



2023 9th Annual Data Science Hackathon

Make  Great Again

Amanda Lin

Jung A Lim

Joy Yoon Soo Kim

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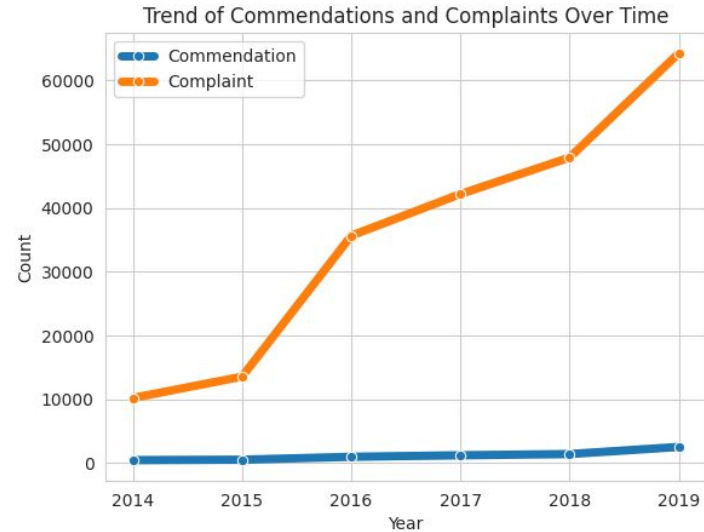
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# I. Introduction

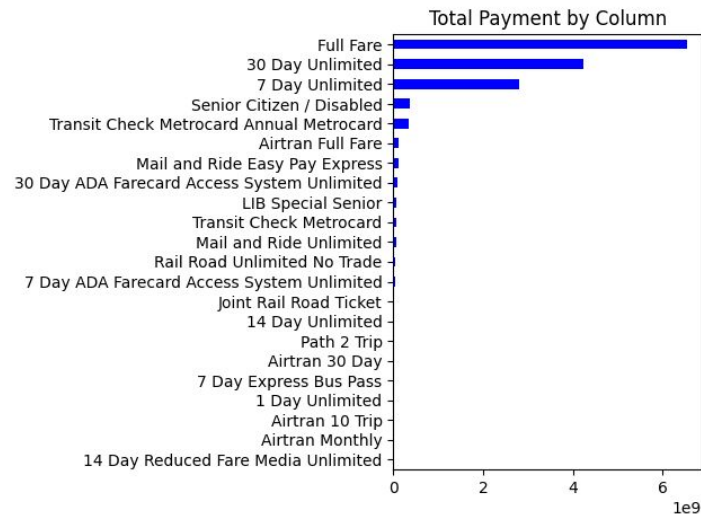
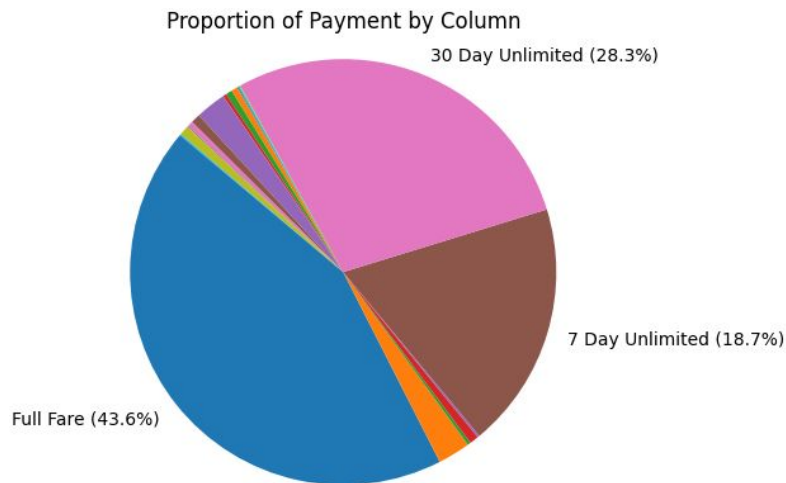


