

● ● ● Faculty Mentor: **Satayaki Das**

# TTC Subway Delay Data Analysis

Data Analytics Capstone  
Project | Group 17



# Operational Context



Public transit reliability is critical for Toronto's economy; in 2025, subway delays resulted in approximately **1,179 lost service hours**. The lack of a structured framework at the TTC to identify root causes by line, station, or time has led to inefficient allocation of maintenance and workforce resources. This project aims to transform raw delay logs into an **interactive dashboard** to enable data-driven maintenance scheduling and workforce planning.

## Context & Problem





# Data Pipeline & Cleaning



Data was sourced from the City of Toronto Open Data Portal covering Jan–Dec 2025 with 25,713 rows. Cleaning included replacing 36.8% missing "Bound" (direction) values and standardizing over 20 inconsistent line names down to six canonical codes. Feature engineering added five columns — Month, Hour, Delay\_Category, Time\_Period, and Is\_Delayed — to support temporal and severity analysis.

## Pipeline overview

# Key Performance Indicators

35.37%

Delay Rate stood at ~35.37%, representing the significant share of incidents that caused actual service disruption across the entire network system.

~42.2%

AM Peak Delay Rate is notably higher at ~42.2%, highlighting a pronounced and significant impact on morning commuters during their daily travels.

~70,754  
minutes

Aggregate Total Delay Minutes reached ~70,754 minutes, which equates to roughly ~1,179 hours of operational loss and quantifies the scale of the problem.

# Major Data Observations



Line 1 (YU Line) is the network's weakest performer with a delay rate of 38.7%, indicating specific and targeted operational issues on that particular line.

## Line performance



Seasonality analysis shows February as the worst month with 917 incidents, likely driven by harsh winter weather conditions affecting operations.

## Seasonality

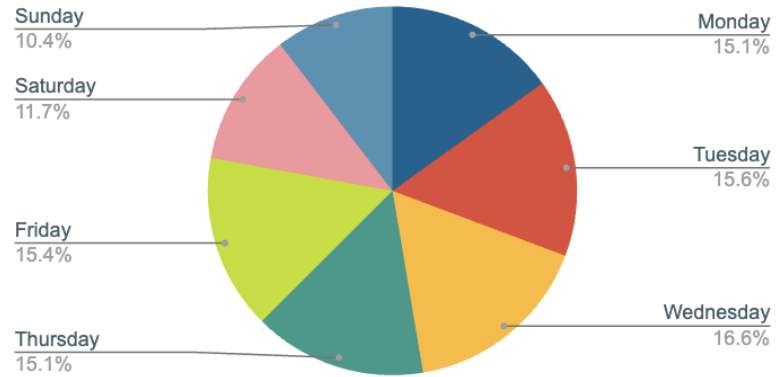


Sundays have the fewest incidents (946) but the highest average delay (10 minutes), likely due to reduced staffing or slower recovery on low-service days.

