Annual Analysis of Delays in TTC Streetcars for the year 2023*

Is there a way to make commuter life easier?

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First sentence. Second sentence. Third sentence. Fourth sentence.

1 Introduction

Toronto Transit Commission (TTC) is the biggest and most used transit authority in Toronto. It was established on September 1, 1921 and since then supports various means of ground transportation like streetcar, shuttle bus and the subway system. Despite being the most used transit system, it does come with several challenges one of the most notable one being the delays experienced between the various stops. One such transportation system we focus on in this paper is streetcars.

These delays make it especially difficult for individuals that commute on a daily basis. Furthermore, one can image the inconveniences caused due to extended delays by streetcars during weather conditions like the winter months. In this paper, we aim to dive deeper into the cause of delays in TTC, how these vary by the times of day and the various seasons and what incidents are the most occurring for the delays experienced. We make use of the dataset made available by Gelfand (2022) for the year 2023.

The remainder of this paper is structured as follows. We first give a brief overview of the dataset under (**dataset-desc?**). Then, we present some graphs on the results extracted from our collected data found under (**results?**). Lastly, we conclude with a discussion of our results and any limitations in our approach found under (**discussion?**).

*Code and data are available at: https://github.com/aakash2002/study_of_ttc_streetcar_delays

2 Dataset Description

bla bla bla

3 Results

3.1 Average Delay By Streetcar Line

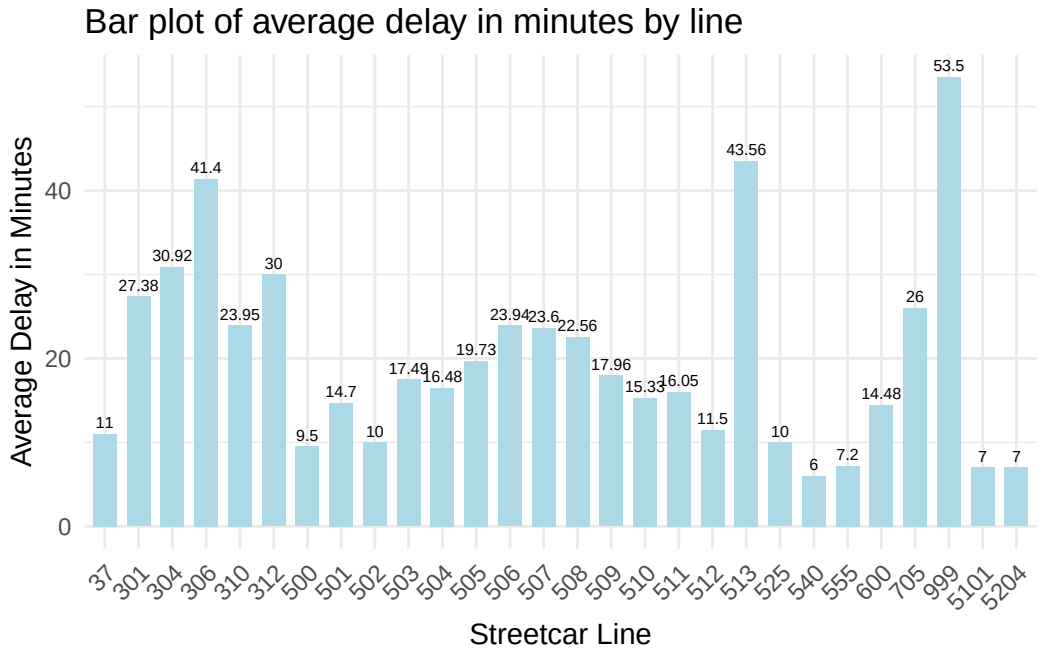

Figure 1: Average annual delay in minutes for each streetcar line

Figure 1 highlights the annual average delay in minutes for every streetcar line for the year 2023. The 300-series lines also called the Blue Network Lines (cite) are the nighttime streetcar lines that start at 1:30 AM. These buses average the most delays reaching at most 30 minutes for line 312.

The 500-series lines are the daytime lines that run from 8 AM. These buses average between 6 to 23.6 minutes with the longest delay experienced by line 507.

