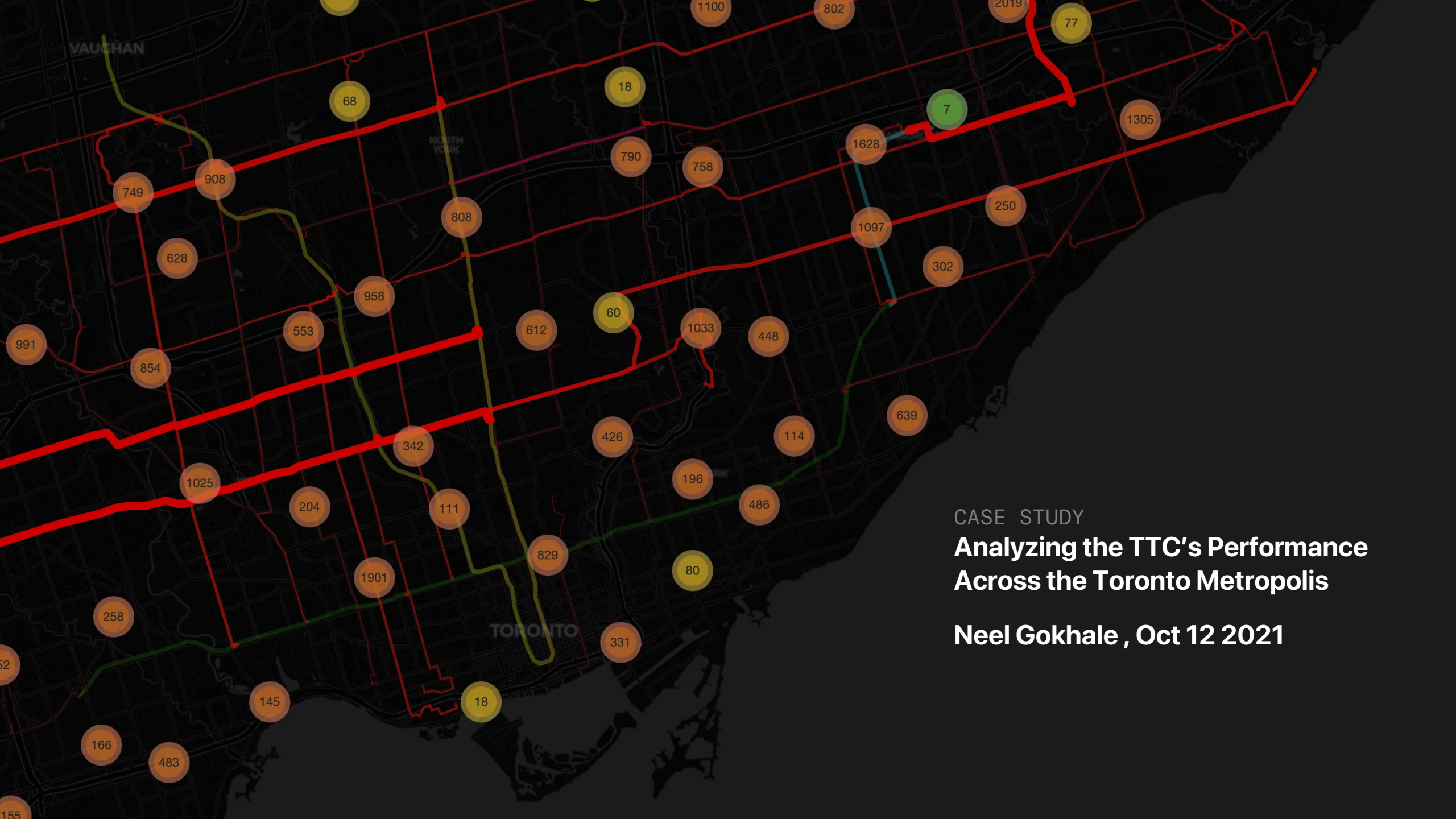


CASE STUDY

Analyzing the TTC's Performance Across the Toronto Metropolis

Neel Gokhale , Oct 12 2021

PRESENTATION OUTLINE

1 KEY HIGHLIGHTS

2 GEOGRAPHICAL ANALYSIS

3 NUMERICAL ANALYSIS

4 NEXT STEPS

