Sheet 1 : BRAINSTORMING

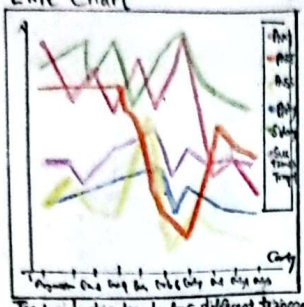
To visualize & convey insights from ridership data effectively.

categorize :
- Temporal
- Comparative
- Distribution
- Flow & Proportion

Combine & Refine :

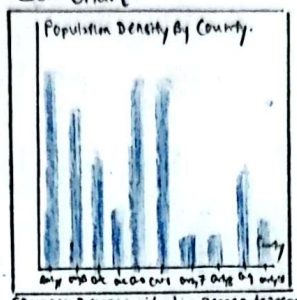
Design
1. Line Chart + Heatmap + Map Visualization + Violin Plot + Stacked Bar } Show ridership changes over time, geographical distribution & trends.
2. Radar Chart + Pie Chart + Sankey Diagram + Bubble Chart + Timeline Chart } Compare ridership distribution, flow, significant events.
3. Scatter Plot + Geographic Heatmap + Boxplot + Chord Diagram + Parallel Coordinates } Explore ridership variability, location-based ridership & relationships between transport modes.

Line Chart



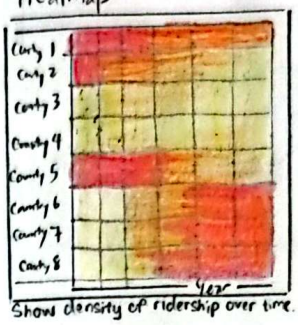
Track ridership trends for different transport system over time.

Bar Chart



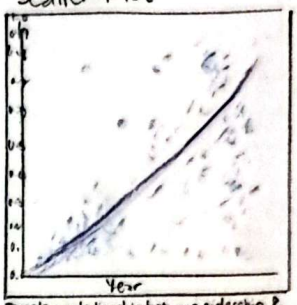
Compare average ridership across transport modes.

Heatmap



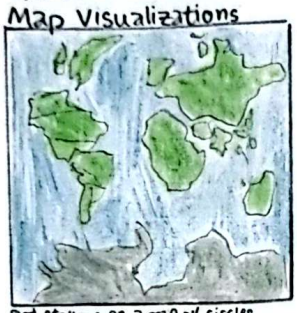
Shows density of ridership over time.

Scatter Plot



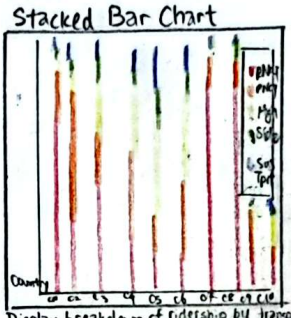
Display relationship between ridership & geographical locations (stations).

Map Visualizations



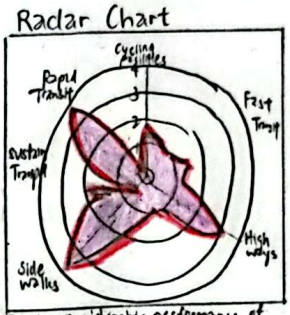
Plot stations on a map w/ circles representing ridership volumes.

Stacked Bar Chart



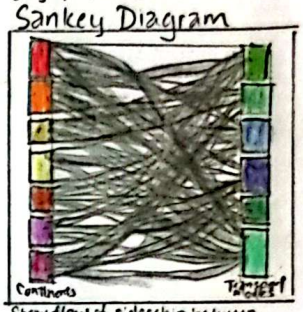
Display breakdown of ridership by transport type over time.

Radar Chart



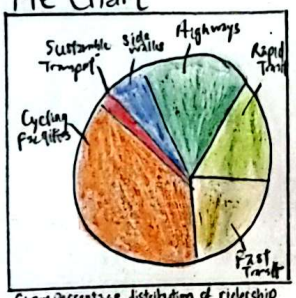
Compare ridership performance of different transport systems.