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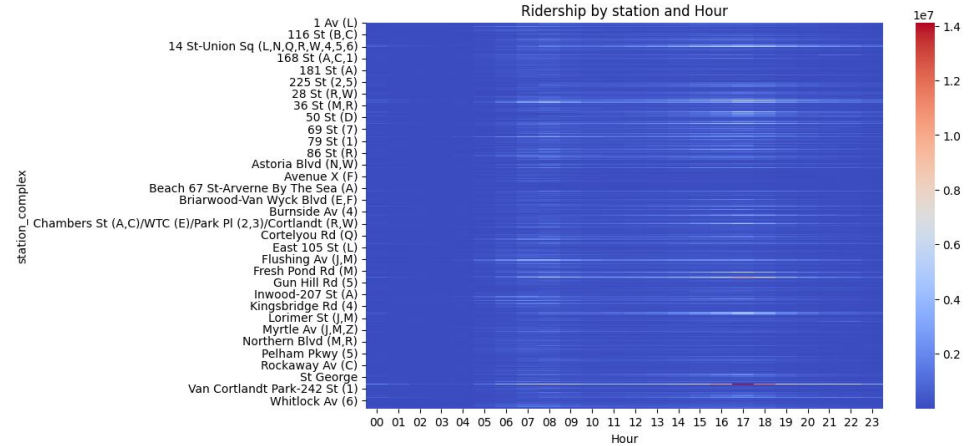
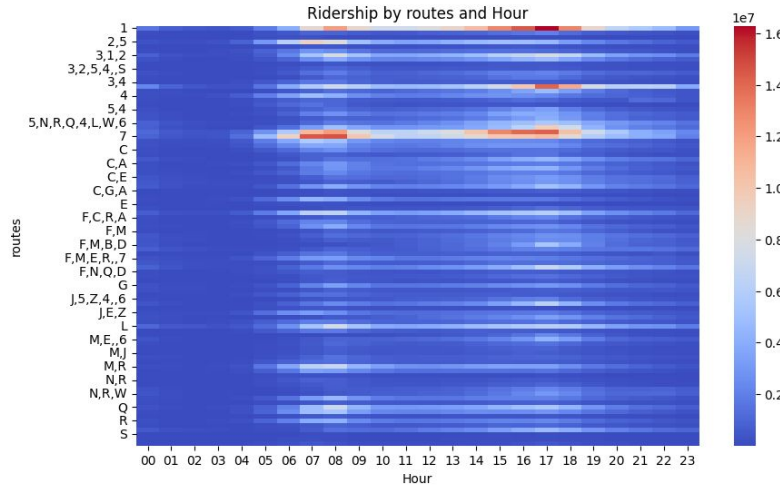
- While NYC MTA has served New York citizens for an extended period, data from the MTA's database reveals a consistent increase in customer complaints over the years.