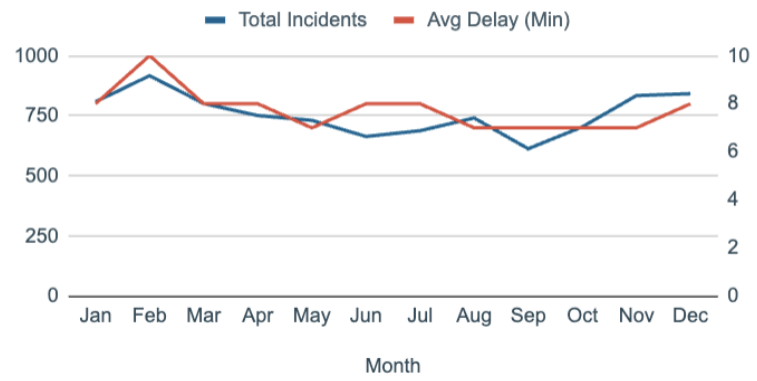
## Day-of-week pattern



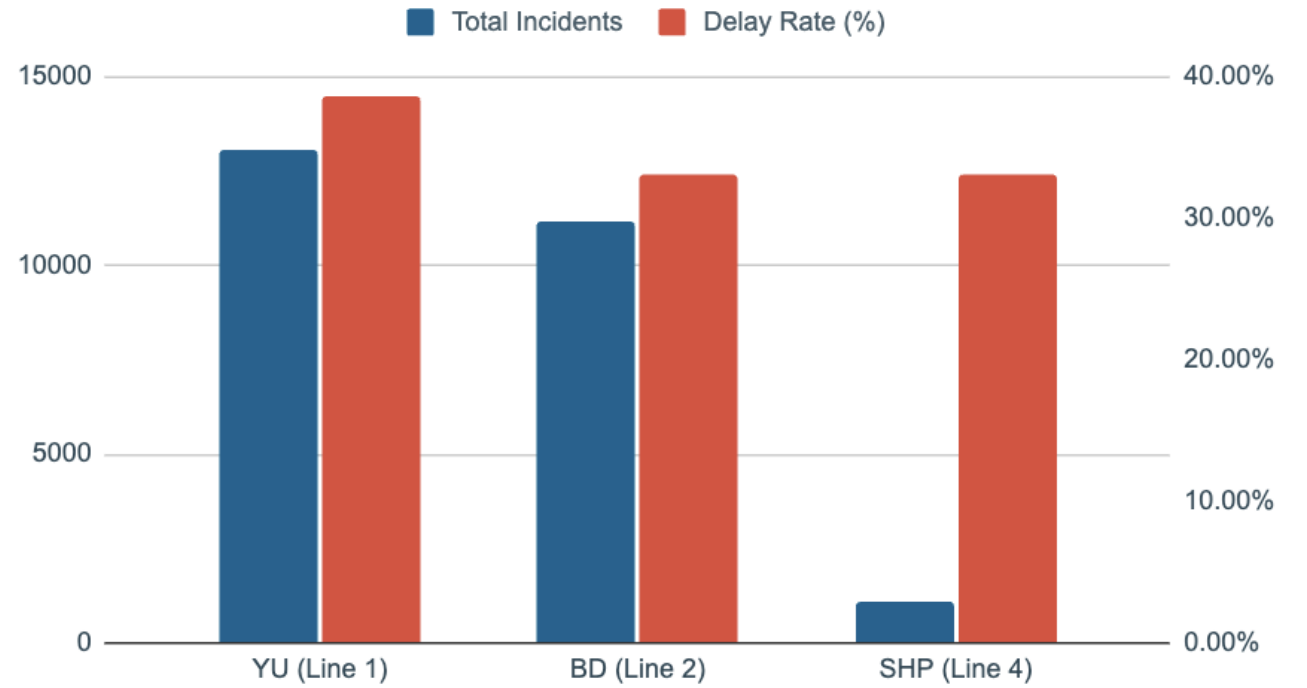
### DAY OF WEEK (Avg Delay)



