Analysis of Toronto Parking Tickets

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Overview:

- Used Jupyter Notebooks to analyze the data – ntb1, ntb2 (some more analysis and visuals on these)
- Used pandas, matplotlib, seaborn, sklearn, holidays packages
- Applied findings to an interactive Power BI dashboard to visualize trends, patterns, and insights effectively.

The problem

The objective

To identify trends in parking ticket data, determine the underlying causes, and provide recommendations to enhance enforcement and increase revenue

Data Overview

- Source: [Toronto Open Data Portal - Parking Tickets](#)
- Time Period: 2017-2020
- Tickets Covered: Approximately 7.8 million tickets

Key Metrics

Total Tickets: 7,806,114
Total Fines: $385.3 million
Top Infraction Types (count):
- Park on Private Property
- Park-Signed HWY-Prohibit DY/TM
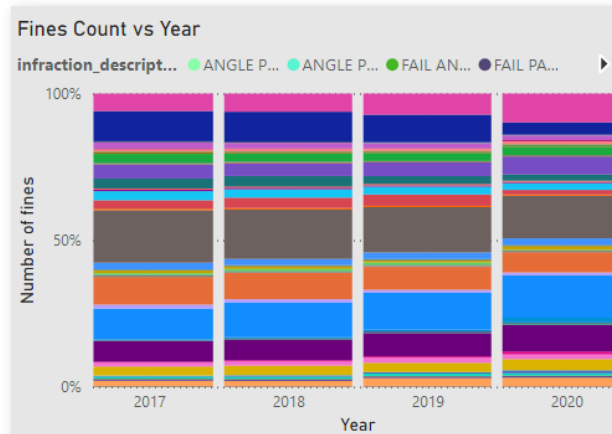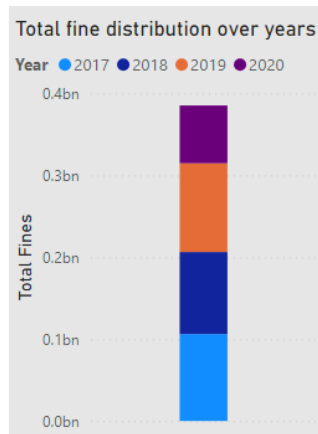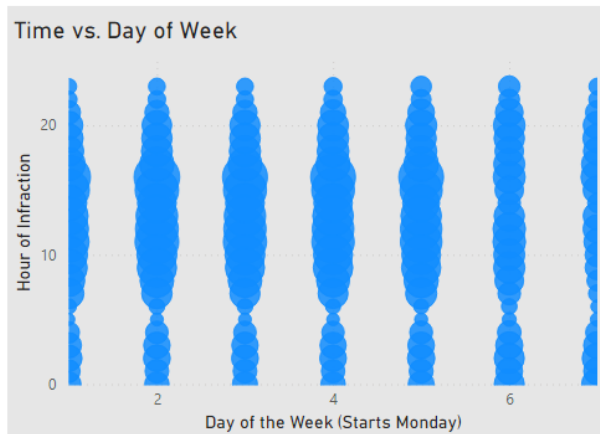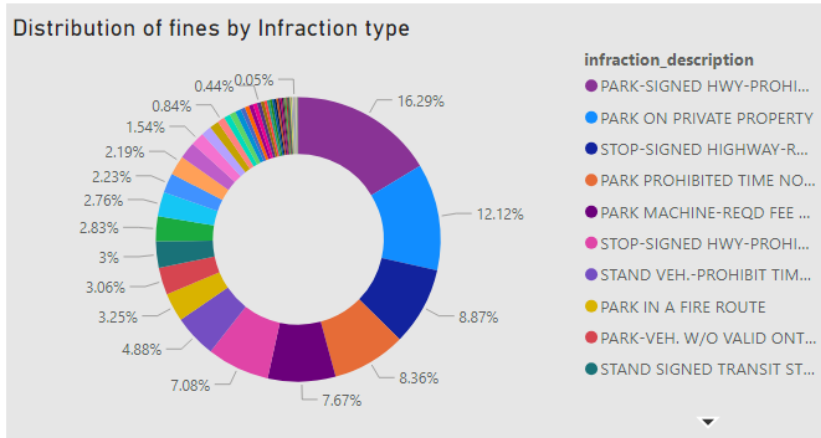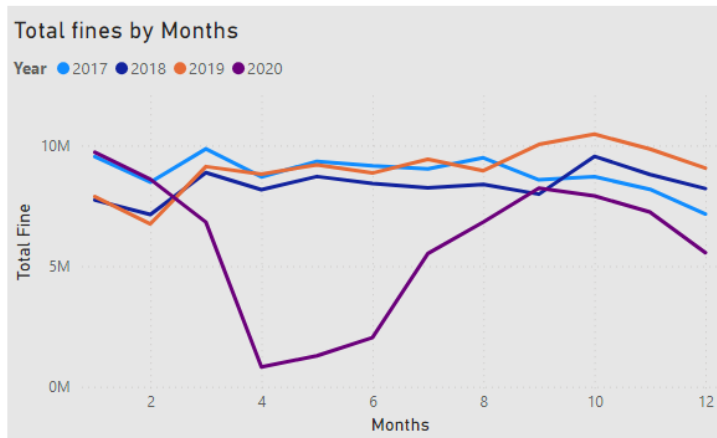- Park Prohibited time no permit

Peak months: Feb, Oct
Most common days: Tue, Wed
Peak times: 11 a.m., 4 p.m.
Highest Revenue Locations:
- 40 orchard view blvd.
- 18 Grenville St.

Some Metrics (Click for PowerBI)

High Level Insights

- There is a seasonal trend end of year having more tickets 2017-2020 (holiday season).
- There exists peak hours for issuing tickets, from 6am - 6pm every weekday (working hours).
- The number of fines varied over the years with no significant pattern except for 2020(can be attributed to COVID19).
- The top infractions are major sources of revenue (more than 50%)
- There are lesser tickets issued on public holidays and weekends (relaxed regulations, less traffic).
- The total sum of fines has been roughly the same, there has been no account of inflation.

Recommendations

- **Targeted enforcement in hot zones -** Using **Decision Tree and Random Forest models,** it was found that the time of day and specific locations are crucial factors.
- **Introduce dynamic parking** - Higher parking rates and tickets during peak times, and reduced rates during off peak time.
- **Smart Parking System** - The parking meter clearly showcases when it is illegal to park in the zone and uses new technology to check for illegal parking and notifies the officers in real time.
- **Collaborate with private property owners** - Since a lot of parking violations came from private property parking.
- In general, the ticketing costs should be increased to match the **inflation**.

Further possible analysis

- **Geospatial Analysis** - Personal Machines don't have much power to map the tickets fast, can utilize cloud-based GIS services.
- **Regression Analysis** - Forecasting the yearly total fines and trends.
- **Principal Component Analysis** - To filter the features that cause highest variability.
- **K-mean Clustering** - Segment data into meaningful clusters and then analyze the clusters.
- **Anomaly detection** - Check the outliers and trends in those outliers (for example – analyze the province that the cars belong too)
- Reflect on any rule changes that took place over the years