Service Call Request Analysis from Sanding and Salting, Debris, Pot-Hole, and Noise Complaints based on Ward

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Abstract:

The following paper seeks to present how the relationship between the highest number of service calls from road sanding and salting, debris, pot-holes, and noise levels are related to one another based on the ward. After conducting an analysis using R, it was found that the number of service calls from each of these instances are not correlated to one another based on the ward but provide relative patterns such as areas with low service requests. This study was done by using relevant R packages to graph the service call requests and data was taken from the road sanding, debris, pot-holes, and noise levels for 2019. This is important as finding some correlations based on the ward would provide insight as to which wards are not ideal for individuals to relocate to. The results revealed that East-York residents had the most service calls for sanding and salting, Eglinton-Lawrence for the clean-up of debris, St. Paul's for road pot-holes, and Rosedale for noise complaints. Residents residing in these areas may be at high-risk for health and safety effects based on high levels of service request calls.

Introduction

A call to 311 goes to the North American municipal hotline to handle non-emergency service requests [1]. This acts as the first point of contact with the city services and is the largest service of its kind which runs 24/7 [1]. The city keeps track of these calls and documents them as complaints and provides this as public information. The present study seeks to analyze these service call requests by region and focuses on the dataset taken from the Toronto Open Data Portal. With this study, individuals seeking to relocate to different areas of Toronto gain a deeper understanding of which regions provide the highest and lowest amount of service calls and can compare this with the different types of calls.

The Dataset

The dataset was taken from the Toronto Open Data Portal and consisted of service calls based on 25 wards that are all found in the city of Toronto [2]. The dataset was downloaded using the opendatatoronto package and provides Torontonians access to this information on a regular basis.

The dataset was taken for the year 2019 and contains 6 variables that include the complaint status (closed, canceled, or in progress), the Ward for the complaint, and service request types (ie. noise) [2]. Tables 1-4 presents summary statistics for the service request types of road sand and salting, debris, pot-holes, and noise levels respectively. The statistics include averages, maximum value, and minimum value and are found in the appendix.

Discussion

The first graph (Figure 1.) displays the total service calls for road sanding and salting and shows the Beaches - East York ward as having the highest number of calls. Table 1 presents the statistics of this particular service call and includes the minimum (33), maximum (171), and average (97.76). It should be noted that wards with the highest number of service calls are also due to a high population density in those areas. Given this, future datasets should display population sizes with the ward in order to provide a more accurate depiction.

Figures 2-4 present the wards with the highest total service calls for debris, road pot-holes and noise complaints as Eglinton-Lawrence, Toronto St. Paul, and Rosedale respectively. These are accompanied by Tables 2-4 that present the respective statistics for the figures given in the same order (Table 2 presents the statistics for Figure 2, etc.). With information such as the maximum, minimum, and average, individuals get a sense of which wards have high service requests in which regions of the city. Scarborough-Rouge Park, for example, presents the lowest service calls for pot-holes. This pattern can be noted for the other service requests such as noise level and Debris where the service call levels are low compared to other areas. Given this information, individuals may look to relocate more towards the east end due to fewer environmental problems. Overall, these results provide a rough idea as to how each region of the city presents setbacks based on the given call rates.

Ethical Issues

A number of ethical issues can be obtained from this dataset and the overall study. One of the first issues is informed consent [4]. This study did not take into account one of the main focuses on ethical research which is to obtain the person's consent prior to taking their information

regarding a service call request. Fouka and colleagues describe informed consent as one of the major issues when conducting research and define it as an individual's right to autonomy [3]. The service calls made to the city ensure anonymity when documenting the service calls and thus, ensure this issue is addressed. Another ethical dilemma is privacy [5]. An invasion of privacy happens when beliefs, attitudes, or opinions are recorded and shared with others [4]. The present study does not show any signs of privacy invasion as the requests are anonymous and the caller's personal information is not recorded.