Sankey Diagram



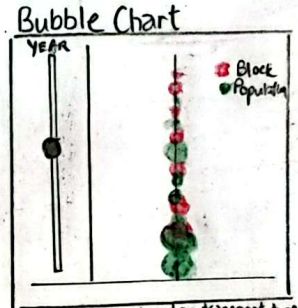
Show flow of ridership between regions or types of transportation

Pie Chart



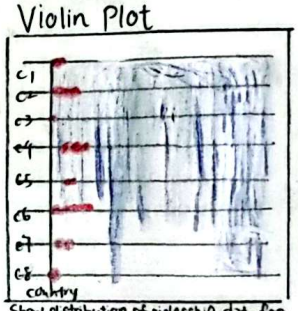
Show percentage distribution of ridership across transport types.

Bubble Chart



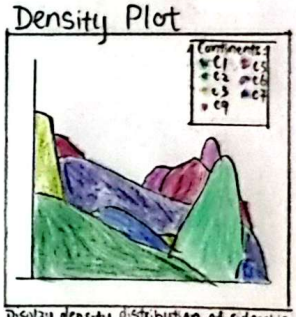
Visualize ridership based on transport type with bubble size representing volume

Violin Plot



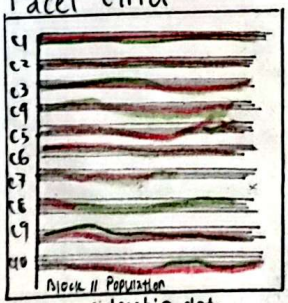
Show distribution of ridership data for each tranport type.

Density Plot



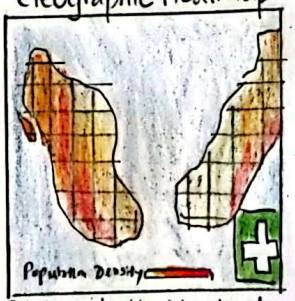
Display density distribution of ridership volumes.

Facet Grid



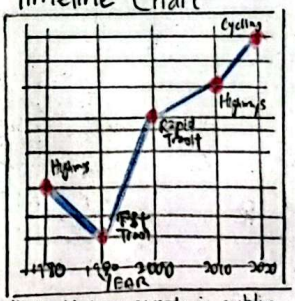
Compare ridership data between different locations.

Geographic Heatmap



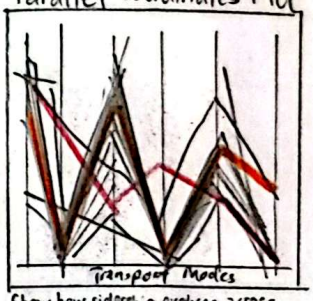
Display ridership intensity at different stations.

Timeline Chart



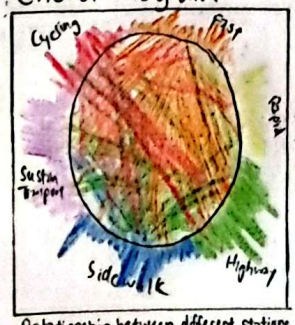
Highlight key events in public transport ridership with annotations.

Parallel Coordinates Plot



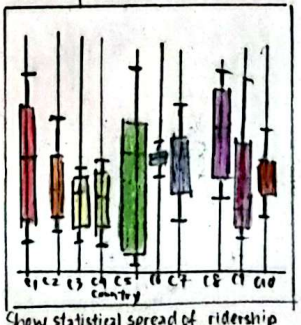
Show how ridership evolves across multiple variables (time, type, location)

Chord Diagram



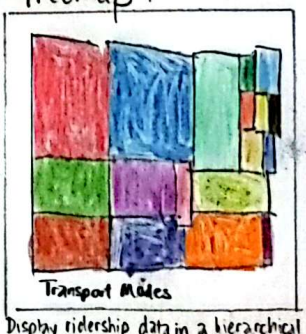
Relationship between different stations & transport systems.

Boxplot



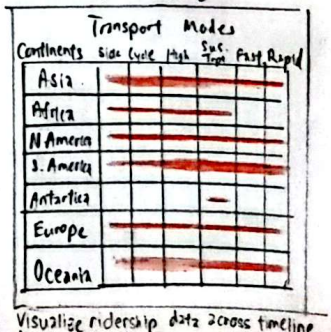
Show statistical spread of ridership data across transport modes.

Treemap



Display ridership data in a hierarchical form, using area to represent volume.

