

Public transportation efficiency analysis

Objective:

The objective of the public transportation analysis project is to improve the efficiency, accessibility, and overall quality of public transportation services within a specific region or city. This can include reducing travel times, enhancing user experience, increasing ridership, and optimizing resource allocation.

Design Thinking Process:

1. Empathize: Understand the needs and pain points of commuters, gather insights from surveys, interviews, and observations to identify key issues in the current transportation system.
2. Define: Clearly define the problem and set specific goals for improvement. Determine the scope of the analysis, considering factors like routes, schedules, infrastructure, and user demographics.
3. Ideate: Brainstorm potential solutions and strategies to address the defined problem. This might involve innovations in technology, route planning, pricing models, or infrastructure development.
4. Prototype: Develop and test prototypes or models of the proposed solutions. This could include pilot programs, simulations, or mock-ups of new transportation services.
5. Test: Implement the prototypes and gather data on their effectiveness. Collect feedback from users and assess whether the proposed solutions are achieving the defined objectives.
6. Iterate: Refine and modify the solutions based on user feedback and data analysis. Continue testing and refining until the desired improvements are achieved.

Development Phases:

1. Data Collection:
 - Gather data on current transportation routes, schedules, and infrastructure.
 - Collect demographic information of commuters.
 - Utilize GPS and sensors to track vehicle movements and passenger counts.
 - Conduct surveys and interviews to capture user preferences and pain points.
 - Acquire data on traffic conditions, weather, and other relevant external factors.
2. Data Analysis:
 - Analyze the collected data to identify bottlenecks, congestion points, and areas with high demand.
 - Use statistical analysis to find correlations and trends within the data.
 - Employ data visualization techniques to make complex data more accessible.
3. Data Visualization:
 - Create interactive maps and visualizations to represent transportation routes, congestion areas, and potential improvements.

- Use charts and graphs to illustrate trends, such as peak travel times and user preferences.
- Develop dashboards for stakeholders to monitor real-time transportation data.
- Implement heat maps, flow diagrams, and other visual aids to convey information effectively.

4. Solution Implementation:

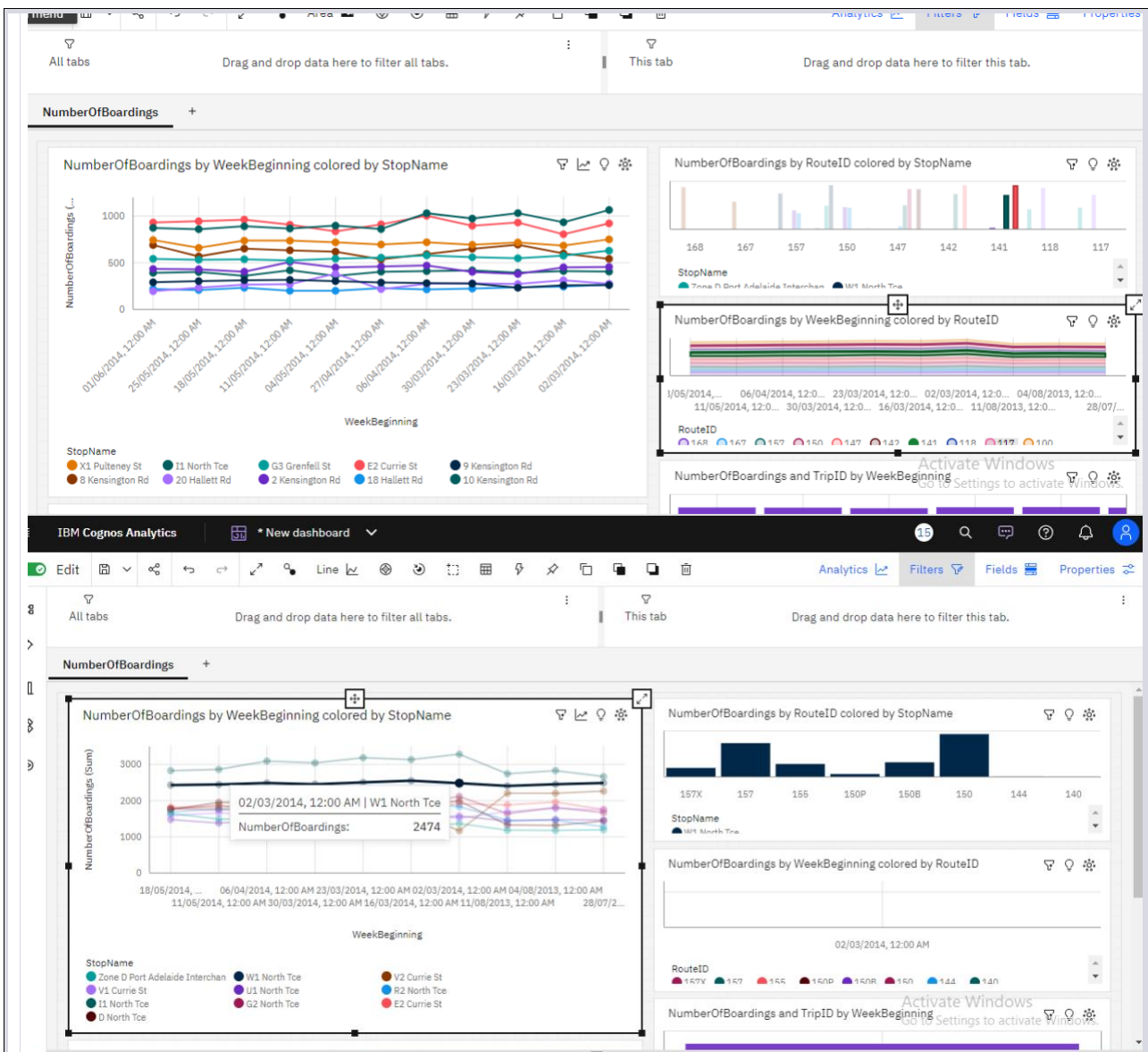
- Based on the analysis, implement changes to the transportation system, which may include adjusting routes, schedules, or infrastructure.
- Deploy digital tools and apps to provide real-time information to commuters.
- Introduce pricing models and incentives to encourage off-peak travel.
- Collaborate with stakeholders, such as transportation authorities, to execute improvements.