Separate issues such as beneficence and vulnerability for different groups of people also do not apply. This is since the research is more quantitative and does not provide any harm to participants and also does not discriminate based on race or ethnicity. One area in this research that may lack ethics is the approval of a community. The research presented did not gain community-wide approval prior to the data being collected which may bring issues as to why the data is collected [5].

Weaknesses

The dataset presented weaknesses that came from different biases. The research presents areas of selection bias as proper randomization is not achieved. For future studies, the research could extract results from the same number of individuals in each ward to determine which service call issues are more prevalent than others. Another weakness is the measurement bias presented in the dataset. Some of the wards with a high number of service requests have larger populations, therefore skewing results to that specific ward. One way this could be avoided is to take ratios, for instance, denoting the number of service calls compared to the population size of the ward.

Conclusion

The study aimed to present a correlation between service call requests for road sanding and salting, debris, pot-holes, and noise levels based on the ward. A service call dataset was taken from Toronto's Open Data Portal and graphed based on the four factors and was found that there were no direct correlations based on the Ward but a few relationships. With this study, individuals can seek to correlate which regions of Toronto have the highest number of service call requests and the likelihood that these regions face safety risks.

References

[1] Ponn, K. (2017). Correlational Analysis between Weather and 311 Service Request Volume. Retrieved February 9, 2020, from http://eil.mie.utoronto.ca/wp-content/uploads/2015/06/311-Toronto-Analysis-2may2017.pdf

[2] City of Toronto. (2019). About 311 Service Requests - Customer Initiated. Retrieved February 9, 2020, from https://open.toronto.ca/dataset/311-service-requests-customer-initiated/

[3] Fouka, G., & Mantzorou, M. (2011). What are the major ethical issues in conducting research? Is there a conflict between the research ethics and the nature of nursing?. *Health science journal*, *5*(1), 3.

[4] Melchin, K. R., & Monette, P. (2001). Action research on ethical deliberation. *Ethical Deliberation in Multiprofessional Health Care Teams*, 171.

[5] Ryen, A. (2004). Ethical issues. *Qualitative research practice*, 230-247.

[6] Hoque, Z., & Rana, T. (2018). Dealing with human ethical issues in research: Some advice.

Appendix

Table 1. Road Sanding and Salting Service Request

```
number_of_road_sanding_salting_calls
Min.   : 33.00
1st Qu.: 63.00
Median : 93.00
Mean   : 97.76
3rd Qu.:132.00
Max.   :171.00
```

Table 2. Road Cleaning Debris Service Request

```
number_of_road_cleaning_debris_calls
Min.   :124.0
1st Qu.:190.0
Median :252.0
Mean   :272.1
3rd Qu.:365.0
Max.   :448.0
```

Table 3. Road Pot-holes Service Request

```
number_of_road_pot_hole_calls
Min.   : 236
1st Qu.: 468
Median : 691
Mean   : 726
3rd Qu.: 924
Max.   :1638
```

Table 4. Noise Service Request

```
number_of_noise_calls
Min.   :153.0
1st Qu.:247.0
Median :329.0
Mean   :444.8
3rd Qu.:592.0
Max.   :932.0
```