### MONTHLY TREND (SEASONALITY)

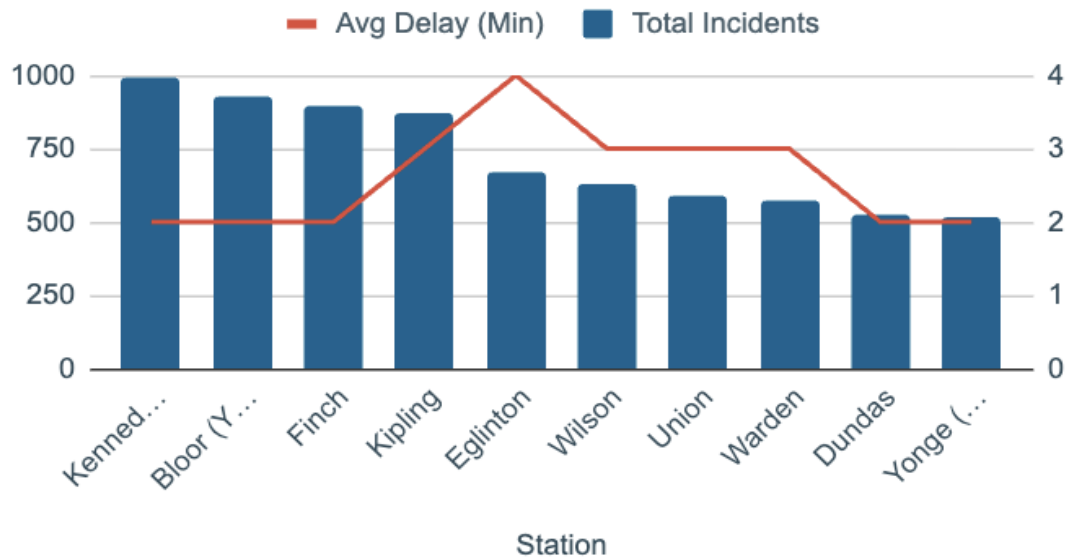


### LINE PERFORMANCE



# Segmentation & Severity

## TOP 10 WORST STATIONS



Pareto analysis shows top 10 stations (12% of network) cause 27% of incidents, highlighting intervention hotspots. 64.6% of logs are 'No Delay', but 2.3% 'Major' (over 16 mins) have big impacts. Stations like Kennedy and Bloor, with severe delays, need priority fixes.

### Pareto hotspots & severity

# Operational Dashboard



The dashboard provides an executive overview of TTC Subway Delay Analysis 2025 with key KPI cards showing Total Delays, Average Delay, and Total Records for quick decision-making. It includes a Monthly Trend chart to track seasonality, a Delay Category pie chart to understand severity distribution, and a Day-of-Week analysis to identify peak risk periods. Together, these insights support targeted operational improvements and long-term planning.

Dashboard overview

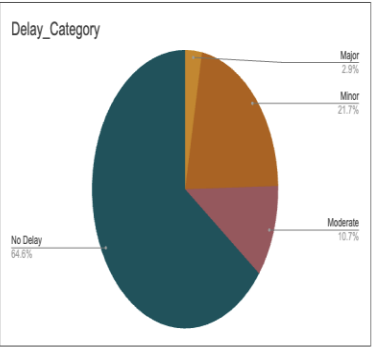
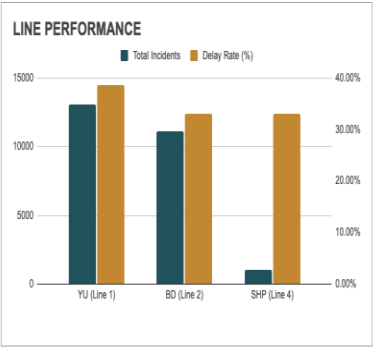
# TTC Subway Delay Analysis 2025

This project contains a comprehensive analysis of Toronto Transit Commission (TTC) subway delay data for the year 2025. The dataset includes detailed information about delay incidents across the TTC subway network, providing insights into operational patterns, peak delay periods, and affected stations.

Total Records  
25713

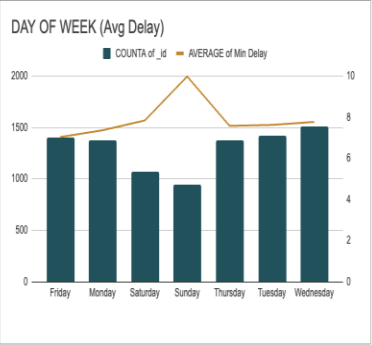
MONTHLY AVERAG...  
93

WEEKLY DELAY  
55



Select the column first

Our data reveals a clear pattern of disruption. While Line 2 (Bloor-Danforth) operates relatively smoothly, Line 1 is our primary choke point, failing nearly 40% of the time. This instability is not random; it is highly predictable. Commuters are most at risk during the Morning Commute and in the winter month of February. By targeting our resources specifically at Kennedy Station and Line 1 infrastructure, we can eliminate the majority of these recurring delays.



Select the column first

