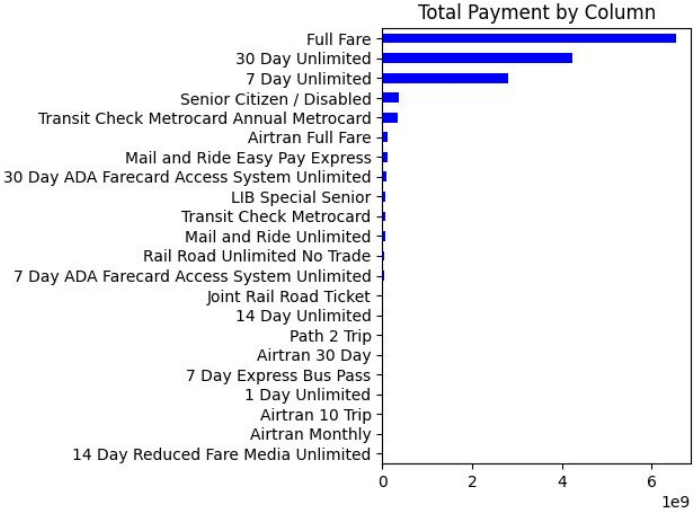
I. Introduction



While NYC MTA has served New York citizens for an extended period, data from the MTA's database reveals a consistent increase in customer complaints over the years.

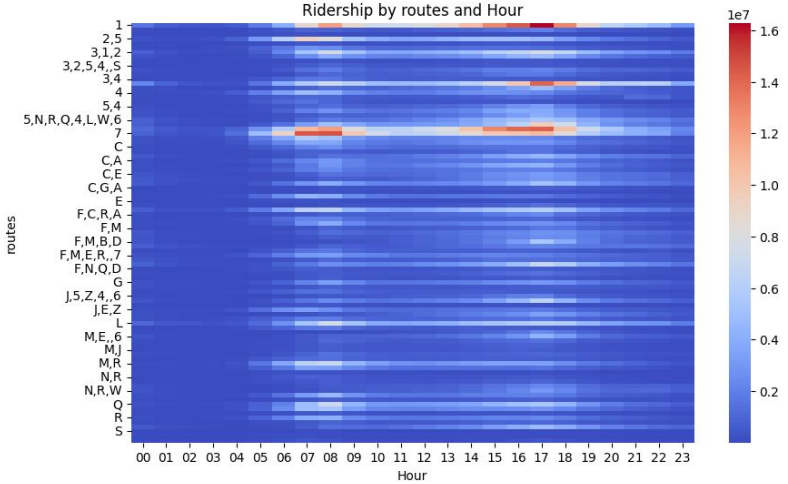
II. Data Exploration: Ridership by type of payment method

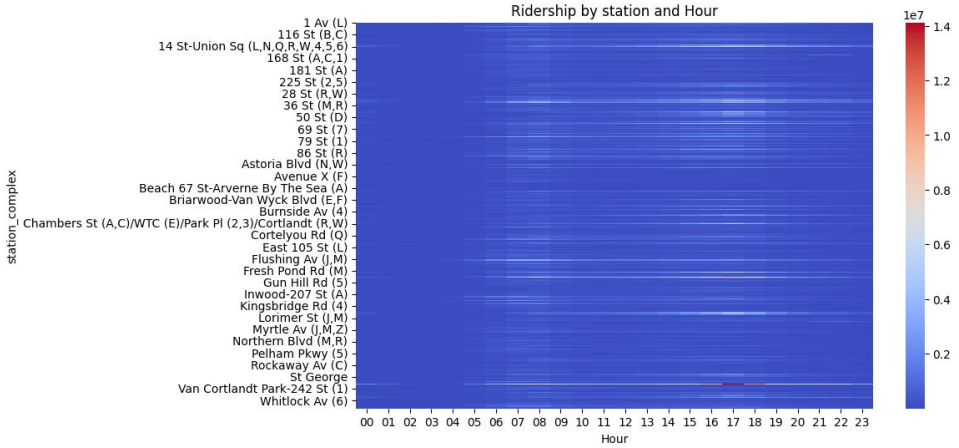




Approximately 90% of all payments fall into three main categories : “Full-fare”, “30 Day Unlimited”, and “7 Day Unlimited”.

