

# Bias in 311 Response

ECO395M: Data Mining

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## Abstract

Abstract goes here. See Appendix D for some misc ramblings and thoughts.

**Keywords:** 311 Complaint, City governance, Classification, Bias

## Introduction

Many cities use 311 systems to capture non-emergency complaints of their citizens in real time ([“About 311, our mission.” 2021](#)). These cities include Austin, New York, Kansas City, Washington, DC, and more. In parallel, access to these data are often granted to the public via open data portals. These portals allow access to many types of city metrics, including: traffic, 311, city governance, and transit. This data availability has led to many governance decisions. For example, the New York City Fire Department (FDNY) uses a tool called FireCast 3.0 to analyze three years’ worth of data for every building in the city and assign a fire risk score.<sup>1</sup> Data availability combined with smart governance allows a city department to be more effective in their response.

However, some instances of city department response may be prone to bias. Bias can also exist in the ways that residents make use of city services, in addition to bias of response to them. Here, I ask who is asking for help from their city government? I make use of 311 data, publicly available from Kansas City’s (KC) OpenData portal, in conjunction with results from a citizen satisfaction survey administered by the Kansas City Office of Performance Management (OPM) to explore potential bias in 311 reporting ([“311 call center service requests” 2021](#); [“Citizen and business satisfaction survey results.” 2021](#)).

The use of the citizen satisfaction survey, administered quarterly, provides depth to the 311 data, allowing me to estimate likelihood of 311 contact from demographic and socioeconomic characteristics as well as

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<sup>1</sup><https://www.nfpa.org/-/media/Files/News-and-Research/Resources/Research-Foundation/Current-projects/Smart-FF/SmartFFNFPAJournalDataDriven.ashx>

political engagement and overall citizen satisfaction. The survey is a stratified sample across city council districts based on a balanced population against census demographics.

Following [Kontokosta and Hong \(2018\)](#), I hypothesize that increased citizen satisfaction and political participation is associated with increased likelihood for 311 usage. This paper is organized as follows: section two describes the data sources and estimation methodology, section three presents the results, and section four concludes.

## Data and Methods

I integrate numerous datasets, described in Table 1, to pursue the research question of whether there is bias in 311 usage. OPM graciously provided me with the data for the citizen satisfaction survey. This survey samples “are stratified across the city council districts based on a statistically significant random sample of the balanced population against census demographics, and responses are collected via mail, phone, and webpage” (“[Citizen and business satisfaction survey results.](#)” 2021). The 311 reports and property violations data capture local disparities in 311 calls and outcomes. Figure 3 illustrates the 311 service request process.

Dataset	Records	Time range	Temporal Resolution	Spatial Resolution	Source and Description
Citizen satisfaction survey	12,644	2014-2017	Quarterly	Individual (household)	Citizen survey on level of satisfaction with city services, use of city services, and household characteristics each fiscal year provided by Kansas City (Missouri)
311 service requests	380,687	2013-2017	Daily	GPS (X, Y)	All citizen service requests and non-emergency complaints, provided by KC 311 through OpenData KC
Property violations	410,460	2015-2018	Daily	GPS (X, Y)	Neighborhood code enforcement violations issued by the KC Neighborhood and Housing Service (NHS), provided by KC NHS through OpenData KC
Census population	240	2010	Annual	Neighborhood	KC Census population in 2010, U.S. Decennial Census and American Community Survey

Table 1: Description of dataset used

Figure 1 illustrates the spatial patterns of 311 call and response. According to the survey, 47% have reported using 311 at least once. In 2016, 103,955 complaints were reported. Of the total reported, 54% (55,743) were related to code enforcement, which is handled by the Neighborhoods and Housing Services Department (NHS). The NHS provides inspections and will close the case unless an inspection is found. Of the cases given the NHS, 22% (12,411) ended up with served violations. A single 311 call that is routed to the NHS can yield many violations. These 12,411 calls that yielded violations, resulted in 71,356 separate violations.

The location of these vary wildly over the city.

