Mapping Toronto's Libraries*

Are Libraries Distributed Equally Throughout the City?

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24 January 2024

This report analyzes the Library Branch General Information dataset, which is made available to the public from Open Data Toronto. It uses the library branches, square footage, and ward information to determine how well libraries are spread across the city. In summary, (TO DO - KEY FINDINGS). These findings are relevant because they can help ascertain how accessible libraries are to residents of Toronto.

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1 Introduction

Libraries are a critical form of social infrastructure in modern society. They serve many functions, ranging from providing access to books and WiFi, to programs on self-improvement, to providing places of shelter to study or work. More importantly, however, they offer most or all of this functionality for free. Thus, libraries are not just places for any specific demographic: they act as third spaces, allowing users of different ages, ethnicities, and backgrounds to all

*Code and data are available at: https://github.com/hadi-q/toronto-public-libraries.

exist in the same space. In a society where most services are monetized or paid, libraries remain a vestige of a more egalitarian era.

The Toronto Public Library in particular excels in these functions due to its size, cross-branch integration, and volume of services available. With 100 physical branches in its network, users can borrow books from any branch and have it delivered to their home branch. This increases the access to information that Toronto Public Library users benefit from. As well, users can borrow movies, internet hotspot devices, video game consoles, and even get free passes for museums or other attractions. A Toronto Public Library card also gives users access to third party platforms like Libby, OverDrive, Hoopla, and Consumer Reports, providing additional online resources that users can benefit from.

In October 2023, the Toronto Public Library was victim to a major cybersecurity attack that took down their website and online systems. This incident also led to some user data being compromised to hackers. As of January 2024, their website services remain offline. This prevents users from being able to borrow or renew books online, create or renew a library card, or access many of Toronto Public Library's services. As a result, physical proximity to a library branch has become more important than ever before, as it remains the only way to borrow books or access other library services until full services are restored.

This paper aims to analyze the distribution of Toronto Public Library branches across the 25 wards of Toronto. The distribution of branches will be viewed in two ways: number of branches and square feet of branch space within a given ward. The resulting analyses will determine if certain wards are over- or underrepresented in terms of the quantity and size of library branches, which could provide cursory information on where future libraries could be built or current libraries that could benefit from expansion. Future analyses may explore demographic factors to determine if libraries are disproportionately located in neighbourhoods of higher or lower income, to get a sense of equality of access to libraries.

The remainder of this paper is structured as follows. (TO DO)

2 Data

All relevant data was sourced from the Open Data Toronto portal, and extracted using the `opendatatoronto` library for `R` (Gelfand 2022). In particular, one dataset was used for the graphs and analyses in this paper, which included information about all Toronto Public Library branches, their addresses, phone numbers, square footage, year of construction of the building, among other variables like whether there as a park adjacent to the library, if adult literacy classes are available, and GPS coordinates of the building.

The data was generated, extracted, and cleaned using `R` (R Core Team 2022), leveraging functions from `tidyverse` (Wickham et al. 2019), `ggplot2` (Wickham 2016), `dplyr` (Wickham et al. 2023), `readr` (Wickham, Hester, and Bryan 2023), `janitor` (Firke 2023), `opendatatoronto` (Gelfand 2022), `knitr` (Xie 2014), and `here` (Müller 2020).

The selected dataset was published by the Toronto Public Library to share information on libraries located in its network, and was last updated on 29 June, 2023 in accordance with its annual updating guideline. The chosen variables of analysis were the branch name, the square footage of the library, the ward number and ward name of where the library is located, and the year of construction of the site.

Branch	Square Footage	Ward Number	Ward Name	Year Built
Albion	29000	1	Etobicoke North	2017
Albert Campbell	28957	20	Scarborough Southwest	1971
Alderwood	7341	3	Etobicoke-Lakeshore	1999
Agincourt	27000	22	Scarborough-Agincourt	1991
Armour Heights	2988	8	Eglinton-Lawrence	1982
Annette Street	7806	4	Parkdale-High Park	1908

Table 1: Sample of Toronto Public Library Data

Libraries are present in each of the 25 wards in the city of Toronto. (Note that at the time of the 2018 election, wards were redrawn from 44 wards down to the present 25.) While neighbourhood data is available from the dataset, it is excluded from this analysis, as neighbourhood classifications and counts varied between different `opendatatoronto` datasets.