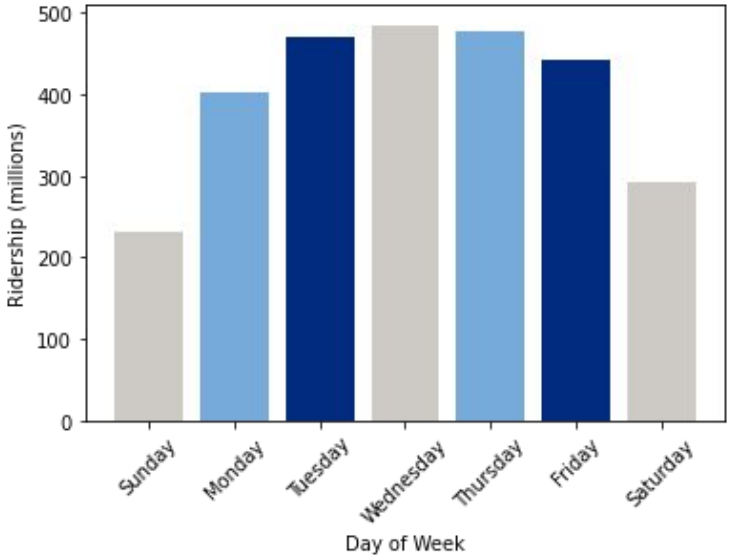
II. Data Exploration: Ridership per hour at each stop

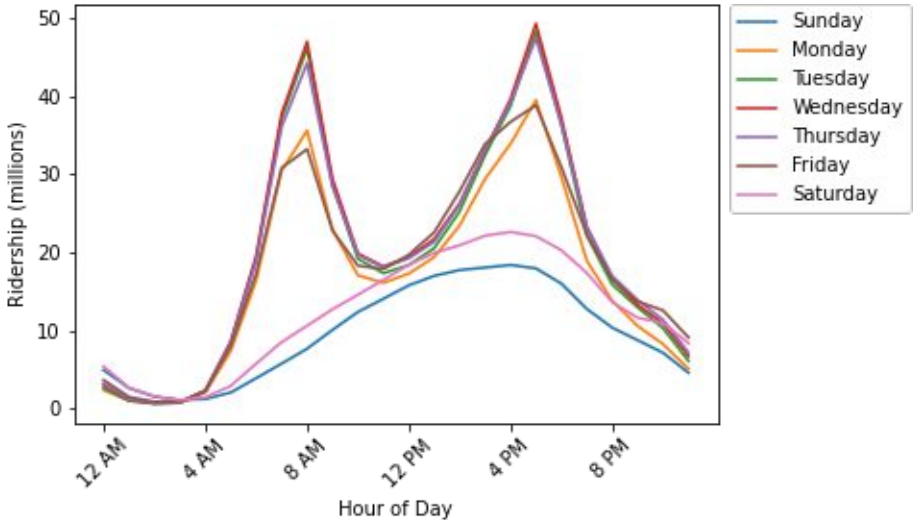




This heatmap with hours and routes clearly shows that there's a peak hour in most of the lines.
Based on this heatmap, we did more analysis for peak hour and peak day
We found that some of the stations have more riders than the others, so we will use the clustering for the predictive model

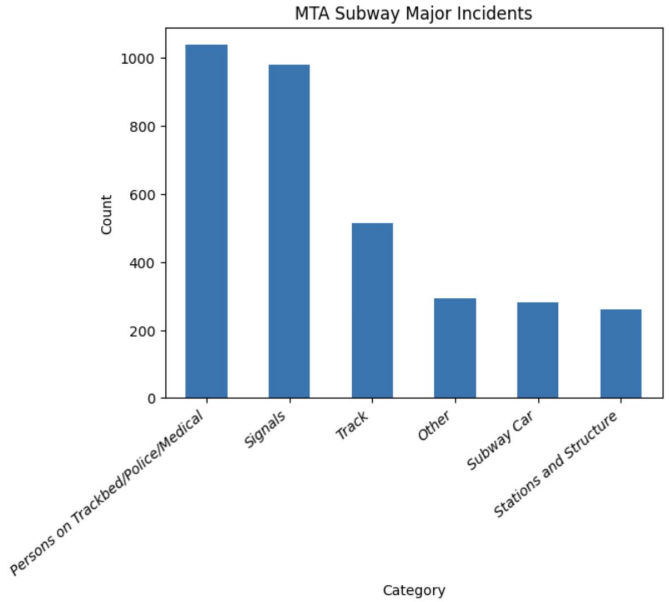
II. Data Exploration : Number of Rideships for each day of week and hour of Day