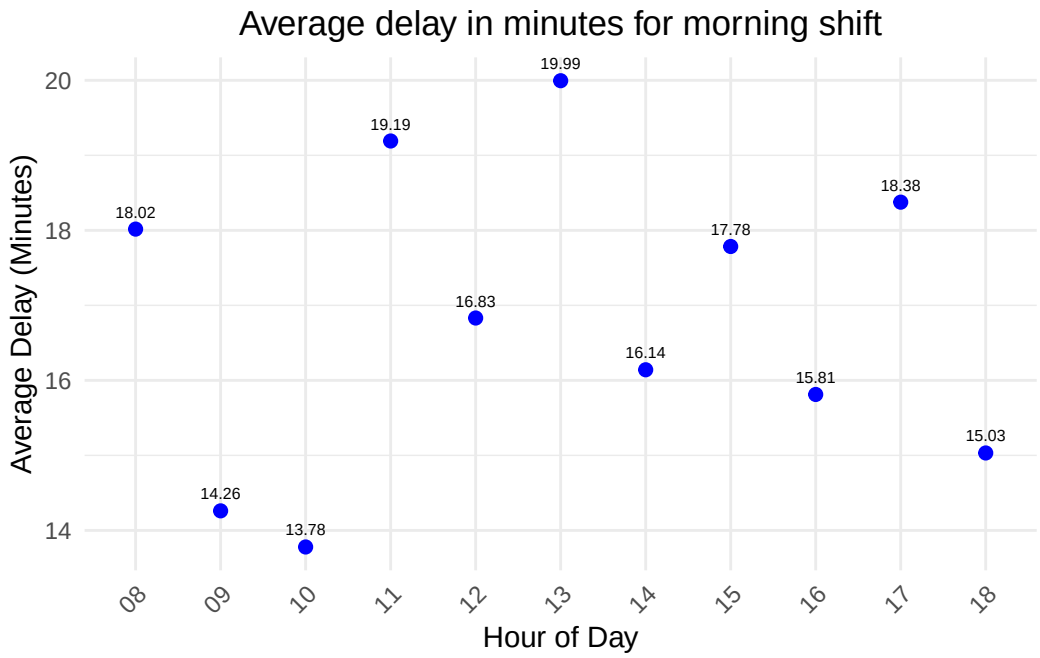

Figure 2: Average delay in minutes for dayshift

3.2 Average Delay By Working Shift

3.2.1 Delays During Dayshift

Figure 2 highlights the annual average delay in minutes experienced by the hour of day for streetcars that run during the day. We observe that there is high variability in the delays throughout the day with the minimum delay being about 13.78 minutes and the maximum being roughly 20 minutes.

3.2.2 Delays During Nightshift

Figure 3 highlights the annual average delay in minutes experienced by the hour of day for streetcars that run during the night We observe that there is low variability in the delays throughout the night with the minimum delay being about 16.62 minutes and the maximum roughly 20 minutes.