The Code

```
---
  title: "Problem set 2 codes"
author: "Jie Huang"
date: "08/02/2020"
output: html_document
---

  {r setup, include=FALSE}
knitr::opts_chunk$set(echo = TRUE)

library(tidyverse)
library(janitor)
library(tidyr)
library(lubridate)
library(visdat)
library(dplyr)
library(ggrepel)
library(skimr)
library(stringr)
library(ggplot2)
library(opendatatoronto)

service_packages <- search_packages("Service Requests")

service_requests_files<- service_packages %>%
  filter(title == "311 Service Requests - Customer Initiated")

service_calls2019 <- service_requests_files %>%
  list_package_resources() %>%
  filter(name == "311-service-requests-2019") %>%
  get_resource()

service_calls2019 <- service_calls2019$SR2019.csv

head(service_calls2019)

unique(service_calls2019$Ward)
```

```
#Bar graph for road pot hole service request
{r ward_count, echo=TRUE}
road_pot_hole2019 <- service_calls2019  %>%
  filter(Service.Request.Type %in% c("Road - Pot hole"))
road_pot_hole2019  %>% select(Ward)
ward_calls_count <- road_pot_hole2019 %>%
  group_by(Ward) %>%
  summarise(number_of_calls = n())
ward_calls_count
ggplot(ward_calls_count, aes(x = Ward, y = number_of_calls)) +
  geom_col() +
  labs(title = "Total Service Calls For Road Pot Hole In 2019 By Ward",
       x = "Ward",
       y = "Number of Calls") +
  coord_flip()

#data summary for road pot hole service requests
summary(ward_calls_count)

#Bar graph for road cleaning debris request
{r ward_count, echo=TRUE}
road_cleaning_debris2019 <- service_calls2019  %>%
  filter(Service.Request.Type %in% c("Road - Cleaning/Debris"))
road_cleaning_debris2019  %>% select(Ward)
ward_calls_count <- road_cleaning_debris2019 %>%
  group_by(Ward) %>%
  summarise(number_of_calls = n())
ward_calls_count
ggplot(ward_calls_count, aes(x = Ward, y = number_of_calls)) +
  geom_col() +
  labs(title = "Total Service Calls For Road Cleaning Debris In 2019 By Ward",
       x = "Ward",
       y = "Number of Calls") +
  coord_flip()

#data summary for cleaning debris service requests
summary(ward_calls_count)

#Bar graph for road sanding and salting request
{r ward_count, echo=TRUE}
sanding_salting_2019 <- service_calls2019  %>%
  filter(Service.Request.Type %in% c("Road - Sanding / Salting Required"))
sanding_salting_2019  %>% select(Ward)
ward_calls_count <- sanding_salting_2019 %>%
  group_by(Ward) %>%
  summarise(number_of_calls = n())
ward_calls_count
ggplot(ward_calls_count, aes(x = Ward, y = number_of_calls)) +
  geom_col() +
  labs(title = "Total Service Calls For Road Sanding and Salting In 2019 By Ward",
       x = "Ward",
       y = "Number of Calls") +
  coord_flip()

#data summary for road sanding and salting service requests
summary(ward_calls_count)
```

Figure 1.

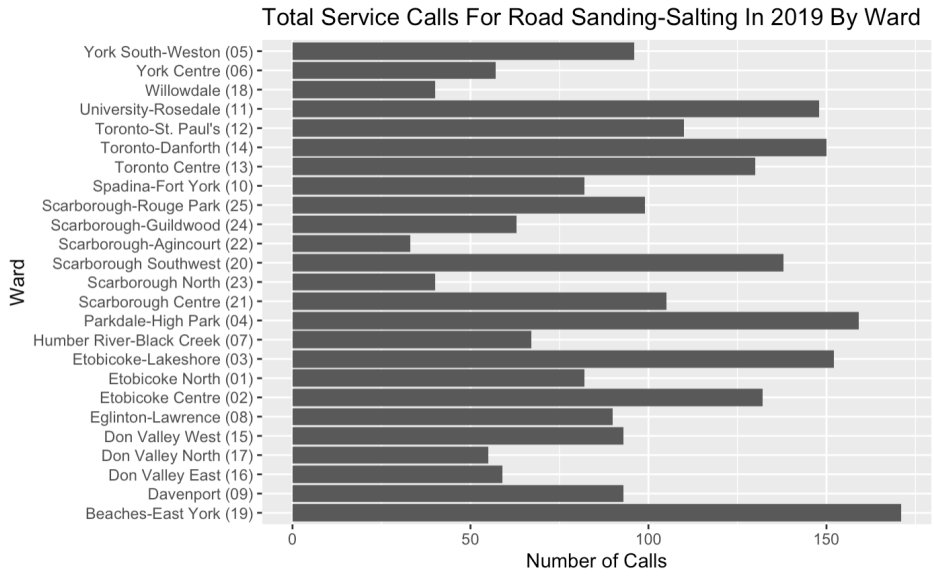

Figure 2.