Gantt Chart



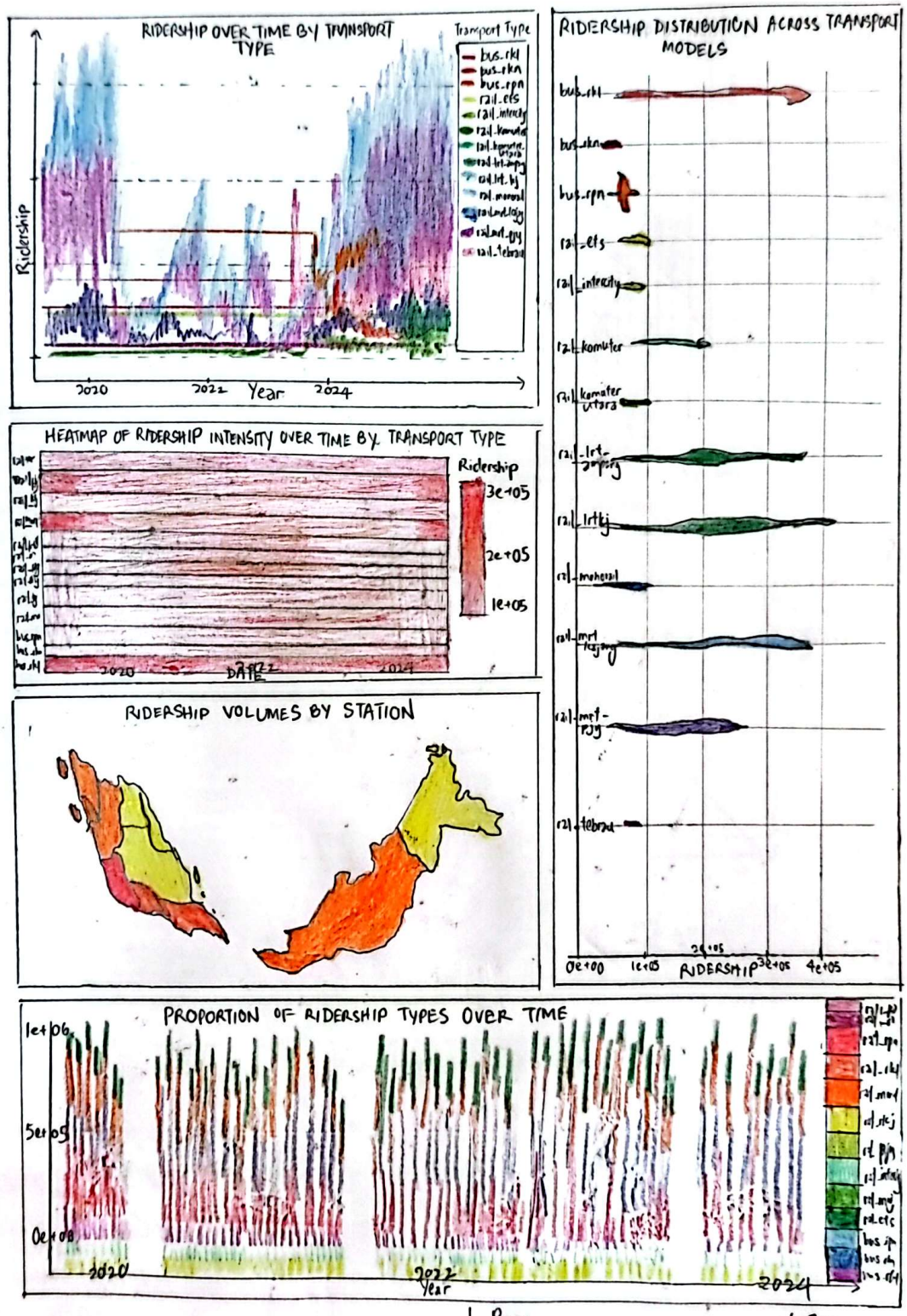
Visualize ridership data across timeline, broken down by transport modes.

Q: How can users understand spatial & temporal ridership trends across Malaysia's public transport system.

A: By using a combination of line charts for trends, geographic maps for spatial insights & additional visualizations (bar charts, Sankey, scatter plot) to compare ridership flows across transport types.