5. Monitoring and Feedback:

- Continuously monitor the performance of the implemented solutions.
- Collect feedback from commuters and stakeholders.
- Use key performance indicators (KPIs) to assess the impact on travel times, ridership, and user satisfaction.

6. Adaptation and Ongoing Improvement:

- Be prepared to adapt the transportation system further based on ongoing analysis and feedback.
- Iterate on the design thinking process

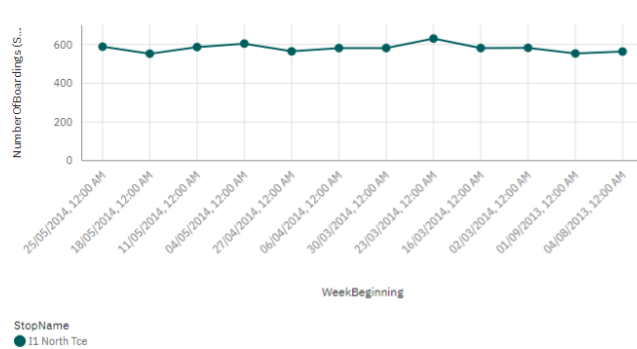


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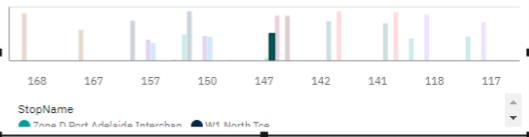
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NumberOfBoardings +

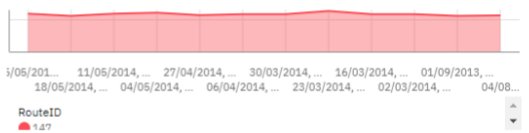
NumberOfBoardings by WeekBeginning colored by StopName



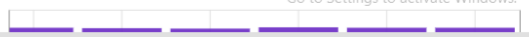
NumberOfBoardings by RouteID colored by StopName