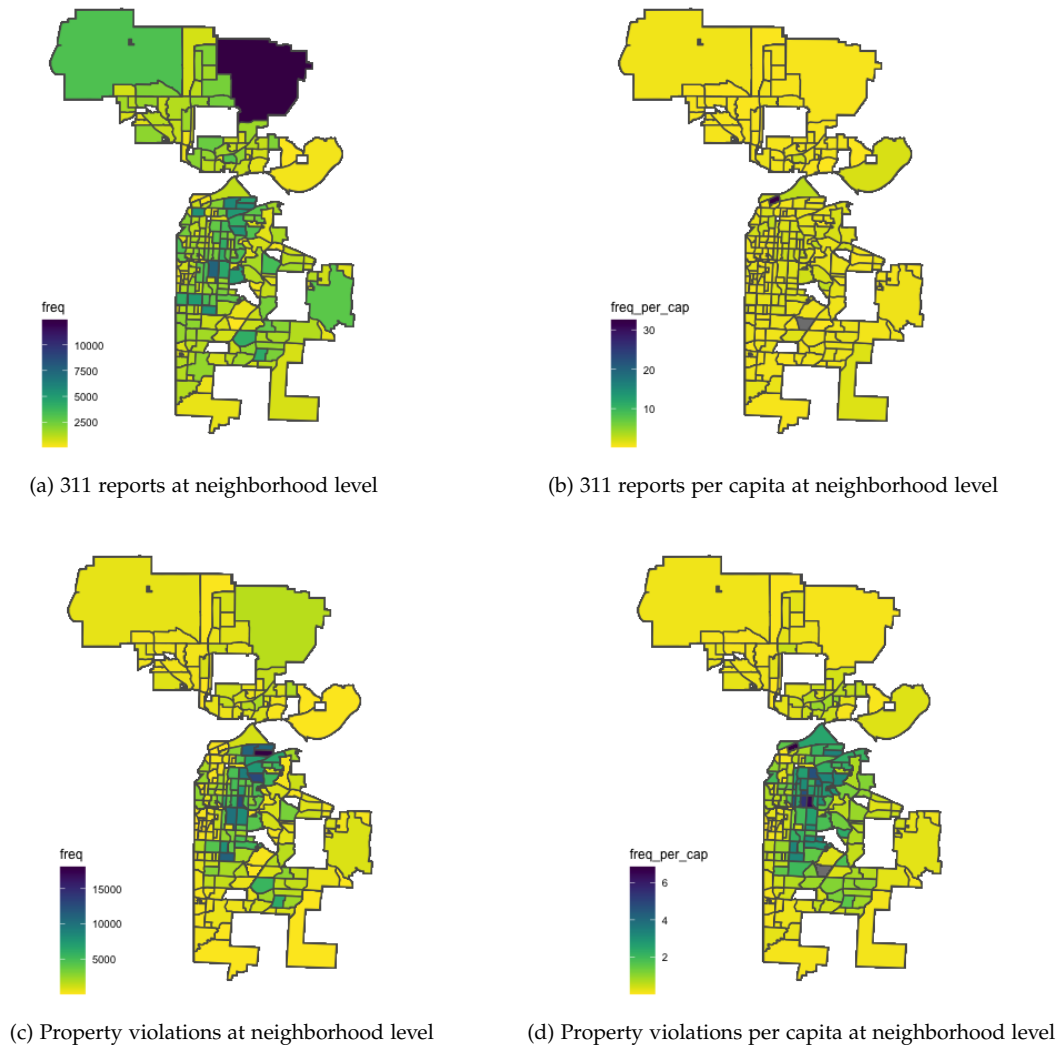


Figure 1: Spatial patterns of 311 reports and property violations

The survey data provides insight on the demographics of households that have and have *not* contacted 311. Since the survey data is random sample across neighborhoods, there should be no disparity due to individual level factors. The survey is split on a single question:

*“Have you or anyone in your household contacted City’s 311 Call Center in the past year?”*

I then use relevant characteristics from the survey to predict the likelihood of 311 usage. To predict the likelihood of 311 usage, I develop two models: a logistic regression and a random forest model. The dependent variable is the binary response to above question:

- 0 (311 User) : Respondent has used 311

- 1 (311 Non-User): Respondent has not used 311

The coefficients used, and their categories/type are in Table 2.

## Results

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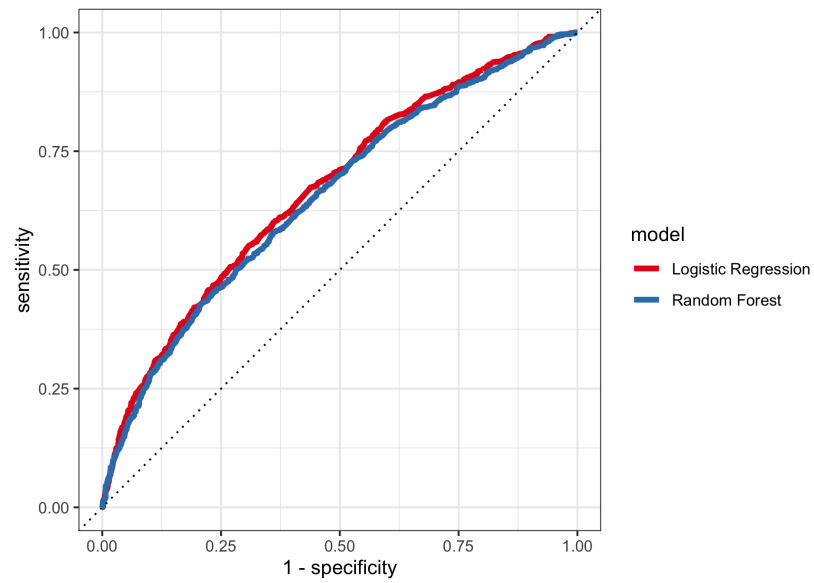