Sheet 2 : Initial Design I

Layout : Top → Line Chart : tracking ridership over time for different transport modes.
Middle → Heatmap : showing ridership intensity over time (days & hours).
Bottom → Map Visualization: stations displayed on the map & bubbles showing ridership volumes.
Side → Violin Plot : displaying ridership distribution for each transport type.
Footer → Stacked Bar Chart : displaying the breakdown of ridership by transport type over time.



Operations

- Line Chart shows trend over time
- Heatmap shows intensity peaks by day
- Map provides a geographical breakdown
- Violin Plot visualizes distribution across transport modes.
- Stacked Bar Chart shows proportion of ridership types over time.

Pros

Provides clear, multifaceted view of temporal & geographical ridership data.

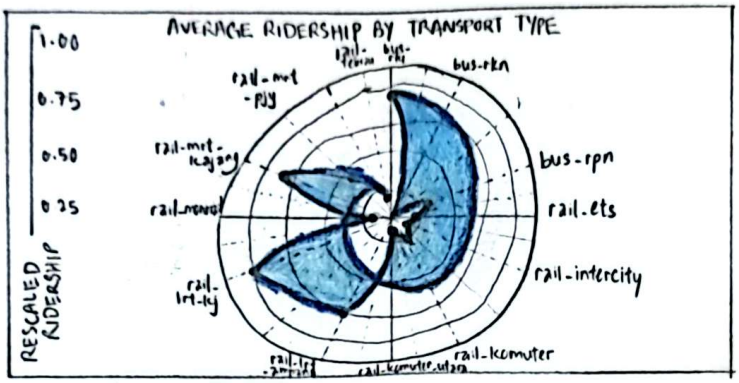
Cons

Combined layout might feel cluttered if not properly spaced & designed.

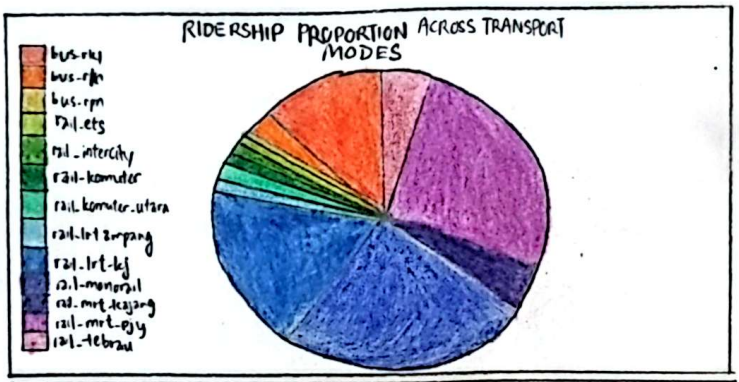
Sheet 3 : Initial Design II

Layout : Top → Radar Chart : comparing ridership across transport systems.
Middle → Pie Chart : showing ridership proportion across modes.
Bottom → Sankey Diagram : showing ridership flow between transport modes and regions
Side → Bubble Chart : showing ridership based on transport type and volume.
Footer → Timeline Chart : highlighting key ridership events.

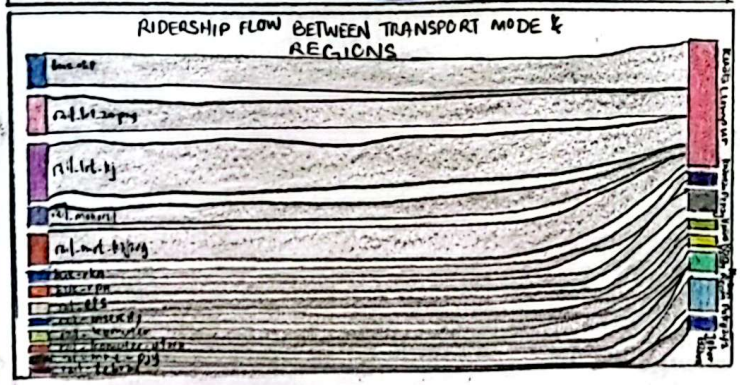
Radar Chart.