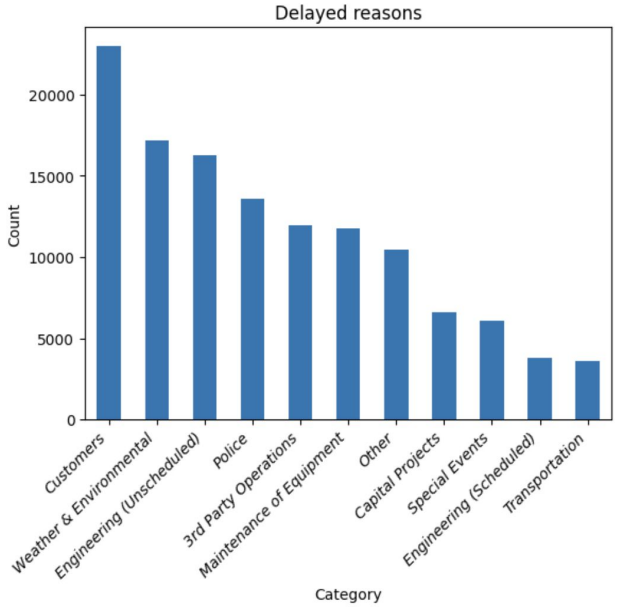




Wednesday saw the highest riderships among the days of the week.
Additionally, peak ridership occurred at 8 AM and 5 PM.

