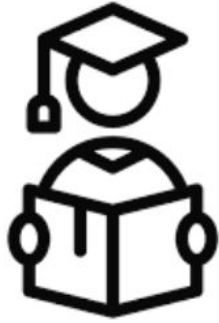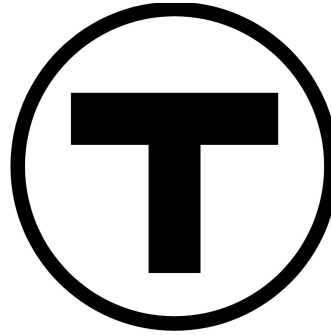# Project Team 19: Public Transportation, housing, and population

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Motivation

Student

MBTA

Waltham

- Students frequently rely on the MBTA system for travel.
- Despite being only **nine miles from Downtown Boston**, Waltham is significantly **underserved** by MBTA services.
- **Nearby cities** enjoy **consistent T services**, highlighting a clear **disparity** in accessibility.

Problem Statement

We aim to explore the **relationships** between MBTA service availability and:

- **Population Characteristics**: Population density, demographics, and socioeconomic status.
- **Housing Dynamics**: Rent prices and housing quality.

Data Description
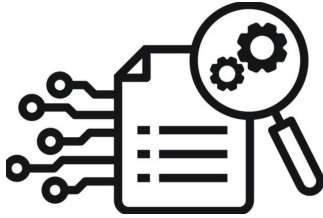
Our project uses **two primary datasets** and one derived dataset to analyze Boston's neighborhoods, MBTA transit systems, and demographic trends.

Data Description

- Source: 2020 census data
- Topic: Demographic breakdown of Boston neighborhoods

Data Type	Variables
Categorical	Race (White, Latino, Asian, etc.), Age groups, Field Concept, Type of institution
Quantitative	Total Population, Household Population, Household size, Average rent (2019-2021)

Data Description

- Source: MBTA API and MBTA Ridership Map
- Topic: Information about MBTA transit stations and lines

Data Type	Variables
Categorical	Name, Municipality, Line
Quantitative	Latitude, Longitude

Interview Results and Insights

Growth and Accessibility:

- Neighborhoods with better MBTA access grow faster.
- Housing is cheaper in areas relying on buses (e.g., Waltham).

Inequality in Impact:

- Affluent areas: Better-maintained transit lines, but residents rely less on public transport.
- Lower-income areas: Heavily depend on transit, yet face neglected services (e.g., Red Line).

Suggested Visualizations:

- Heatmaps/Choropleth Maps: Show accessibility and housing connections.
- Scatterplots: Highlight transit, housing prices, and growth relationships.