## 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”.

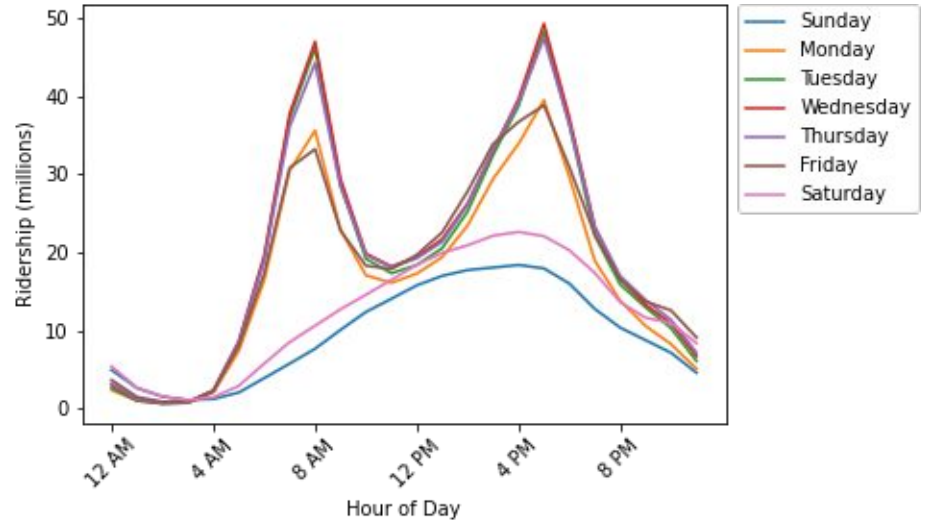
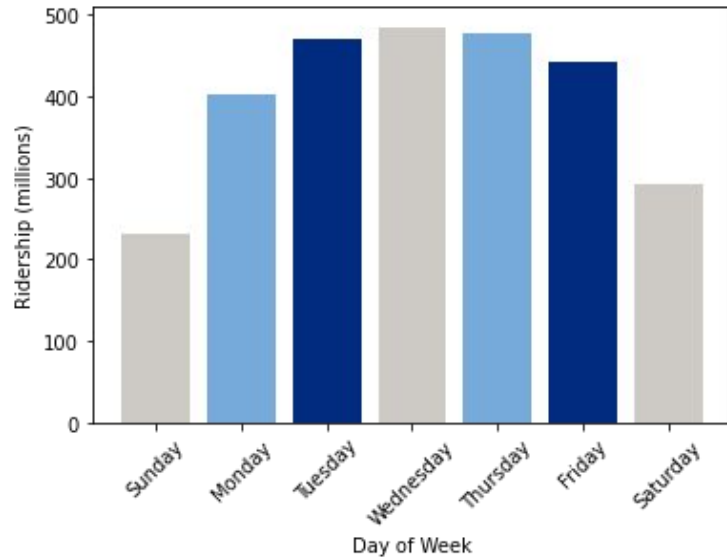
## II. Data Exploration: Ridership per hour at each stop



- 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

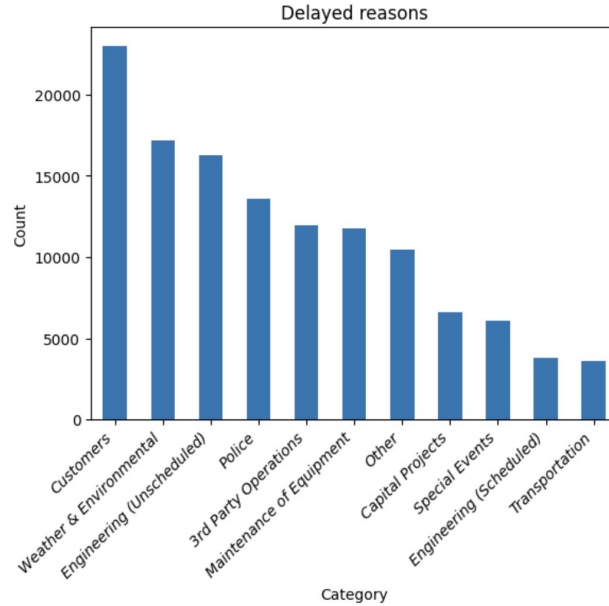
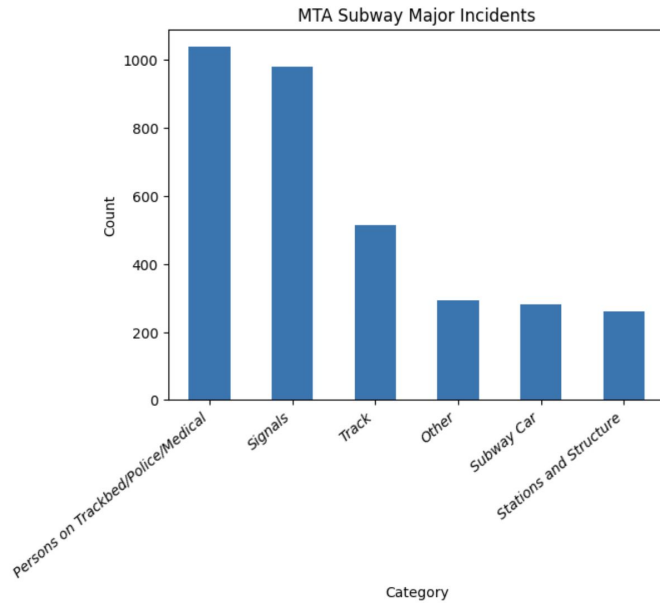
<https://app.powerbi.com/groups/me/reports/7be2e81d-b9c2-493d-a7d6-8282a5bd9e35/ReportSection66de955011e9c45b50de?experience=power-bi>