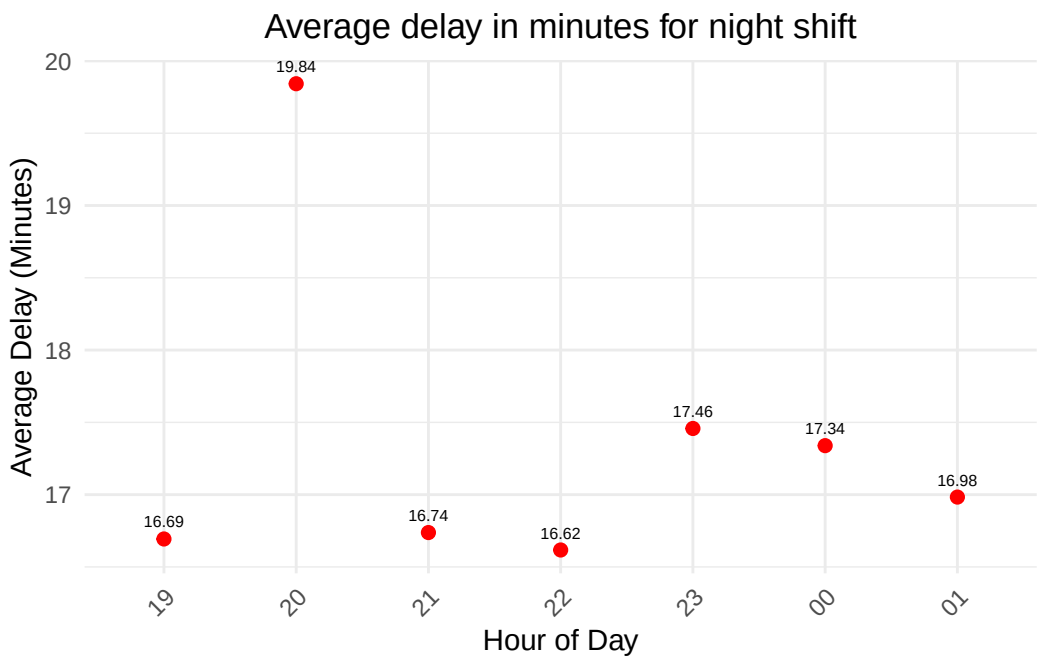

Figure 3: Average delay in minutes for nightshift

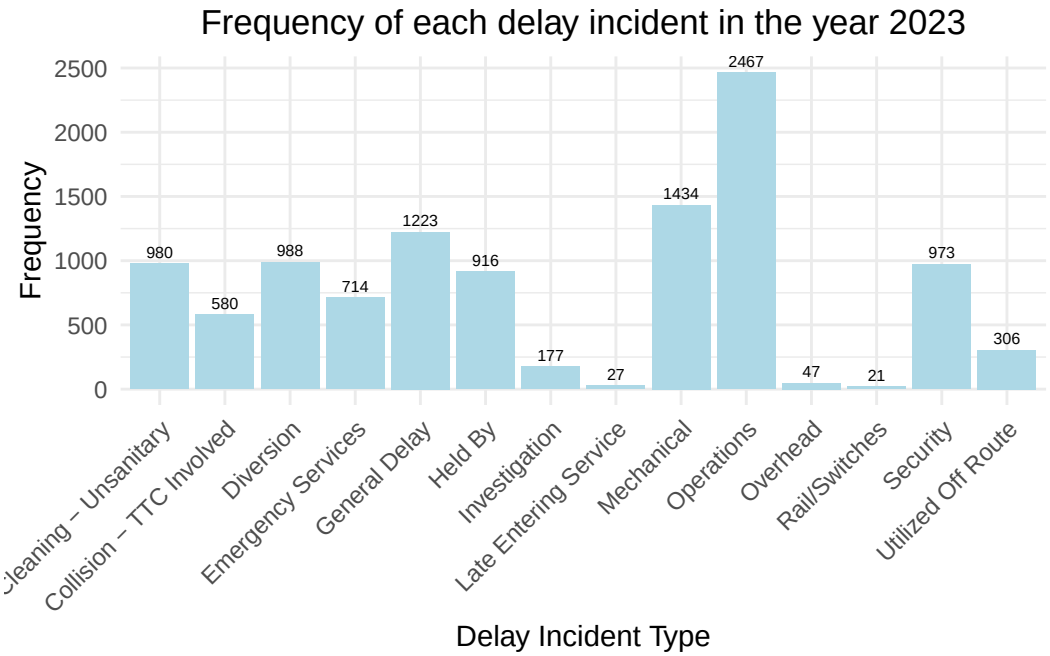

Figure 4: Frequency plot for cause of streetcar delay by incidents

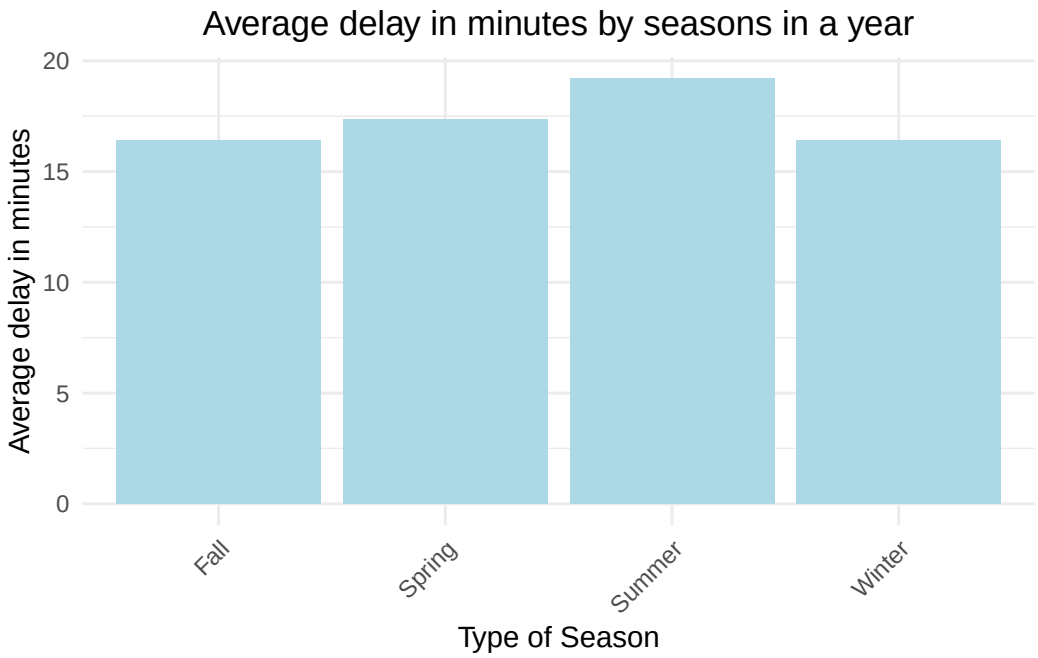

Figure 5: Average delay in minutes by seasons in a yea

3.3 Frequency of delays by incidents

4 Discussion

4.1 First discussion point

If my paper were 10 pages, then should be be at least 2.5 pages. The discussion is a chance to show off what you know and what you learnt from all this.

4.2 Second discussion point

4.3 Third discussion point

4.4 Weaknesses and next steps

Weaknesses and next steps should also be included.

Appendix

A Additional data details

References

Gelfand, Sharla. 2022. *Opendatatoronto: Access the City of Toronto Open Data Portal*. https://CRAN.R-project.org/package=opendatatoronto.