Source

KEY HIGHLIGHTS

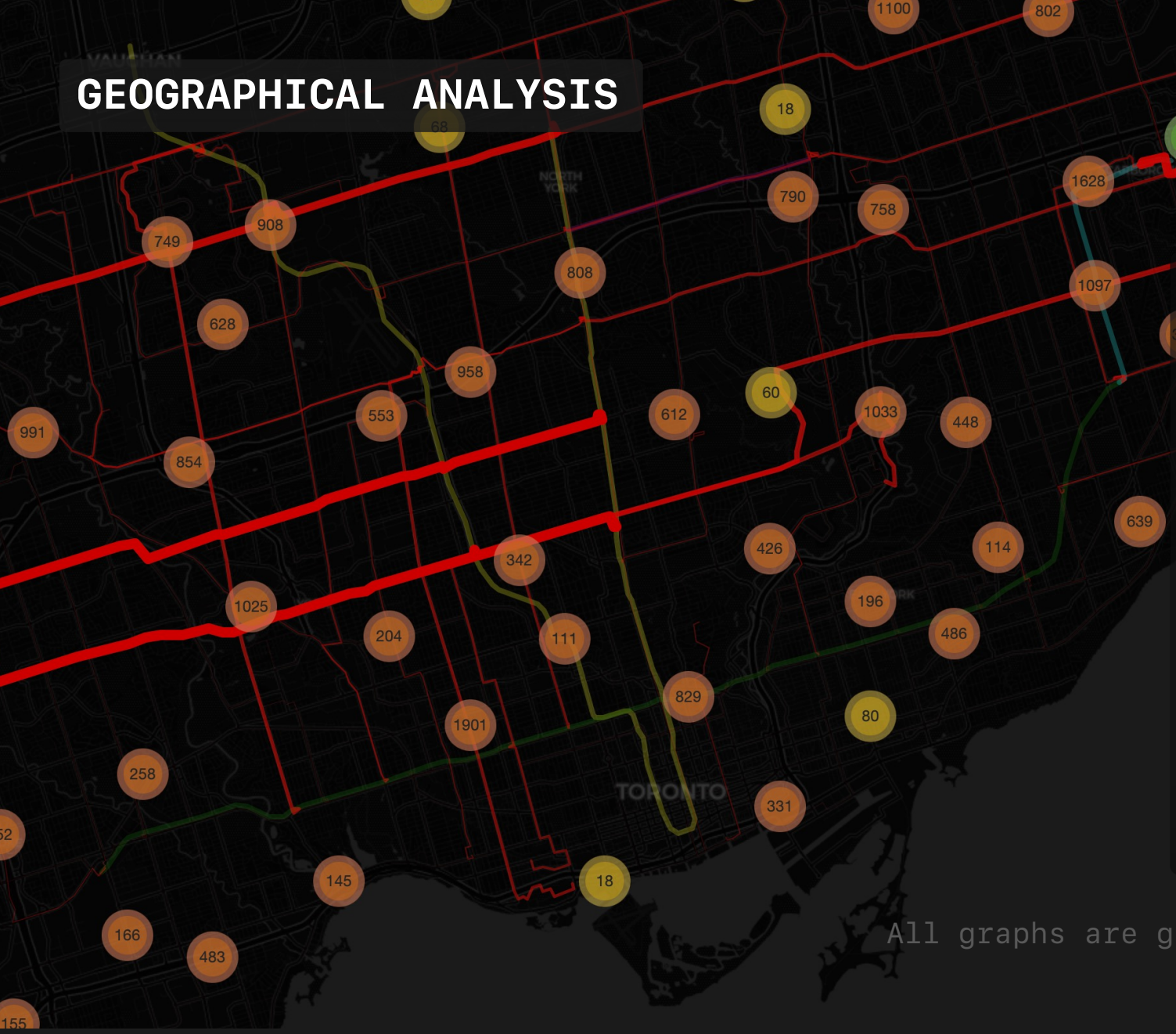
1 The TTC facilitates ridership for over 1.7 million Torontonians / day[1], accounting for commutes of 40% of the workforce[2]. It plays a major role in Toronto's transport network.