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



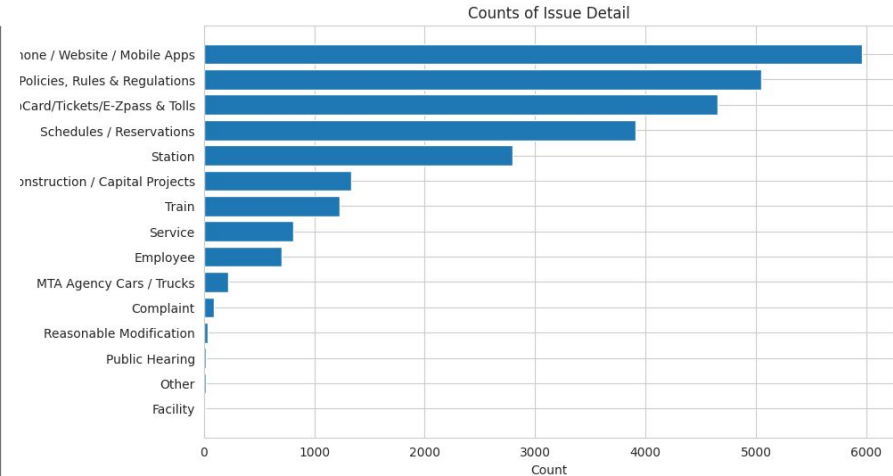
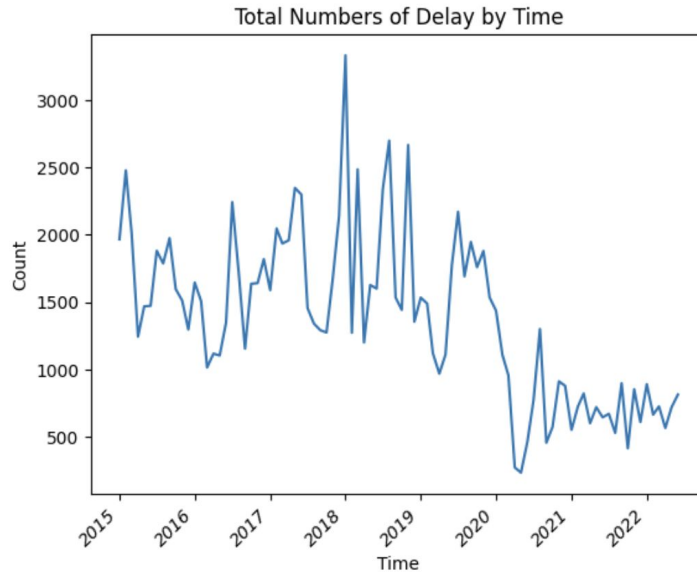
- Wednesday saw the highest riderships among the days of the week.
- Additionally, peak ridership occurred at 8 AM and 5 PM.

