Boston Bus Transit Performance

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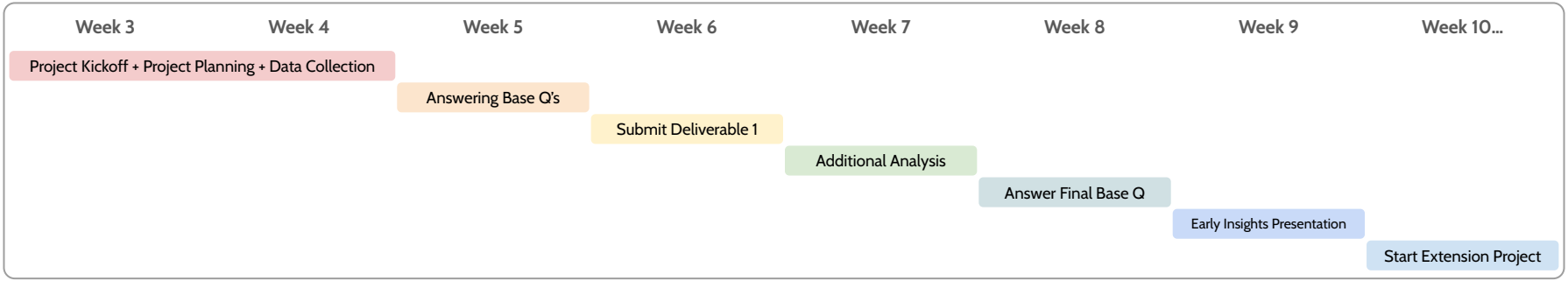
Motivation: Public transport plays an important role in the quality of life for residents in Massachusetts and Boston in terms of economic development, the environment, and equity.

Goal: To better understand the impact of bus performance on Boston residents.

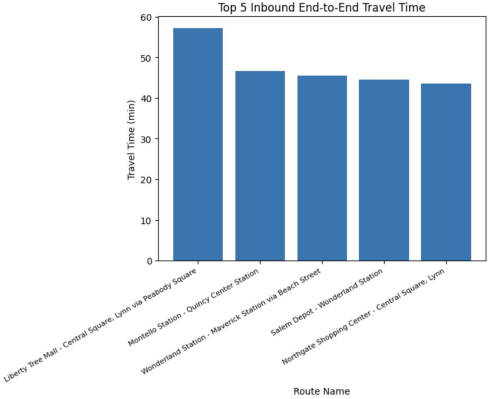
Overall Progress

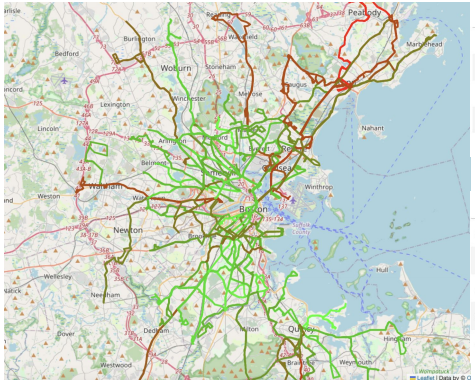


Datasets

- MBTA Bus Arrival Departure Times 2022 → To answer BQ 1, 2
- MBTA V3 API → To extract additional info + metadata of bus stops
- Analyze Boston – Boston Neighborhood Data (Census Data) → To answer BQ 3
- MBTA Bus Route + Boston Neighborhood Shape Files → Data Visualization

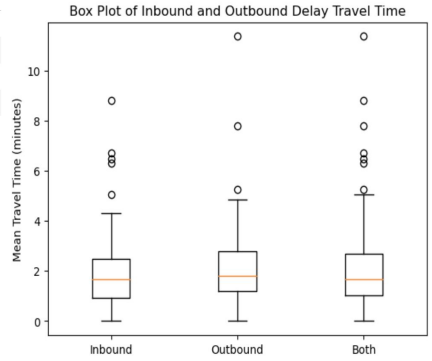
Base Question 1 & 2



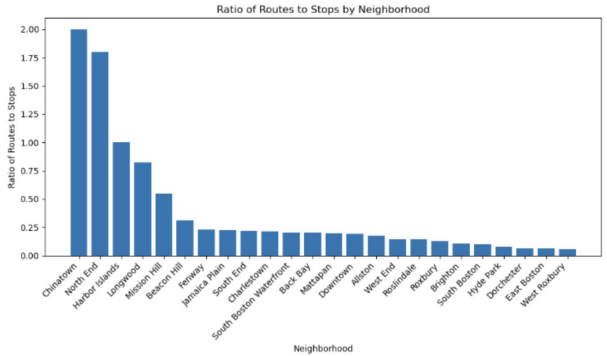


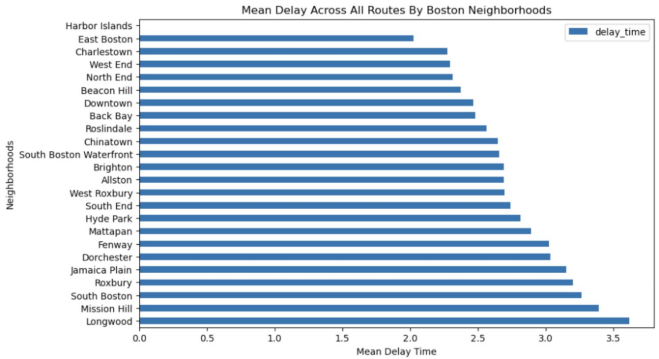
	route_id	direction_id	end_to_end_travel_time	route_long_name
0	435	Inbound	57.194444	Liberty Tree Mall - Central Square, Lynn via P...
1	435	Outbound	50.576667	Liberty Tree Mall - Central Square, Lynn via P...
2	230	Inbound	46.570833	Montello Station - Quincy Center Station
3	117	Inbound	45.450000	Wonderland Station - Maverick Station via Beac...
4	112	Outbound	45.010417	Wellington Station - Wood Island Station