NumberOfBoardings by WeekBeginning colored by RouteID



NumberOfBoardings and TripID by WeekBeginning

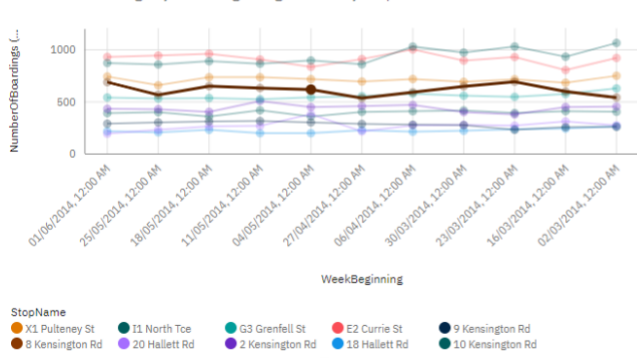


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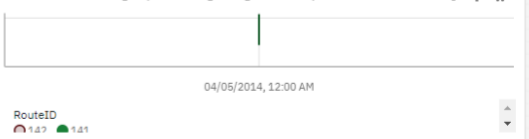
NumberOfBoardings by WeekBeginning colored by StopName



NumberOfBoardings by RouteID colored by StopName

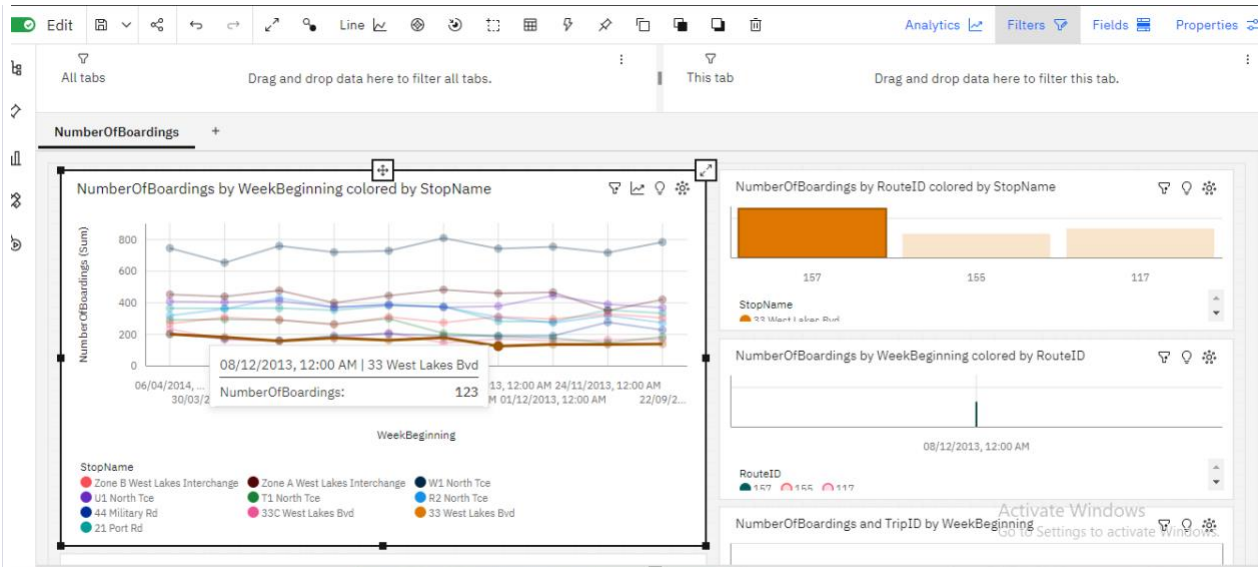


NumberOfBoardings by WeekBeginning colored by RouteID



NumberOfBoardings and TripID by WeekBeginning





Data Collection Process: In a public transportation efficiency analysis project, the data collection process is crucial for gathering the information necessary to assess and improve the system. Here are key data collection steps:

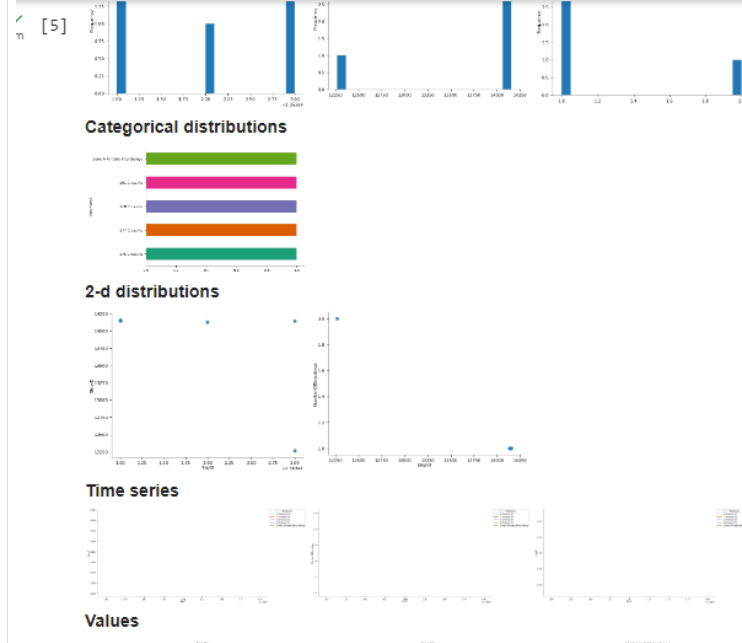
1. **Ridership Data:** Collect data on the number of passengers using different routes and at various times. This data can be obtained through ticket sales, fare card usage, or automated passenger counters on vehicles.
2. **Route and Schedule Data:** Gather information on the routes, schedules, and timetables of public transportation services. This includes the locations of stops, departure and arrival times, and frequency of service.
3. **Real-Time Data:** Utilize GPS and tracking systems to gather real-time data on the location and movement of vehicles. This helps in monitoring service reliability and making real-time adjustments.
4. **Operational Data:** Collect data on operational aspects such as fuel consumption, maintenance schedules, and vehicle breakdowns. This information can help identify areas for improvement in maintenance and resource allocation.
5. **Surveys and Feedback:** Conduct surveys and gather feedback from passengers to understand their experiences, preferences, and pain points. This qualitative data provides valuable insights.
6. **Traffic and Weather Data:** Collect external data sources such as traffic conditions, weather forecasts, and road closures that can impact the efficiency of public transportation.
7. **Infrastructure Data:** Obtain data on the condition of infrastructure like bus stops, train stations, and maintenance facilities to identify areas in need of repair or improvement.

Data Analysis Objectives:

The data collected in a public transportation efficiency analysis project is analyzed to achieve specific objectives, which include:

1. **Identifying Bottlenecks:** Analyze data to pinpoint areas of the transportation system that are causing delays or congestion. This could be due to traffic, scheduling issues, or inadequate infrastructure.
2. **Optimizing Routes and Schedules:** Use data analysis to optimize the allocation of vehicles, routes, and schedules to minimize waiting times and improve overall efficiency.
3. **Reducing Dwell Times:** Evaluate data to minimize the time spent at stops and stations, ensuring that vehicles spend more time in motion and less time idling.
4. **Improving Reliability:** Analyze real-time data to ensure that public transportation services run on schedule and respond promptly to unexpected events or disruptions.
5. **Enhancing User Experience:** Use feedback and survey data to make changes that improve the passenger experience, such as cleaner vehicles, better signage, and digital tools for real-time information.
6. **Evaluating Cost Efficiency:** Assess operational data to identify cost-saving measures, such as optimizing maintenance schedules and fuel consumption.
7. **Increasing Ridership:** Utilize data to create strategies to attract more passengers, potentially through pricing models, marketing campaigns, or route expansion.
8. **Sustainability:** Analyze data to determine the environmental impact of public transportation and identify opportunities for reducing emissions and improving sustainability.
9. **Safety:** Ensure that data analysis also focuses on safety by monitoring accident data, ensuring vehicle maintenance, and improving driver training programs.
10. **Economic Impact:** Assess the economic impact of public transportation, including job creation and support for local businesses.

By setting these data analysis objectives, the project can make data-driven decisions to enhance the efficiency, reliability, and overall quality of the public transportation system



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The 'c1' parameter is deprecated. Use 'errorbar=None' for the same effect.

sns.barplot(x='RouteID', y='NumberOfBoardings', data=data, c1=None)

Total Boardings per Route

12
correlation_matrix = data.corr()

plt.figure(figsize=(10, 8))
sns.heatmap(correlation_matrix, annot=True, cmap='coolwarm', linewidths=.5)
plt.title('Correlation Heatmap')
plt.show()

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correlation_matrix = data.corr()

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