## 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



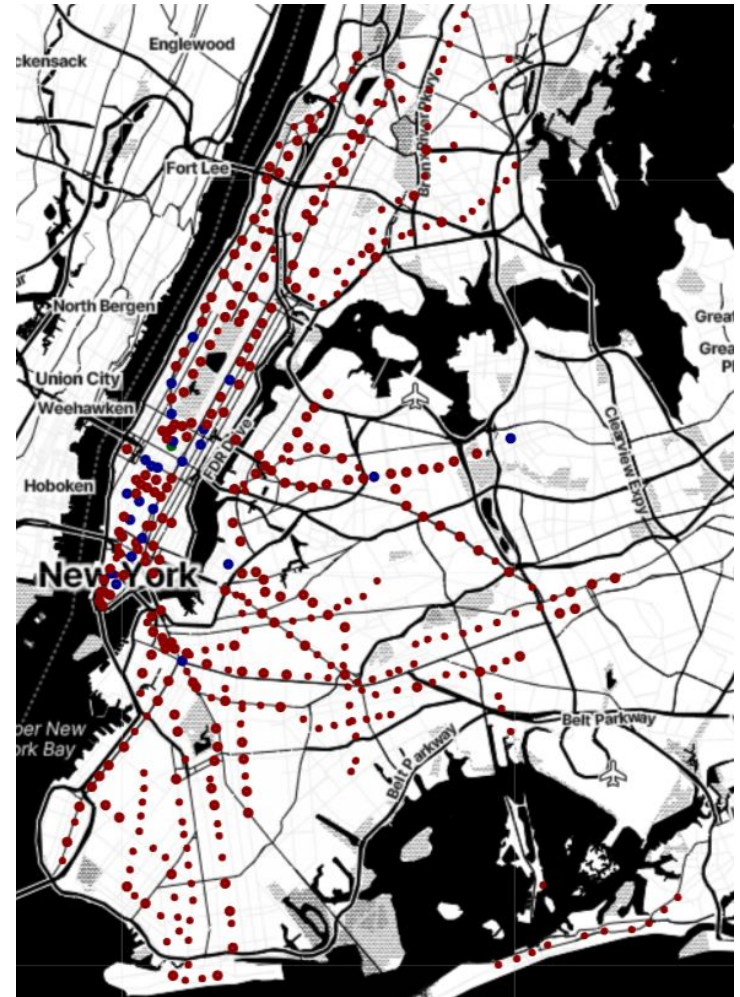
- The total number of delays varies each year, with a significant reduction observed in 2020. Subsequently, there has been a continuous decrease in the in delays since then.
- Based on customer complaints and the primary causes of delays, we recommend enhancing the air conditioning system during peak 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

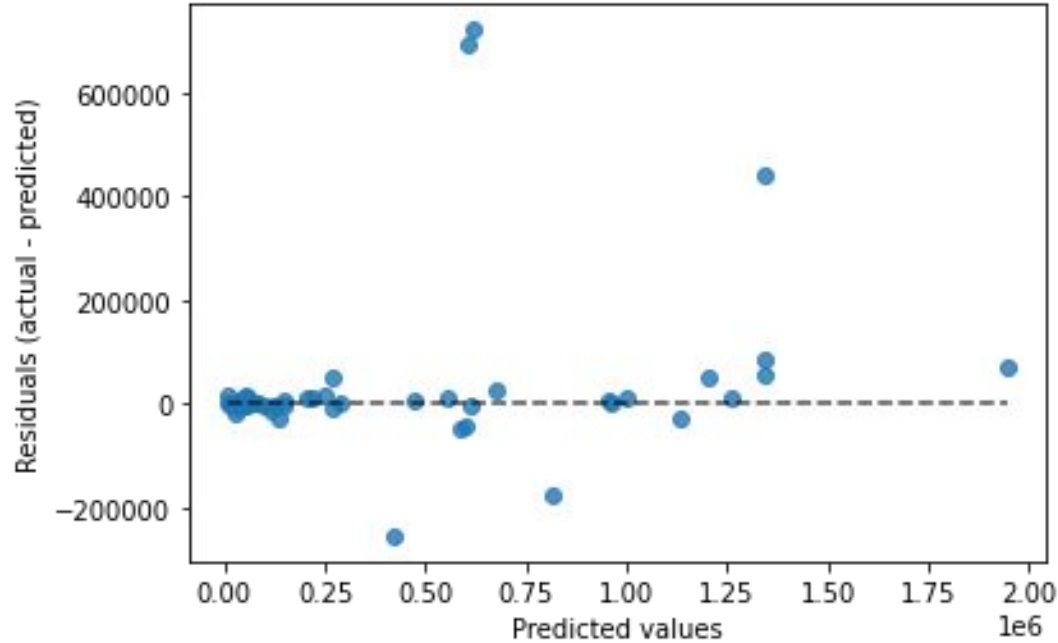
- Used K-means clustering by ridership.
- Time Square is its own cluster.