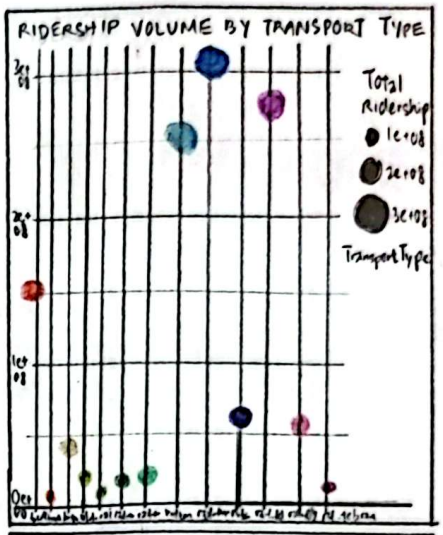
Pie Chart



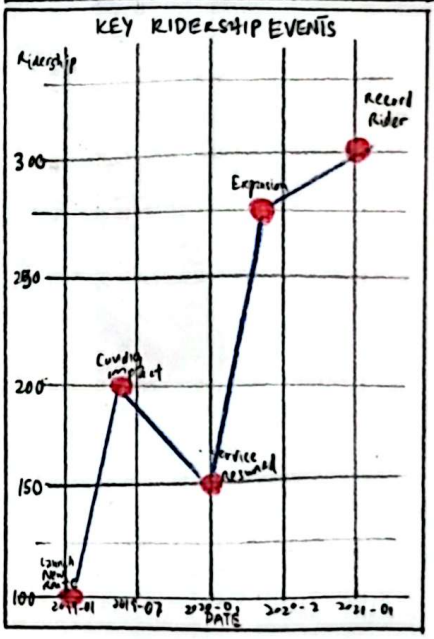
Sankey Diagram



Bubble Chart



Timeline.



OPERATIONS

- Radar Chart compares performance across systems.
- Pie Chart shows distribution of ridership.
- Sankey Diagram visualizes ridership flow between regions and modes.
- Bubble Chart shows ridership volume by station.
- Timeline highlights events that may have impacted ridership

PROS

Clear comparison and flow analysis

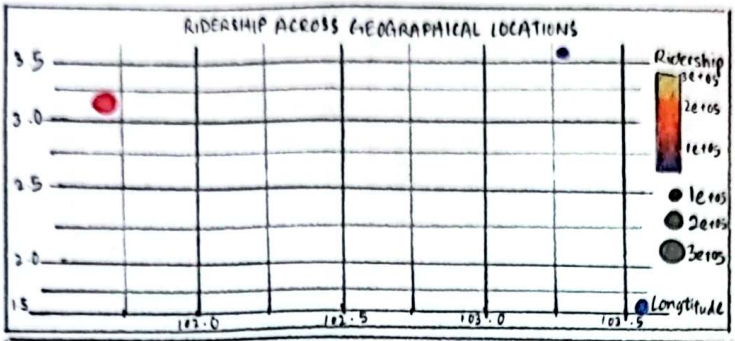
CONS

Radar charts might be complex for beginners to interpret.

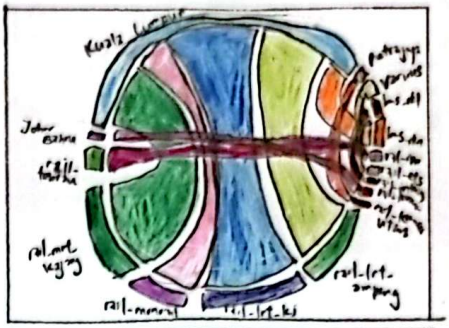
Sheet 4 : Initial Design III

Layout :
- Top → Scatter Plot : showing ridership against geographical locations
- Middle → Geographic Heatmap + (Proportional Spatial Map) : showing ridership intensity at different stations.
- Bottom → Boxplot : showing ridership variation by transport mode.
- Side → Chord Diagram : visualizing relationships between stations and transport modes.
- Footer → Parallel Coordinates Plot : showing how ridership varies across multiple dimensions.

