

New York City Parking

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Background Information

- Revenue for a local government is important to keep that government running
- Around 22.6%, second biggest portion, of a governments income comes from fines and fees, which parking tickets is a part of
- NYC made \$993 million off parking fines from fiscal year 2012 to 2016
- How does understanding the data help?

Problem

- How to increase the revenue of NYC parking tickets
- Which tickets could increase the revenue generated by NYC
- Are there safety issues on street that are getting more tickets issued
- Does weather and temperature play a role in the number of tickets issued

Methodology

- Using a Spark cluster to analyze data
- Load in data sets into data frame
- Analyze columns in data to understand what is needed and what can be dropped
- With temperature convert all the Kelvin readings to Fahrenheit
- In the weather and temperature data frame drop all data except for date and data about New York
- Filter out unwanted dates and null values for weather and temperature

Methodology

- Then format date on parking data to match the date format of the weather and temperature creating a data frame with ticket information and weather and temperature columns too
- Start creating csv's to look at details of the data
- Such as top streets tickets were given on, most common weather when a ticket was issued, and most common temperature when a tickets was issued
- Wrote those data frames out to csv files on an HDFS cluster

Methodology

- Take in csv files produced by our spark cluster
- Use python3 and Jupyter notebooks to analyze data
- Asked 12 different questions like how does weather affect tickets?
- Some data required additional data wrangling to get useable output.

Performance Benchmarks

- 'Sky is clear' is most ticketed weather description
- 40 degrees F is most ticketed temperature, with a nice normal distribution across the range of degrees we measured
- Precinct 19 gave out the most tickets
- 3rd ave with parking violation 37 was the most ticked street and most ticketed violation
- The most violations occurred in precinct 19
- 36 was the most given violation

Performance Benchmarks

- NY plates were the most ticketed, followed by NJ
- Cop with id 18 gave out the most tickets (over 4000)
- The most ticketed violation in the most ticketed weather was violation 36 in 'sky is clear'

Insights and Conclusion

- NYC needs to train their law enforcement in better data recording to make further analysis easier
- We can increase fines for speeding in school zones to easily increase revenue by over \$100M a year
- We can also increase parking in no park zones to achieve the same effect.
- The problem space must be closely monitored in the next 10 years as NYC's public transit system is revamped and with the increasing share of autonomous vehicles in traffic.

References

- Coryne, H. (2019, November 29). How People Are Using Our Chicago Parking Ticket Data in Their Research. Retrieved April 29, 2020, from <https://www.propublica.org/article/the-ticket-trap-how-people-are-using-our-chicago-parking-ticket-data>
- Donyoe. (2017, November 6). Exploring 42.3M NYC Parking Tickets. Retrieved April 29, 2020, from <https://www.kaggle.com/donyoe/exploring-42-3m-nyc-parking-tickets>
- Gene, S. (2017, December 28). Historical Hourly Weather Data 2012-2017. Retrieved April 30, 2020, from https://www.kaggle.com/selfishgene/historical-hourly-weather-data#weather_description.csv
- Murphy, M. (2017, May 3). New York City Fine Revenues Update. Retrieved April 29, 2020, from https://comptroller.nyc.gov/reports/new-york-city-fine-revenues-update/#_ednref1
- Shrutimehta. (2018, March 4). Analysis of NYC Parking Tickets. Retrieved April 29, 2020, from <https://www.kaggle.com/shrutimehta/analysis-of-nyc-parking-tickets>
- Tax Policy Center. (n.d.). What are the sources of revenue for local governments? Retrieved April 29, 2020, from <https://www.taxpolicycenter.org/briefing-book/what-are-sources-revenue-local-governments>
- Weatherspark. (n.d.). Average Weather in New York City. Retrieved April 29, 2020, from <https://weatherspark.com/y/23912/Average-Weather-in-New-York-City-New-York-United-States-Year-Round>
- NYC Government. (n.d.) Violation Codes, Fines, Rules & Regulations. Retrieved April 29, 2020, from <https://www1.nyc.gov/site/finance/vehicles/services-violation-codes.page>
- Curbed. (2019, September 16). MTA unveils \$51.5 billion plan to fix New York City's transit system. Retrieved April 29, 2020 from <https://ny.curbed.com/2019/9/16/20869063/mta-capital-plan-nyc-subway-improvements>
- Businesswire. (2019, May 24). Global Autonomous/Driverless Car Market Forecasts to 2024: Semi- Autonomous Vehicles Dominating the Market. Retrieved April 29, 2020 from <https://www.businesswire.com/news/home/20190524005297/en/Global-AutonomousDriverless-Car-Market-Forecasts-2024-Semi-Autonomous>