

Analysis of the San Francisco TOLE Program

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Background on Dataset

General information and Data Collection

The Transit-Only Lane Enforcement (TOLE) is run by the San Francisco Municipal Transportation Agency (SFMTA) from March 2008 to February 2015 as a pilot program to reduce obstruction of transit-only lanes through increased enforcement. Currently, private and commercial vehicles that drive and park in transit-only lanes can cause delays in bus service, increase traffic jams, and inconveniencing customers.

Under the TOLE program, all public buses are equipped with video cameras to capture the license plates of vehicles parked or stopped in a dedicated transit-lane. The vehicle's registered owner will then receive the citation in the mail in an attempt to deter future transit-only lane violations. These citations and their details form the dataset we are examining. The data were obtained from the US government's open data site at <https://catalog.data.gov/dataset/muni-driver-reported-transit-only-lane-violations>.

San Francisco currently operates 26 miles transit-only lanes with 160,000 daily passengers and planned future expansion of 22 miles, so the TOLE program has strong potential for long-term impact by increasing the efficiency of the municipal transit system and potentially increasing municipal revenue temporarily as drivers adjust to the enforcement scheme.

Background on dataset

The unit of observation was an individual citation for a transit-only lane violation reported by municipal drivers under the TOLE program, and the raw dataset contains the following variables regarding the transit-only lane violations:

- **Object.ID** – Unique key that corresponds to each observation
- **Ticket.Number** – Unique number that corresponds to each ticket catalogued with the Superior Court of San Francisco
- **Citation.Issue.Date** – The date (MM/DD/YY) that the traffic only lane violation citation was issued
- **Citation.Issue.Month** – The month (MM) that the traffic only lane violation citation was issued; This column was completely blank when downloaded
- **Citation.Issue.Time** – The time of day (HH:MM) PST that the traffic only lane violation citation was issued
- **Location** – The street address where the traffic only lane violation citation was issued
- **Violation.Code** – A code that corresponds to the type of traffic only lane violation that was committed to warrant issuing a citation
- **Violations** – Description of the traffic only lane violation issued in the citation
- **Fine.Amount** – The dollar amount of to be paid for the traffic only lane violation
- **Citation.Status** – Status of the citation (Open, Closed, Unapplied)
- **Amount.Paid** – The dollar amount paid for the traffic only lane violation
- **Amount.Due** – Outstanding balance for the traffic only lane violation
- **Suspend.Code** – Code that represents reason for license suspension (Suspended until the driver goes to driving school, pays fine, too many points on license, etc.)
- **Suspend.Process.Date** – Date the license suspension goes into effect
- **Suspend.Until.Date** – Date the license suspension is over
- **Disposition.Code** – The city of San Francisco does not release disposition codes

- **Last.Edited.Date** – Date that represents the last date the corresponding observation was edited; This column was completely blank when downloaded
- **Geom** – The latitude and longitude (latitutde, longitude) of the traffic only lane violation

Limitations of Dataset and Data Cleaning

The limitations of the data include the timing of the implementation of the video camera citation system. While SFMTA claims 100% of their buses are equiped with cameras, they fail to indicate if the 100% implementation was at the start or end of the program. We believe there was a trial period, so we decided to drop variables in 2008 when the program first started because there were only 154 citations issued that year, while typically several thousand citations in the following years. In addition our dataset lacked demographic controls for the regions where citations were issued. This means demographic factors could cause unobserved biases in our data. While out of the scope of this initial analysis, future analysis can map the **Geom** variables in the dataset to census tracts to derive demographic information.

Some observations were missing key data. We decided to drop all oberssations with no **Geom** data, so that future geospatial and demographic analysis could be done (12 observations). We dropped all observations where **Citation.Status** was not specifiied or “unapplied”, as we determined “unapplied” was out of the scope of this project (84 observations). We dropped **Violations** where the listed violation was determined to be “No Violation” (1 observation) or occured less than or equal to 70 times (77 observations). We also dropped citations in the year 2015 to avoid biases in monthly and yearly analysis because only 2 months were included for 2015.

Overall, we dropped 374 of the original 17,178 observations in the dataset. This only accounts for 2.18 percent of the dataset. Thus, we are confident that we did not introduce any inherent biases to the data by dropping the aforementioned observations.

- * This led to 78 observation being dropped
- * It is worth noting that only 1 violation was deemed not to be a violation
 - Basically what’s wrong and how we got around that by cleaning data
 - Introduce new variables we created

Prior Exeternal Analysis Related to Content of Dataset

- information from “Description_of_TOLE_Program.pdf”
- inforamtion from bill Jack mentioned about EDA

Background Research & Broad Questions

- Research on program from “Description_of_TOLE_Program.pdf”
- Introduce 3 “Broad Questions”

EDA & SMART Question

- Show EDA
- Show refinement into SMART Questions

Answering the SMART Question

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NOTES:

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TO-DO:

- CITATIONS!!!!!!!!!!!!!!!!!!!!!!
- add summary stats/dimensions to the background of the dataset
- Bill introduced in 2007, reevaluated in 2011, made permanent in 2015