Cluster 1  
Cluster 2  
Cluster 3



# III. Modeling

## Decision Tree Regressor

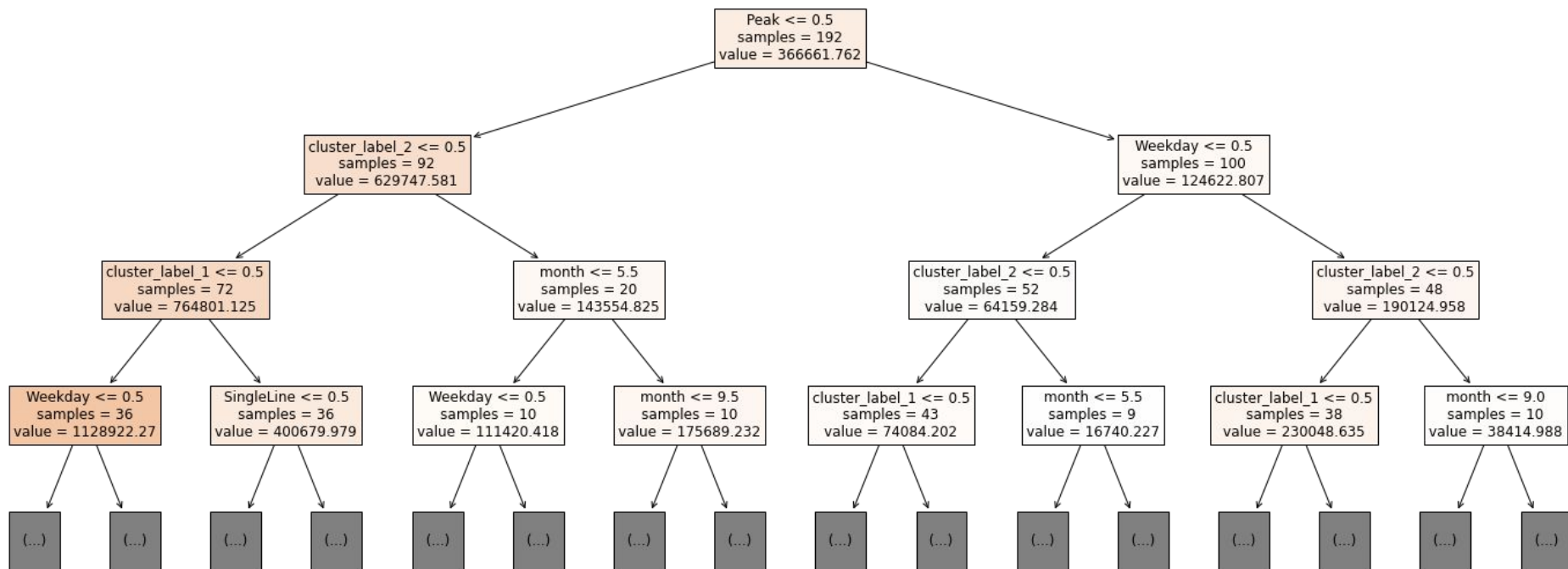


$R^2 = 0.905003$

Adj  $R^2 = 0.902556$

# 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

## VI. Appendix - Datasets

- MTA Hourly Ridership - Beginning February 2022
- MTA Fare Card History - Beginning 2010
- MTA Subway Major Incidents - Beginning 2020
- MTA Systemwide Delays - Beginning 2015
- MTA Complaints - Beginning 2014



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Thank you.

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