

# CSIS 3860 – 001: TERM PROJECT

## Interactive Data Storytelling with D3.js

### Parking meters

Bannor Kakra Antwi-Boasiako (300389563)

---

**Data Source:** <https://opendata.vancouver.ca/explore/dataset/parking-meters/information/>

This dataset contains information on the rates and time limits for parking meters in the City. Information is shown at the block level rather than for the individual meter.

#### Objective

The primary objective of this analysis is to examine parking meter rates and time limits across different neighborhoods in Vancouver, identify pricing trends, and visualize spatial and temporal variations to support data-driven decision-making for urban planning and parking management.

---

#### Three Major Questions

- 1. How do parking rates vary across different neighborhoods in Vancouver?**
  - Which local areas have the highest and lowest average weekday/weekend parking rates?
  - Are there noticeable pricing patterns based on geographic location?
- 2. Is weekend parking generally cheaper than weekday parking across all neighborhoods?**
  - Which areas have the most significant difference between weekday and weekend rates?
- 3. How are parking meters distributed geographically, and does rate variation correlate with high-traffic zones?**
  - Are higher parking rates concentrated in commercial or tourist-heavy areas?

## Preprocessing

## Steps:

Data cleaning and preparation were done using Power BI's Power Query tool:

### 1. Data Cleaning (Power BI Power Query):

- Removed blank entries in Rate\_Misc and TIMEFFE fields
- Filtered null values in RATE\_MISC
- Standardized text fields (Geo\_Local\_Area, METERHEAD) by replacing spaces/special characters

### 2. Geospatial Processing:

- Extracted longitude/latitude from geo\_point\_2D
- Removed redundant columns (Geom, geo\_point\_2D)

### 3. Feature Engineering:

- Created Avg\_Weekday\_Rate:  $(R\_MF\_9A\_6P + R\_MF\_6P\_10)/2$
- Created Avg\_Weekend\_Rate: 4-period average
- Added Is\_Weekend\_Cheaper boolean flag

## 2. How to Use This Report

- Open the interactive dashboard built using D3.js.
- Navigate through the three main visualizations:
  - Line Chart (Trends): Displays parking rate fluctuations over time.
  - Bar Chart: Compares rates across neighborhoods.
  - Choropleth Map: Highlights rate distributions geographically.
- Use dropdown filters to customize the view based on weekdays, weekends, or all data.

### 3. Page Descriptions

- **Line Chart (Time-Series):** Visualizes parking rate trends over key time periods, such as weekdays vs. weekends. Thus, Hourly/daily rate fluctuations across neighborhoods.
- **Bar Chart (Comparative Analysis):** Ranks neighborhoods by their average parking rates and explores rate-time limit correlations.
- **Choropleth Map (Geospatial Overview):** Shows parking meter distribution and rate variations by geographic region by color-coded neighborhoods by average rates.

### 4. Key Insights per Page

- **Line Chart:**
  - Peaks and troughs in parking rates across weekdays and weekends.
  - Identify neighborhoods with steep rate changes over time and unusual patterns.
- **Bar Chart:**
  - Areas with the highest and lowest rates, ranked by average values.
  - Clusters of similar rates and outliers indicating unique pricing.
- **Choropleth Map:**
  - Darker areas representing higher weekday parking rates.
  - Areas with no data shaded in grey.
  - Visual differences between high-traffic and low-traffic zones.

### 5. Interactive Features Available to Users

- **Dropdown Filters:**
  - Choose between "All", "Weekday", or "Weekend" to filter the displayed rates.
- **Hover Effects:**
  - Highlighted areas pop out slightly with a smooth transition to green.

- Tooltip displays relevant rates based on the selected filter.
- **Responsive Design:**
  - Charts adapt dynamically to screen size for better accessibility.
- **Legend:**
  - Provides a color gradient that explains rate ranges.

## **Project Overview**

Objective: Enable data-driven parking policy decisions through spatial-temporal analysis of meter rates.

Key Features:

- Three interconnected D3.js visualizations
- Mobile-responsive design
- Open data integration

Audience:

- City transportation planners
- Urban researchers
- Business improvement associations

Data Scope:

- 100+ parking meter blocks
- Weekday/weekend rate analysis
- Geographic coordinate mapping

*Home Page Figure: Sample parking meter from Stanley Park, Vancouver (data context example)*