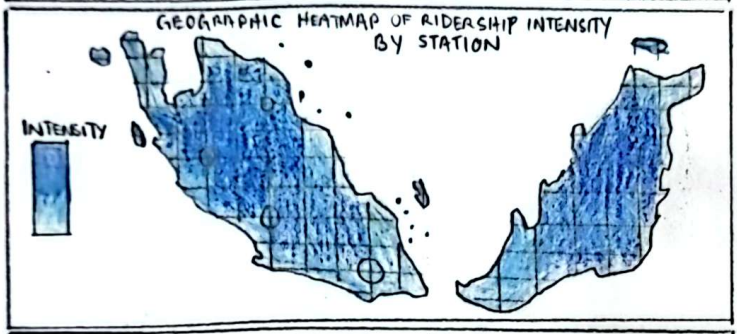
SCATTER PLOT



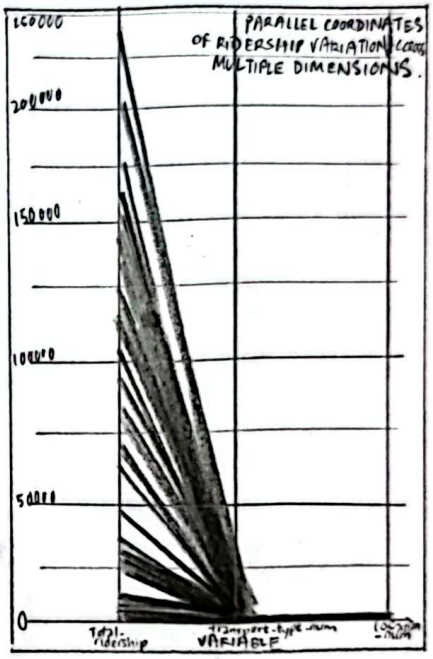
CHORD DIAGRAM



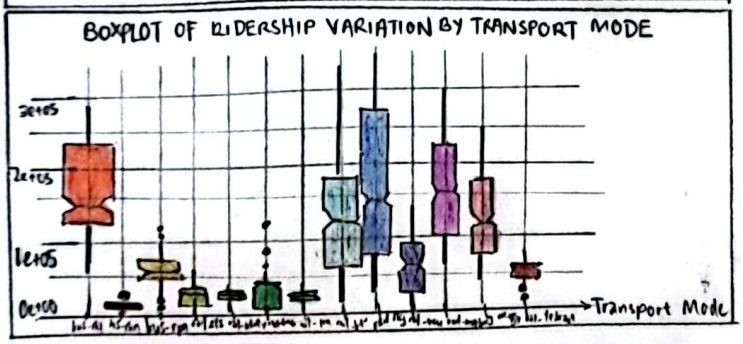
GEOGRAPHIC HEATMAP + PROPORTIONAL SPATIAL MAP



PARALLEL COORDINATES PLOT



BOXPLOT



OPERATIONS:

- Scatter Plot shows the spatial distribution
- Geographic Heatmap hybrid Proportional Spatial shows intensity of ridership across stations.
- Boxplot shows variation in ridership by mode.
- Chord Diagram visualizes relationships between stations & transport modes.
- Parallel Coordinates Plot allows for multi-dimensional ridership analysis.

PROS

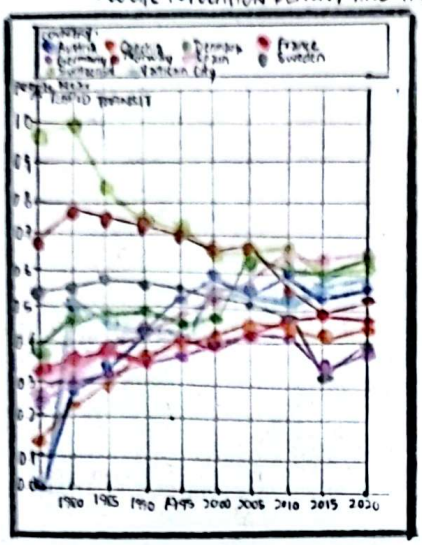
Excellent for spatial & relational analysis.