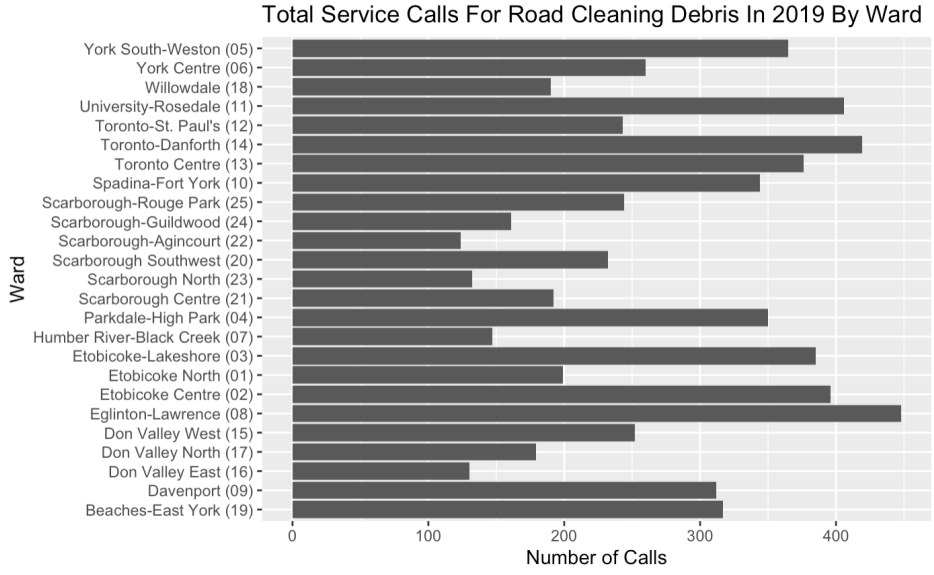

Figure 3.

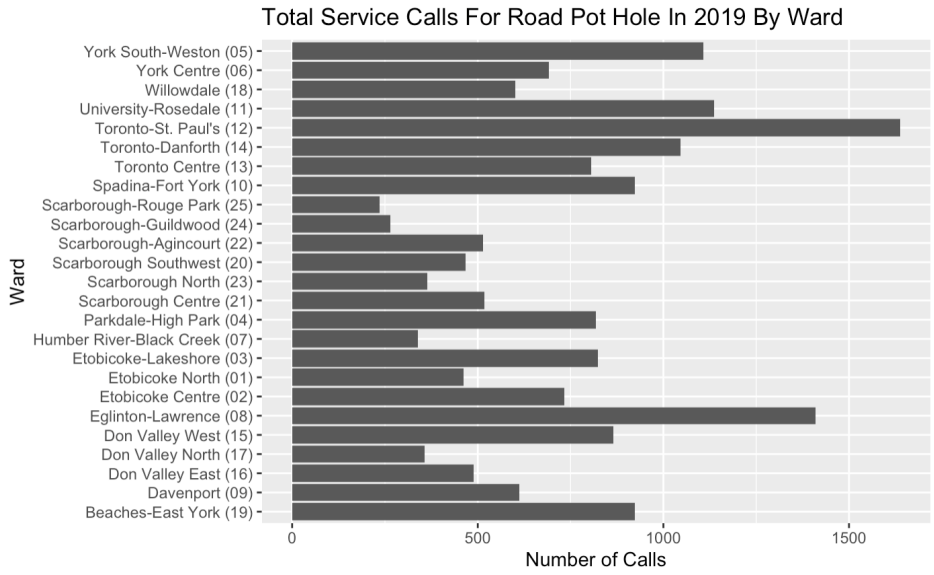

Figure 4.