There is significant range in both the square footage and year of construction of libraries. The smallest library in the dataset, Todmorden Room, measures just 554 square feet, while the largest, the Toronto Reference Library, amounts to over 400,000 square feet. There is also much range in the ages of libraries, with the oldest, the Yorkville branch, having been established in 1907, while the newest, Ethennonnhawahstihnen', was built in 2023.

The original dataset had entries for codes that did not correspond to physical locations, such as the phone line. These were filtered out, leaving a total of 100 library branches.

Ward Name	Number of Branches
Beaches-East York	4
Davenport	4
Don Valley East	4
Don Valley North	4
Don Valley West	4
Eglinton-Lawrence	4
Etobicoke Centre	3
Etobicoke North	4
Etobicoke-Lakeshore	6
Humber River-Black Creek	5

Table 2: Sample of Count of Library Branches by Ward

On average, there were four library branches per ward. However, in practice, this ranges from one branch in wards like Willowdale, up to seven in branches like Toronto-Danforth.

Ward Name	Total Square Footage of Branches
Beaches-East York	33021
Davenport	40312
Don Valley East	42129
Don Valley North	97349
Don Valley West	40510
Eglinton-Lawrence	91449
Etobicoke Centre	63055
Etobicoke North	43772
Etobicoke-Lakeshore	61053
Humber River-Black Creek	68108

Table 3: Sample of Total Square Footage of Library Branches by Ward

Ward Name	Number of Branches	Total Square Footage of Branches
Beaches-East York	4	33021
Davenport	4	40312
Don Valley East	4	42129
Don Valley North	4	97349
Don Valley West	4	40510
Eglinton-Lawrence	4	91449
Etobicoke-Lakeshore	6	61053
Etobicoke Centre	3	63055
Etobicoke North	4	43772
Humber River-Black Creek	5	68108
Parkdale-High Park	6	65855
Scarborough-Agincourt	3	40453
Scarborough-Guildwood	2	36083
Scarborough-Rouge Park	4	44834
Scarborough Centre	5	49252
Scarborough North	3	24444
Scarborough Southwest	4	48816
Spadina-Fort York	3	33784
Toronto-Danforth	7	57331
Toronto-St. Paul's	5	78705
Toronto Centre	3	27267

Ward Name	Number of Branches	Total Square Footage of Branches
University-Rosedale	6	494632
Willowdale	1	168022
York Centre	2	26882
York South-Weston	4	35814