2 Bus routes 24, 29, 32, 36, 52, 54, 60 and 133 facilitate 13% of daily ridership but also contribute to over 23% of delay incidents across all routes.

3 Prioritizing delays on routes based on propensity and duration (#DELAYS * TIME) offers a more accurate way to represent metrics on fleetwide inefficiency.

Sources: 1 | 2 All un-cited figures / facts are calculated from dataset

GEOGRAPHICAL ANALYSIS



This map plot displays all the transportation routes offered by the TTC.

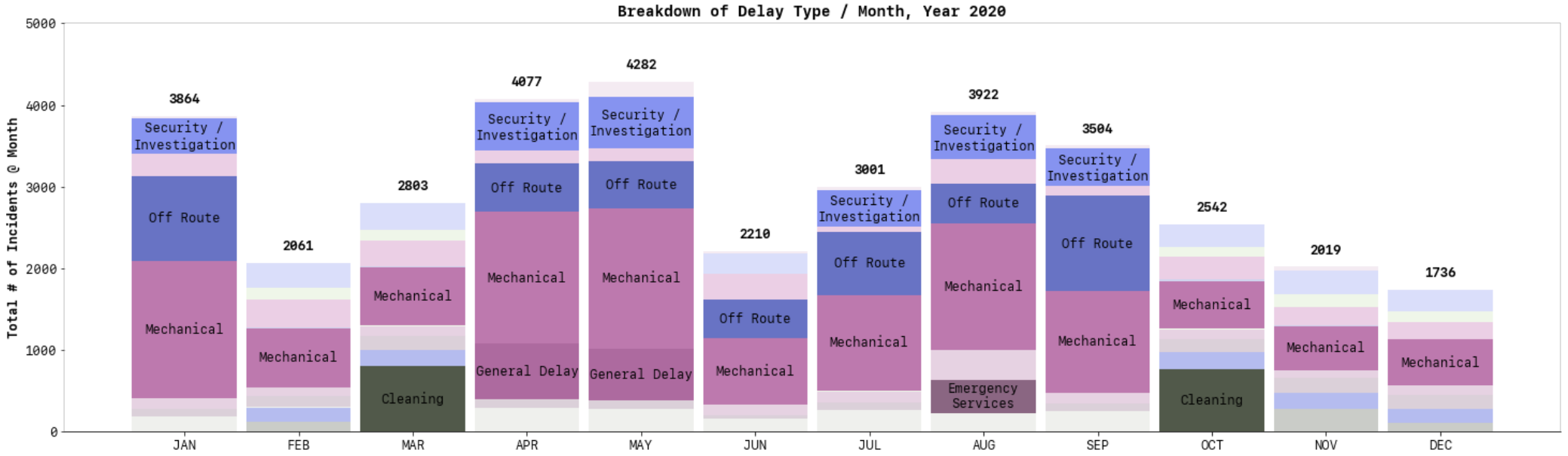
- Thickness of RED bus routes correlates to total # of delay incidents over 2020
- Marker clusters dynamically split and combine to indicate all incident types and delay in minutes on a route or across a larger part of the city with multiple intersecting routes
- An effective & intuitive way to correlate route inefficiencies to geography

IMPORTANT: Please click on map or this link to view it in dynamic mode

All graphs are generated using data from open.toronto.ca

NUMERICAL ANALYSIS 1

All graphs are generated using data from open.toronto.ca



Graph: 2020 MoM breakdown of delay incident counts across all TTC routes. For each month, top 2-4 incident types are highlighted