II. Data Exploration : Major Incidents and Delayed reasons in Subway

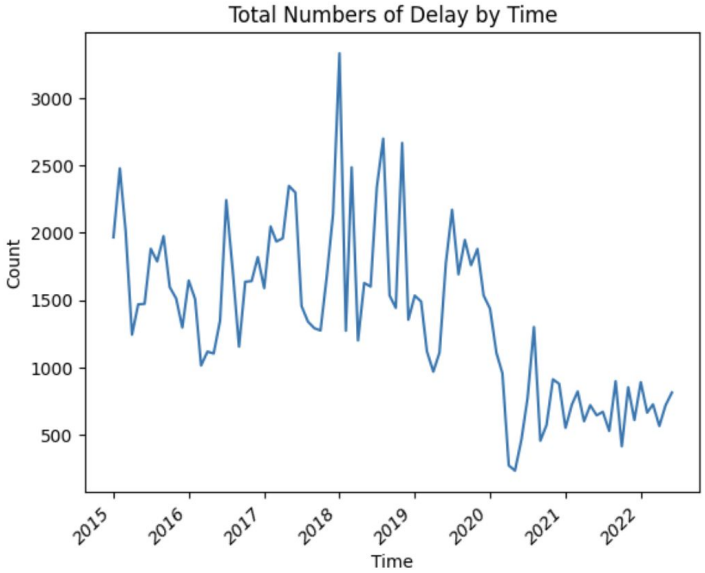


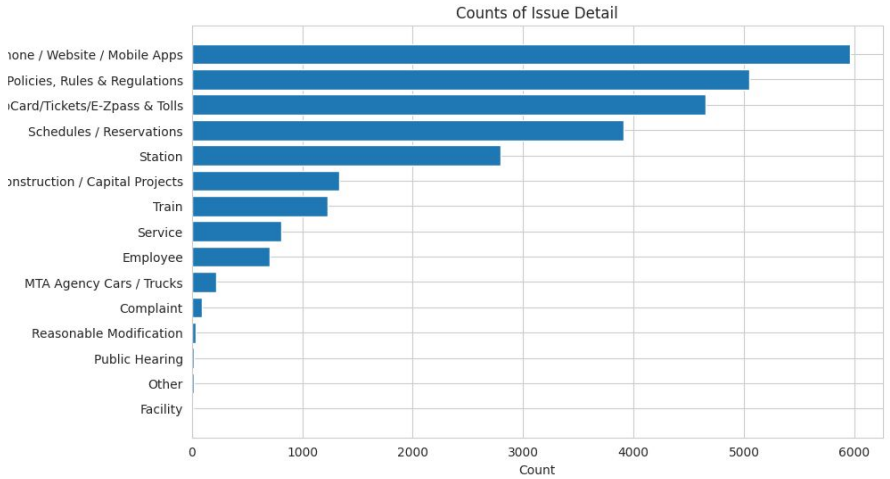


Top three incidents occurred in the MTA Subway System are “Persons on Trackbed / Police / Medical”, “Signals”, and “Track”.

The leading causes of delays in the MTA Subway are “Customers”, “Weather & Environmental”, and “Engineering (Unscheduled)”.

II. Data Exploration : Numbers of Delay and Counts of Issue





The total number of delays varies each year, with a significant reduction observed in 2020. Subsequently, there has been a continuous decrease in the in delays since then.

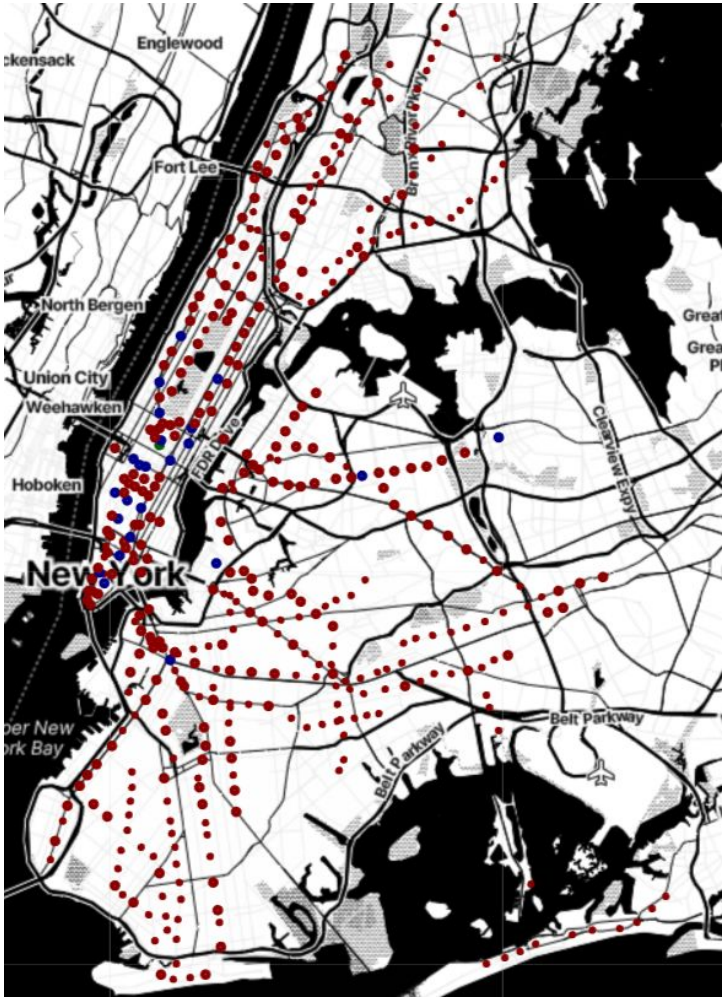
Based on customer complaints and the primary causes of delays, we recommend enhancing the air conditioning system during peak days and hours. Implementing energy-efficient AC usage or using it selectively can also contribute to environmental sustainability. Furthermore, employing time-dependent AC usage can enhance passenger comfort.