Table 4: Count and Total Square Footage of Library Branches by Ward

3 Results

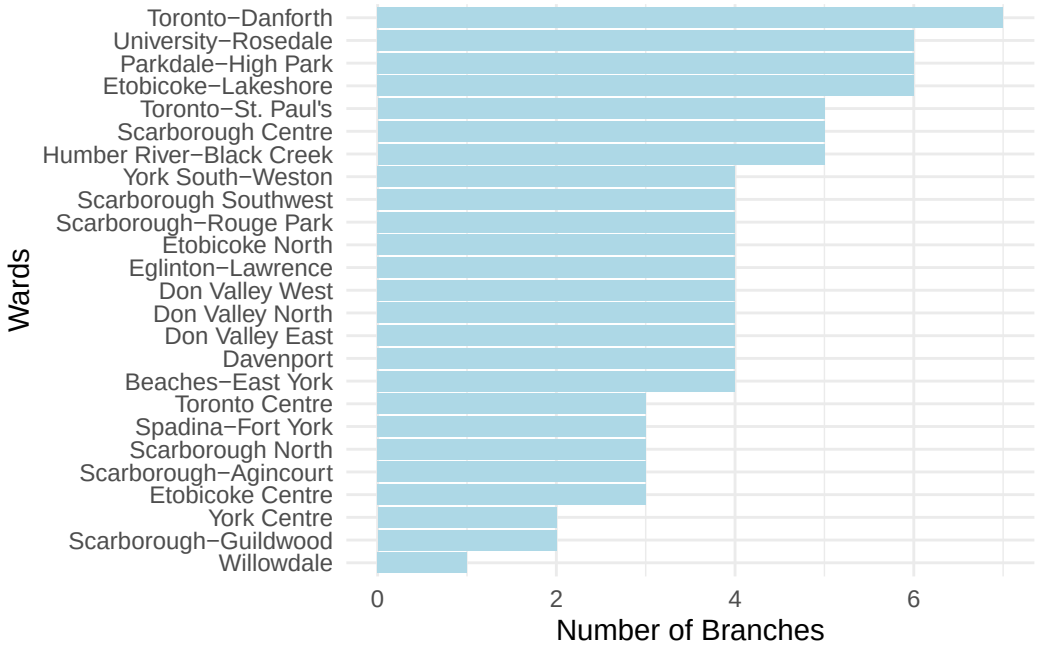

Figure 1: Library Branches by Ward by Count

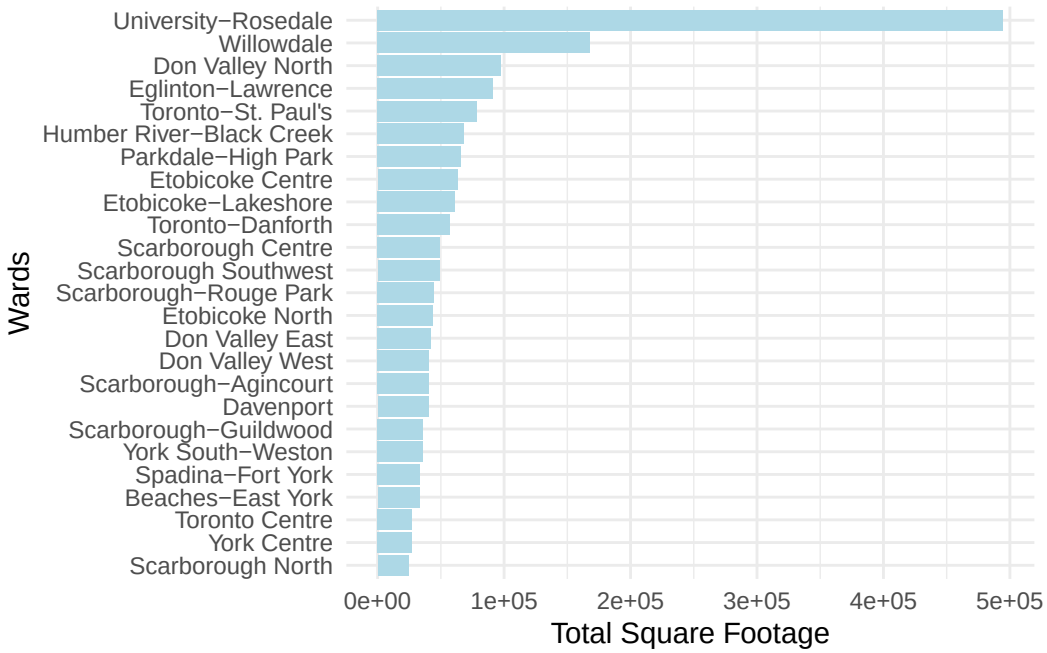

Figure 2: Library Branches by Ward by Square Footage

4 LLMs

Statement on LLM usage: no LLMs were used in the making of this paper.

References

Firke, Sam. 2023. *Janitor: Simple Tools for Examining and Cleaning Dirty Data*. https://CRAN.R-project.org/package=janitor.

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

Müller, Kirill. 2020. *Here: A Simpler Way to Find Your Files*. https://CRAN.R-project.org/package=here.

R Core Team. 2022. *R: A Language and Environment for Statistical Computing*. Vienna, Austria: R Foundation for Statistical Computing. https://www.R-project.org/.

Wickham, Hadley. 2016. *Ggplot2: Elegant Graphics for Data Analysis*. Springer-Verlag New York. https://ggplot2.tidyverse.org.

Wickham, Hadley, Mara Averick, Jennifer Bryan, Winston Chang, Lucy D'Agostino McGowan, Romain François, Garrett Grolemund, et al. 2019. "Welcome to the tidyverse." *Journal of Open Source Software* 4 (43): 1686. https://doi.org/10.21105/joss.01686.

Wickham, Hadley, Romain François, Lionel Henry, Kirill Müller, and Davis Vaughan. 2023. *Dplyr: A Grammar of Data Manipulation*. https://CRAN.R-project.org/package=dplyr.

Wickham, Hadley, Jim Hester, and Jennifer Bryan. 2023. *Readr: Read Rectangular Text Data*. https://CRAN.R-project.org/package=readr.

Xie, Yihui. 2014. "Knitr: A Comprehensive Tool for Reproducible Research in R." In *Implementing Reproducible Computational Research*, edited by Victoria Stodden, Friedrich Leisch, and Roger D. Peng. Chapman; Hall/CRC. http://www.crcpress.com/product/isbn/9781466561595.