X-axis: Month, 2020

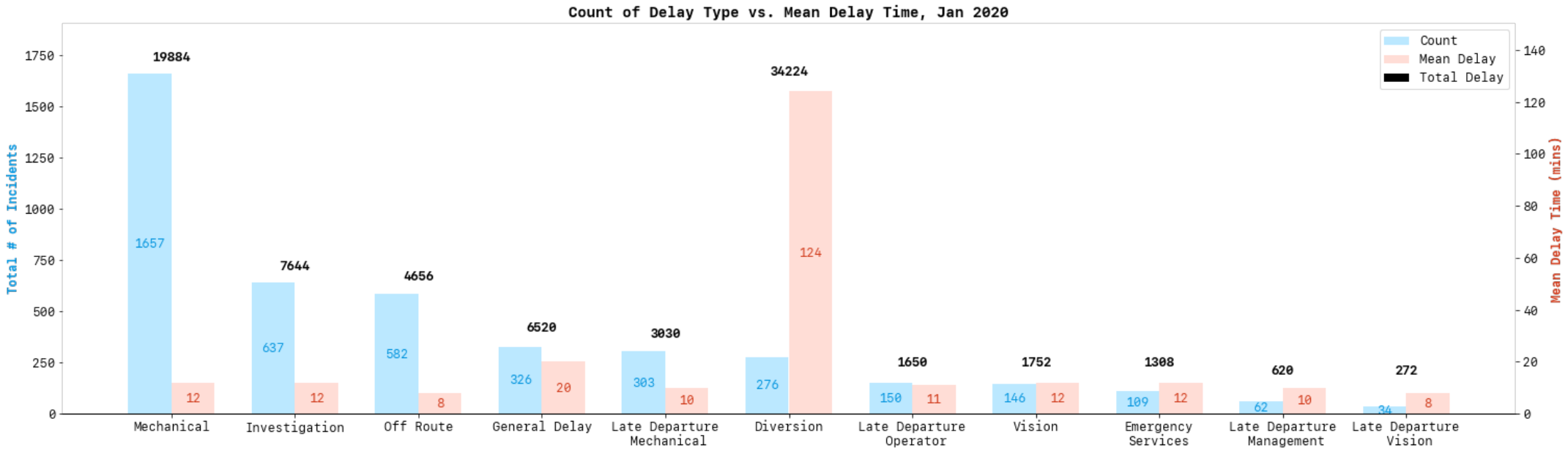
Y-axis: Count of incident

Observations:

- Based on propensity, `Mechanical`, `Off-Routing`, `Security/Investigation` delays are constant and should be addressed as **a top priority**
- Delays caused by `Cleaning` appear periodically, usually in parallel to a conditional change (in this case, the start and end of winter). These incidents should be **prepared for based on periodicity**
- Delays like `Emergency Services` appear randomly. These are **more difficult to predict and prepare for**

NUMERICAL ANALYSIS 2

All graphs are generated using data from open.toronto.ca



Graph: Jan breakdown of incident counts and mean delay cross all TTC routes.
Total delay = incident count x mean delay

X-axis: Types of delay

Y-axis: Count of incident
Mean delay time

Observations:

- Based on propensity, **Mechanical**, **Off-Routing**, **Security/Investigation** delays **are still a top priority**
- However, when factoring **mean delay**, we observe that **Diversion** becomes the most significant contributor of overall delay
- **Thus, propensity factored with mean delay yields the most accurate view of fleetwide inefficiency**

NEXT STEPS

1 Most transit agencies rely on operational experience, rather than data analytics, when planning bus-bridging strategies. The move to data-aided decision making is critical to increase fleetwide efficiency and mobility

2 A bus-bridging framework and model is proposed. Using key inputs, like local traffic, duration of delay, type and propensity of incident, a shuttle-bus-rollout strategy is outputted.

3 Bus-bridging policy guidelines are established with the transport governing body to create a logical pathway for future advances in mobility improvement in the transportation network

Thank You for Listening!

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