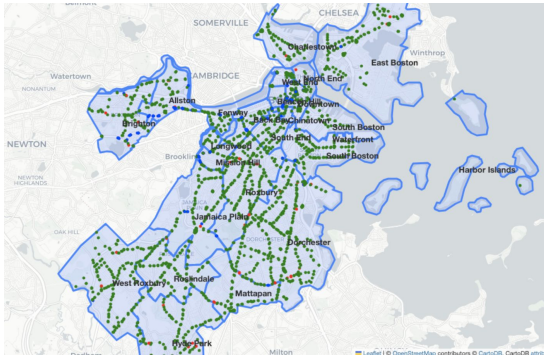
	route_id	direction_id	delay_time	route_long_name
0	210	Outbound	11.361111	Quincy Center Station - Fields Corner Station
1	137	Inbound	8.813095	Reading Depot - Malden Center Station
2	137	Outbound	7.779514	Reading Depot - Malden Center Station
3	116	Inbound	6.697222	Wonderland Station - Maverick Station via Reve...
4	66	Inbound	6.462963	Harvard Square - Nubian Station



Base Question 3



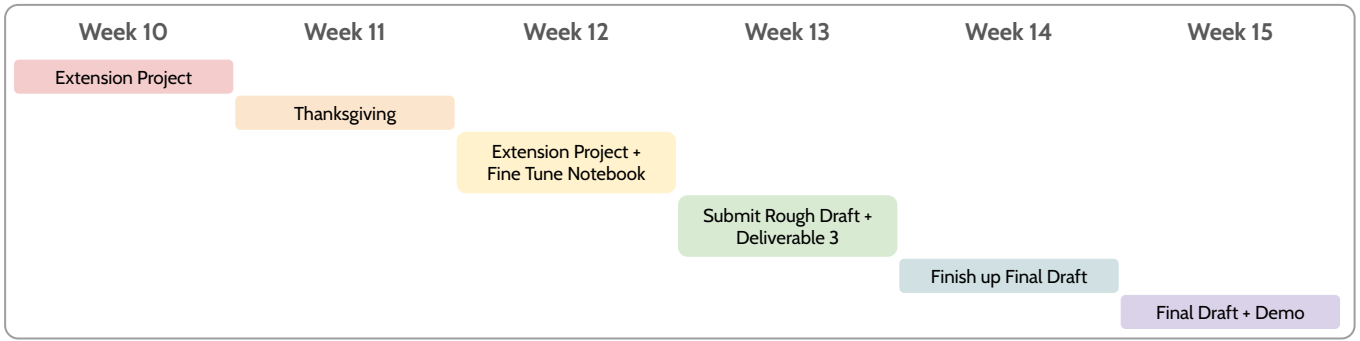




Challenges Faced / Limitations Encountered

- Working with unclean data + gathering data sources
- Scope of research time frame is short → limiting analysis and scope of insights

Expected Next Steps / Project Completion Plan



Conclusion

- **Base Question 1 & 2**
  - Conclusions are self-explanatory through visualizations provided in the notebook.
  - Interesting Notes: Overall Bus routes closer to Downtown Boston shows shorter end-to-end travel times; Average bus delay times were around 1 minute, 59 secs.
- **Base Question 3**
  - Majority of the bus stops in Boston are wheelchair accessible
  - Neighborhoods associated with a higher person-of-color demographic have significantly less bus routes to stops
  - Allston and Chinatown emerge as neighborhoods with a high percentage of stops lacking wheelchair boarding facilities; Noteworthy that both Allston and Chinatown have a substantial population of Asian-Americans.

Extension Project

Extension Pitch	*To explore the impact of seasonal times and rush hours on transportation patterns. By scrutinizing data across weekdays, weekends, and specific times a longer time frame we seek to uncover nuanced insights that can inform urban planning and traffic management strategies.*
Rationale	*Understanding variations in transportation patterns during rush hours and seasonal changes is crucial for optimizing urban mobility. This extension provides an opportunity to reveal hidden trends within the dataset, aiding in resource allocation and infrastructure enhancements.*
Questions for Analysis	• *How do travel patterns differ during rush hours and non-rush hours?* • *Are there distinct variations between weekdays and weekends?* • *What trends emerge during different times of the days?* • *How do external factors like weather impact transportation during these periods?* • *Are there differences in delays/travel times for different months?*
Data Sets & Sources	*We will use the existing transportation dataset and process our data for the entire year of 2022, incorporating timestamps, days of the week, and weather conditions. Supplementary data on events, road closures, or public transportation schedules may also be considered.*
Data Visualizations	*Hourly Traffic Heatmap (GIF Animations); Weekday vs Weekend Chart; Line Graph of Delay Times over differents month (Time-Series Analysis)*
Additional Information	*Consideration of external factors, like weather and local events, will provide context for observed trends. Collaboration with transportation authorities and experts will contribute to actionable insights for urban planners and policymakers.*