Figure 2: ROC (Receiver Operating Characteristics) Curve of the logistic regression and random forest model

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## Conclusion

Category	Variable	Questionnaire
Demographic/socioeconomic characteristics	Gender	Gender (Categorical)
	Age	What is your age (Categorical)
	Income	Total annual household income (Categorical)
	Race/Ethnicity 1	Describe your race ethnicity (Categorical)
	Race/Ethnicity 2	Are you Hispanic Latino Spanish (Categorical)
	Home ownership	Own or rent current residence (Categorical)
	Internet access	Have access to Internet at home (Categorical)
	Recycling	How often use curbside recycling (Categorical)
Civic engagement	City website	Visited city's website (Categorical)
	Community center	Visited KCMO community center (Categorical)
	Park	Visited any parks in KCMO (Categorical)
Citizen satisfaction	Neighborhood service	Quality of neighborhood service (Ordinal)
	Quality of life	Quality of life in the city (Ordinal)
	Safety	Feeling of safety in the city (Ordinal)

Table 2: Input variables

Table 3: Results of the logistic regression model for 311 use

Term	Estimate
(Intercept)	-1.376
female	0.091
age_18_24	-0.786
age_25_34	-0.509
age_35_44	0.049
age_45_54	0.000
age_55_65	0.091
age_over65	-0.070
income_under30	0.096
income_30_59	-0.126
income_60_99	-0.260
income_over100	-0.587
asian_pac_isl	-0.497
white	-0.058
amer_ind_esk	-0.080
black	0.352
race_other	0.198
hispanic	-0.016
own_prop	0.365
rent_prop	-0.014
internet_access	-0.054
recycle_freq_weekly	0.820
recycle_freq_biweekly	0.655
recycle_freq_monthly	0.592
recycle_freq_never	0.430
visit_city_website	0.776
visit_comm_center	0.237
visit_park	0.296

## References

- “311 call center service requests: 2007 - march 2021,” (<http://www.kcmo.org/CKCMO/Depts/CityManagersOffice/The3-1-1ActionCenter/index.htm>, 2021).
- “About 311, our mission.” (<http://www1.nyc.gov/311/our-mission.page>, 2021).
- “Citizen and business satisfaction survey results.” (<https://dashboards.mysidewalk.com/kansas-city-mo-citizen-survey>, 2021).
- Kontokosta, Constantine E, and Hong, Boyeong, “Who calls for help?” (2018) (Bloomberg Data for Good Exchange Conference).

## Appendices

### Appendix A – 311 Request Process

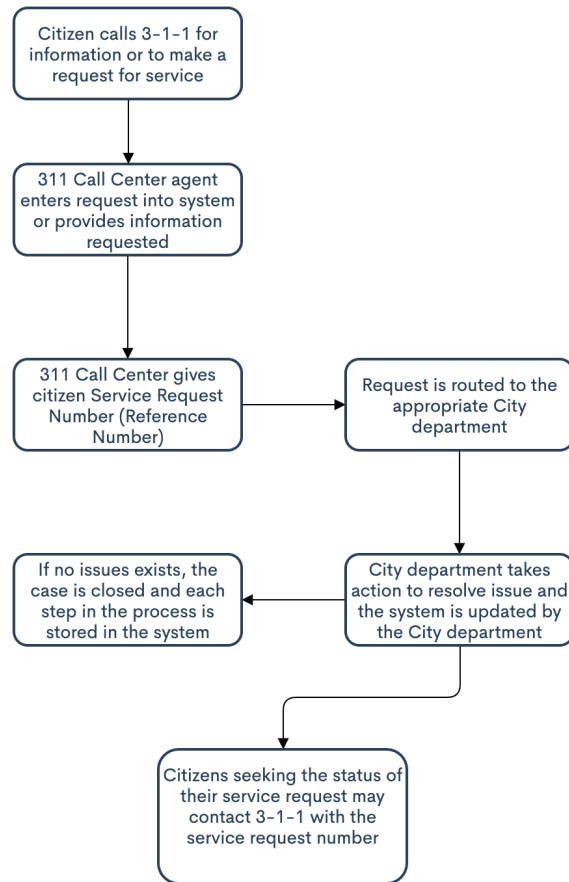


Figure 3: 311 Service Request Process

### Appendix B – Session Information

(Not run)