Interactive Sketches Design

Key Features

1. **Interactive Map**:
   - Displays **MBTA ridership**, color-coded by city.
2. **Interactive Table**:
   - Shows detailed city-level data.
   - Highlights cities on the map upon **hovering**.
   - Allows selection by **row (city)** or **column (metro line)** for focused visualization.
3. **Heatmap**:
   - Displays **correlation coefficients** between housing, population density, and transportation accessibility.
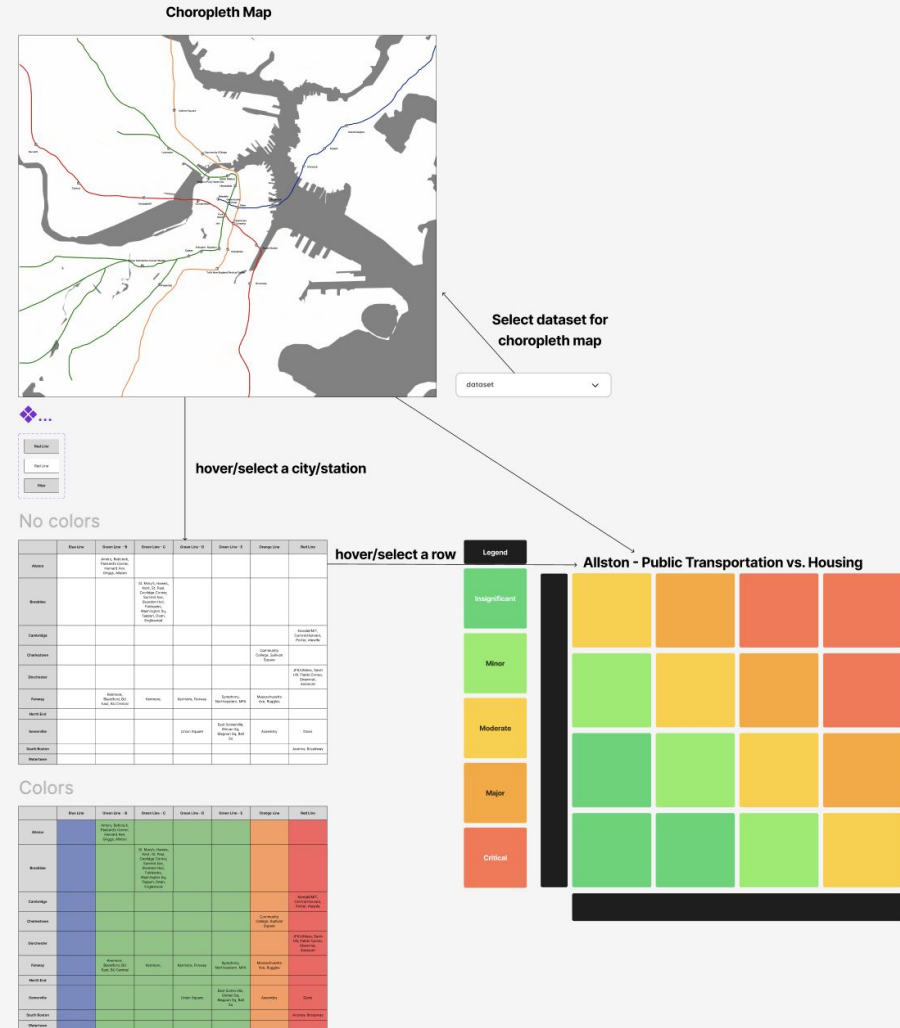
Visualization: Interactive Map

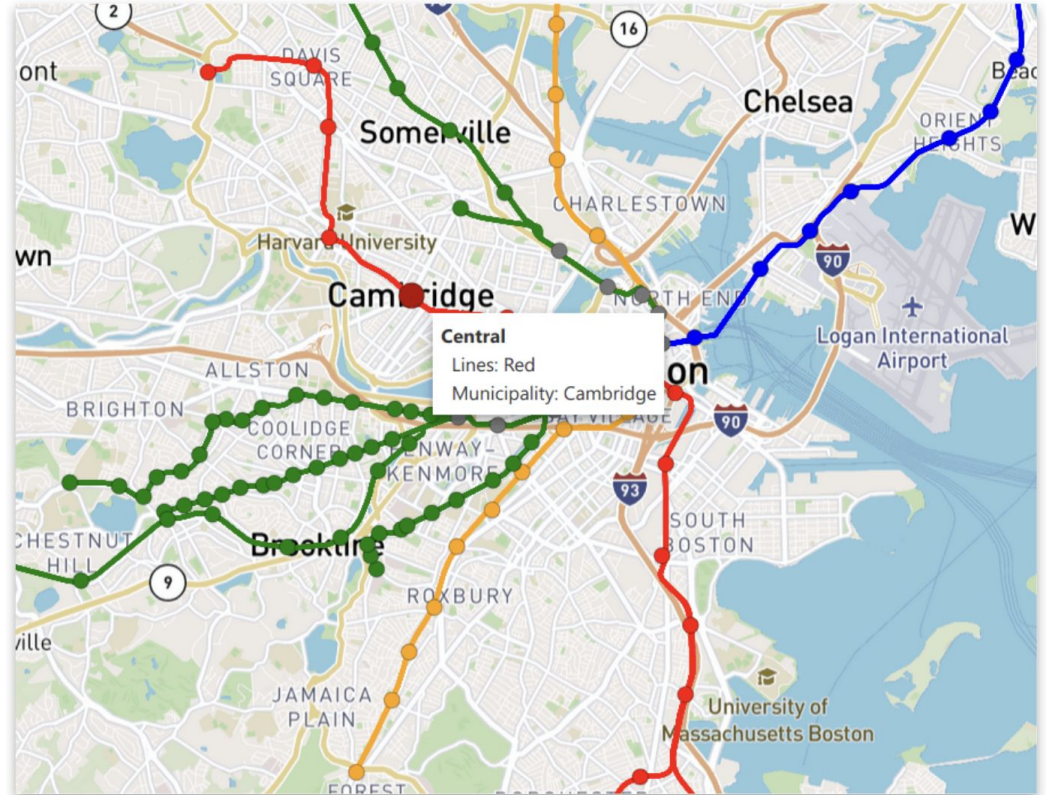**Interactive Map** of all MBTA "T" rapid transit lines.
Station Information:

- Hovering over stations displays the **lines** and associated **municipality/neighborhood**.
- **Gray-colored stations** indicate multiple lines servicing the same station.

Line Representation:

- Some lines (e.g., **Green Line**) share tracks and are shown as **branches** of the same line.

Visualization: Interactive Table

Neighborhood	Blue	Green-B	Green-C
Allston		Amory Street, Babcock Street, Packard's Corner, Harvard Avenue, Griggs Street, Allston Street, Warren Street	
Back Bay		Hynes Convention Center, Arlington, Copley	Hynes Convention Center, Arlington, Copley
Beacon Hill		Arlington, Boylston, Park Street	Arlington, Boylston, Park Street
Braintree			
Brighton		Warren Street, Washington Street, Sutherland Road, Chiswick Road, Chestnut Hill Avenue, South Street, Boston College	Cleveland Circle
Brookline		Boston University Central, Babcock Street, Amory Street	Saint Mary's Street, Hawes Street, Kent Street, Saint Paul Street, Coolidge Corner, Summit Avenue, Brandon Hall, Fairbanks Street, Washington Square, Tappan Street, Dean Road, Englewood Avenue, Cleveland Circle
Cambridge			
Charlestown			
Chinatown			
Dorchester			
Downtown	Aquarium, State, Government Center, Bowdoin	Arlington, Boylston, Park Street, Government Center	Arlington, Boylston, Park Street, Government Center
East Boston	Maverick, Airport, Wood Island, Orient Heights, Suffolk Downs		

Alphabetically Organized for easy lookup of neighborhoods/cities or T lines.
Selection Highlights:

- Rows/columns highlight in **light blue** for accessibility.
- Individual cells highlight in **darker blue** with **bold text** to draw focus.

Map & Heatmap Integration:

- Selecting a neighborhood or line **highlights stations on the map**.
- The **heatmap updates dynamically** based on selections.

Visualization: Heat Map

Filters: Highlight **high correlations (≥0.7)** and **low correlations (≤0.2)** for quick insights.

Interactive Heatmap:

- **Color Gradient**: Blue intensity reflects correlation strength.
- Displays values with **hover tooltips** for precise relationships (e.g., "Transit Lines × Population: 0.990").

Citywide Correlation Analysis

High Correlations (≥0.7) Low Correlations (≤0.2)

	Minority	College Housing	Rent	Population	Transit Lines	Income
Minority	1.00	0.68	0.52	0.16	0.12	0.68
College Housing	0.68	1.00	0.54	0.19	0.10	0.37
Rent	0.52	0.54	1.00	0.13	0.08	0.79
Population	0.16	0.19	0.13	1.00	0.99	0.13
Transit Lines	0.12	0.10	0.08	0.99	1.00	0.12
Income	0.68	0.37	0.79	0.13	0.12	1.00

Transit Lines

The total number of public transit lines (bus, rail, etc.) serving the neighborhood.

Higher values indicate better public transportation accessibility.

Rent

The average monthly rental cost for residential properties in the neighborhood.

Reflects the cost of living and housing market conditions in the area.

Minority

The percentage of neighborhood residents who identify as racial or ethnic minorities.

Indicates the demographic diversity of the neighborhood.

Income

The average annual income per person in the neighborhood.

Reflects the economic status of neighborhood residents.

Population