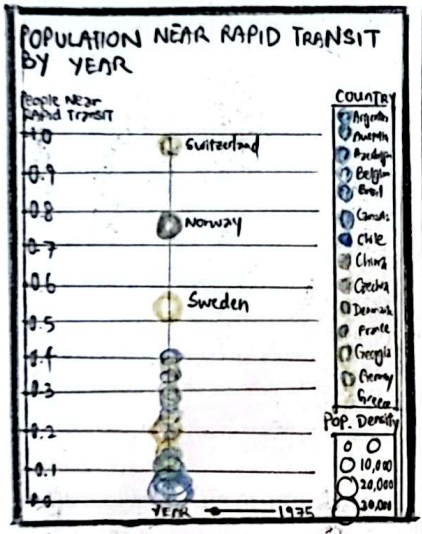
CONS

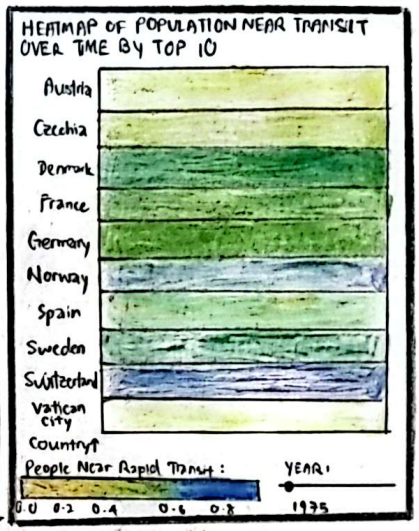
Chord Diagrams and Parallel Coordinates might be harder to interpret.

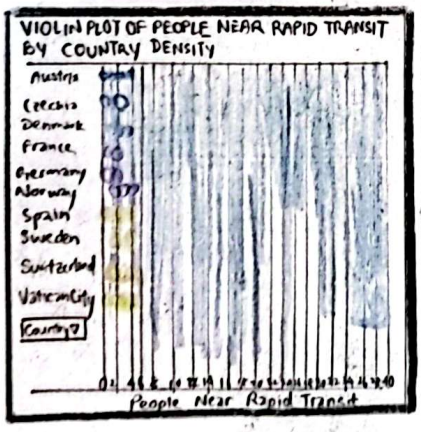
Sheet 5 : REALIZATION

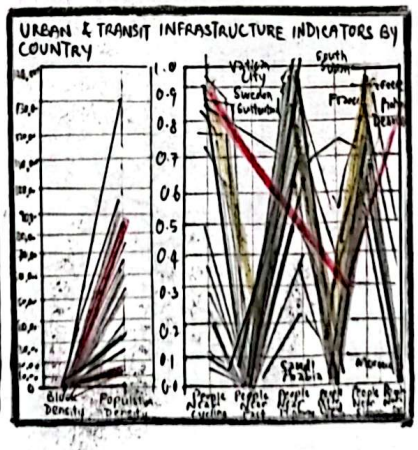
GLOBAL POPULATION DENSITY AND TRANSIT ACCESS OVER TIME











Layout

Top Left (Primary Visualization)
↳ Line Chart for ridership trends over time

Top Right (Primary Visualization)
↳ Geographic Map showing countries with stations, ridership volumes and spatial distribution.

Middle Left (Primary Visualization)
↳ Bubble Chart showing population near rapid transit by year.

Middle Right (Primary Visualization)
↳ Heatmap showing ridership intensity & changes over time.

Bottom Left (Secondary Visualization)
↳ Violin Plot showing ridership distribution across transport types.

Bottom Right (Secondary Visualization)
↳ Parallel Coordinates Plot comparing key infrastructure indicators like block density & population density.

Primary	Secondary
① Line Chart	① Violin Plot
② Geographic Map	② Parallel Coordinates Plot
③ Bubble Chart	
④ Heatmap	

Operations :

- The layout combines spatial, temporal & distribution-based analysis, providing users with insights into ridership trends, geographic patterns, and infrastructure performance.
- Interaction Features : Users can interact with the geographic map to drill down into specific stations, while the line chart allows filtering by transport type & time period. The violin plot highlights ridership distribution across transport types, adding another layer of comparative analysis.

Details :

- Algorithms :
  - a. Averaging & Summing : Algorithms calculate average, sums and densities of ridership over time.
  - b. Mapping Algorithm : Used for precise geographic mapping of ridership volumes & transport stations.
  - c. Heatmap Intensity Calculations : To visualize temporal ridership changes over time.

Estimated Time :

a. Line Chart & Geographic Map => 3 HRS
b. Bubble Chart & Heatmap => 2.5 HRS
c Violin Plot & Parallel Coordinates Plot => 2 HRS
d Interactivity & Filtering Features => 1.5 HRS

Total time for Realization => 9 HRS