II. Data Exploration - Clustering

Used Kmeans clustering by ridership

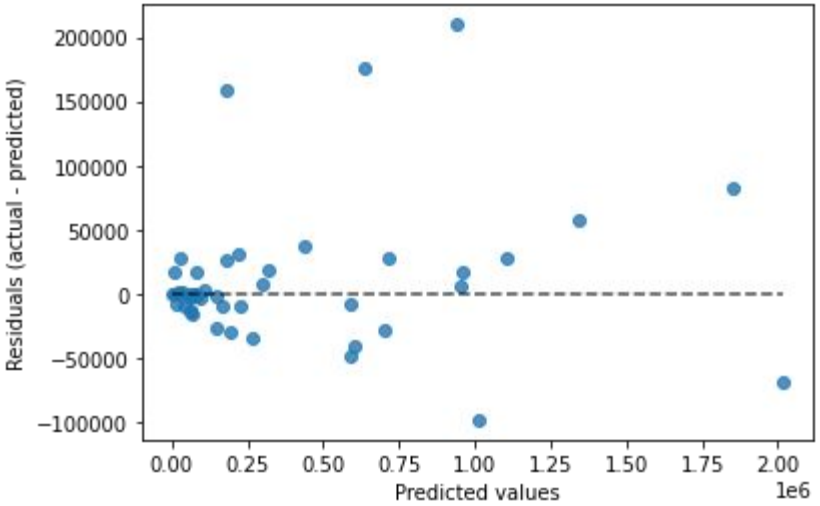
Time Square is its own cluster

Cluster 1
Cluster 2
Cluster 3



III. Modeling

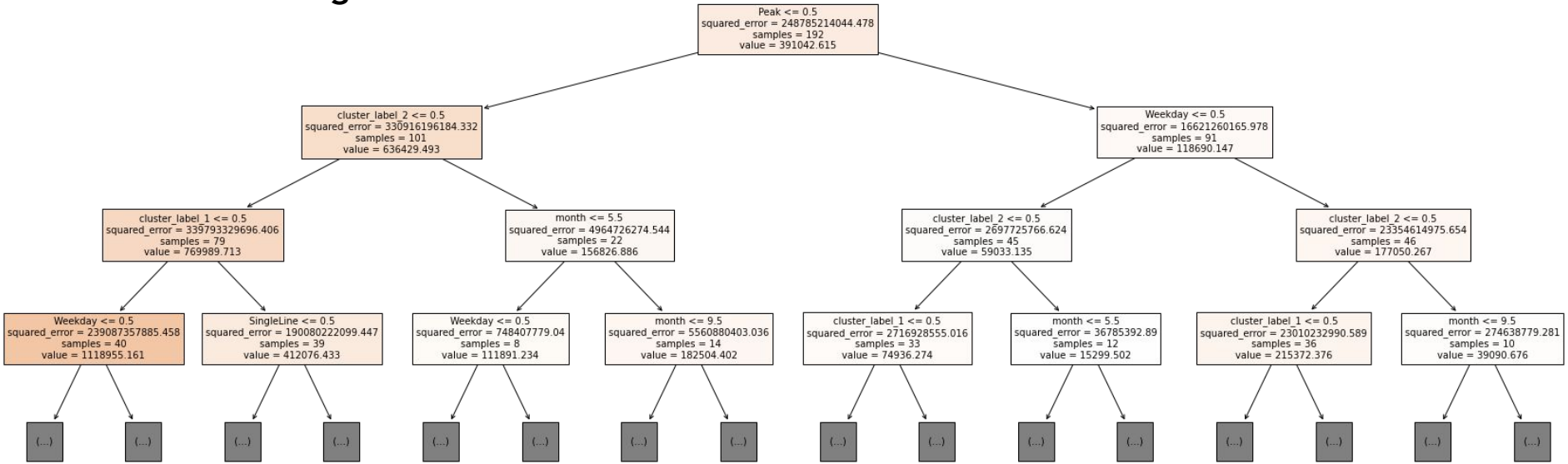
Decision Tree Regressor



R^2 = 0.987595
Adj R^2 = 0.987276

III. Modeling

Decision Tree Regressor



IV. Conclusion

Based on our data analysis:

- The MTA can use ML techniques to predict surges of passengers
- AC and additional train cars can be used during such surges
- Times Square should be targeted for improvements because the most passengers transit through there
- This will reduce customer complaints

V. Future Studies

- Compare express vs local lines to determine if any stops should be made express stops or vice versa
- Create mathematical model to determine which stations should be prioritized for improvements such as AC, wifi, etc.
- Compare OMNY vs metrocard riders in different stations
- Listen to customers to improve MTA

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Thank you.

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