City of Boston: 311 - Animal Reports

Team D

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Introduction

In recent years, urban areas have witnessed a significant increase in interactions between humans and wildlife, leading to a rise in service requests related to animals. The City of Boston, known for its rich history and dense population, is no exception. The Boston 311 service system, which allows residents to report non-emergency issues, has accumulated a wealth of data on such interactions. This report aims to delve into this data, focusing on animal-related requests, to uncover trends, patterns, and areas of concern that could inform policy, urban planning, and community education efforts.

Research Objectives and Key Questions

The primary objective of this research is to analyze the nature and evolution of animal-related 311 service requests in Boston over the last decade. By examining this data, we seek to understand how urban wildlife interactions have changed over time and to identify factors that influence the frequency and type of these interactions. This analysis revolves around the following key questions:

Trend Analysis: How many animal-related reports were there in the previous 2-3 years compared to 5-10 years ago? Are there any positive or negative trends in the volume of these reports, such as a decrease or increase in total numbers?

Common Animals in Complaints: What kinds of animals are most involved in complaints? Are certain types of animals, such as rats, domesticated pets, dogs, or cats, more prevalent in these reports?

Geographical Distribution: From which geographic areas do most complaints originate? Is there a discernible trend in the type of animal complaints by area, suggesting specific wildlife-urban interface issues in different parts of Boston?

Impact of Seasonality: How do other factors, such as season, impact the nature of the complaints? For instance, are there more complaints during the summer or winter, indicating a seasonal pattern to human-animal interactions?

Through answering these questions, the report aims to provide insights into the dynamics of human-animal interactions in an urban setting, highlight areas for potential intervention, and suggest directions for future research.

This report, by elucidating the complex dynamics of animal-related 311 service requests in Boston, serves as a resource for enhancing the city's response strategies to non-emergency animal issues. By identifying trends and patterns in these requests, the findings can guide the Boston 311 system in optimizing resource allocation, prioritizing areas with frequent complaints, and tailoring responses to seasonal variations in service demands. Additionally, understanding the geographical distribution of complaints enables city planners to implement targeted educational campaigns and wildlife management strategies in high-incident areas, potentially reducing future occurrences.

Base Analysis

Data Collection and Processing

Data for this study was sourced from the publicly available Boston 311 service request dataset, which contains records of non-emergency requests and complaints filed by residents of Boston. The dataset spans several years (2011-2024) and includes detailed information on each request, such as the type of complaint, the date and time it was made, the geographic location, and the resolution status.

Data Collection
We started by gathering data from a collection of .csv files, each containing records of 311 service requests from Boston. This step involved identifying all relevant files in a specified directory, ensuring comprehensive coverage of the data available for our analysis. Each file represented a treasure trove of information on various service requests, including those related to animals, spanning several years.

Data Processing
The initial phase of data processing aimed at ensuring data quality. We focused on entries relevant to our study by filtering out records not mentioning animals in their titles. This was crucial for maintaining the focus of our analysis on animal-related issues. Additionally, we addressed missing or incomplete data, particularly in key fields like the title of the request, to maintain the integrity of our dataset.

After cleaning, we merged the data from all files into a single DataFrame. This consolidation was an essential step for creating a unified dataset that allowed for a more streamlined and comprehensive analysis across different time periods.

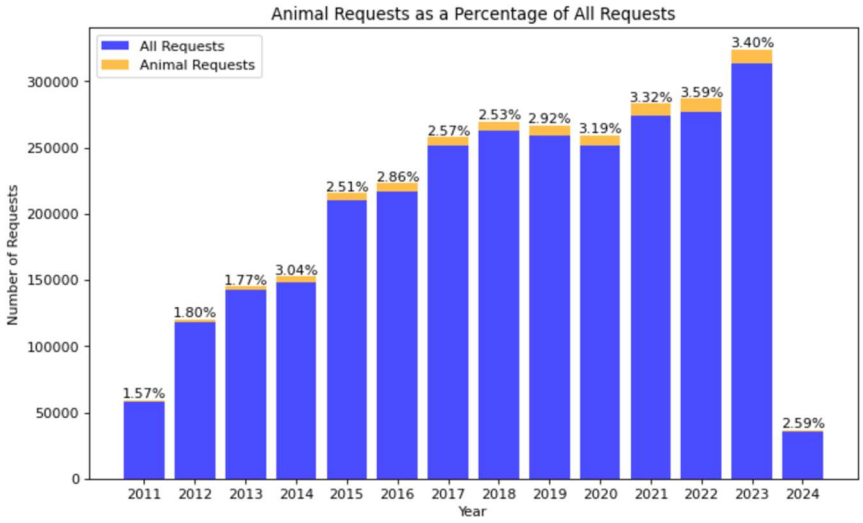
Standardization and Categorization
Given the diverse nature of the dataset, which comprised data generated by humans without a standardized format, we employed advanced Natural Language Processing techniques alongside manual annotation to sift through the *closure_reason* texts. This approach was crucial not only for identifying requests related to animals but also for extracting information about the specific type of animal referenced in each request. Despite being time-consuming, this approach enables us to adeptly manage future requests in the coming years. Following the identification of these mentions, we further enhanced our dataset by categorizing each request according to the type of animal referenced, thereby enriching our data for comprehensive analysis.

Through these steps, we prepared our dataset for analysis, focusing on maintaining clarity and simplicity in our approach. This ensured that we could accurately capture and analyze trends and patterns in animal-related service requests within Boston, laying a solid foundation for insightful conclusions.

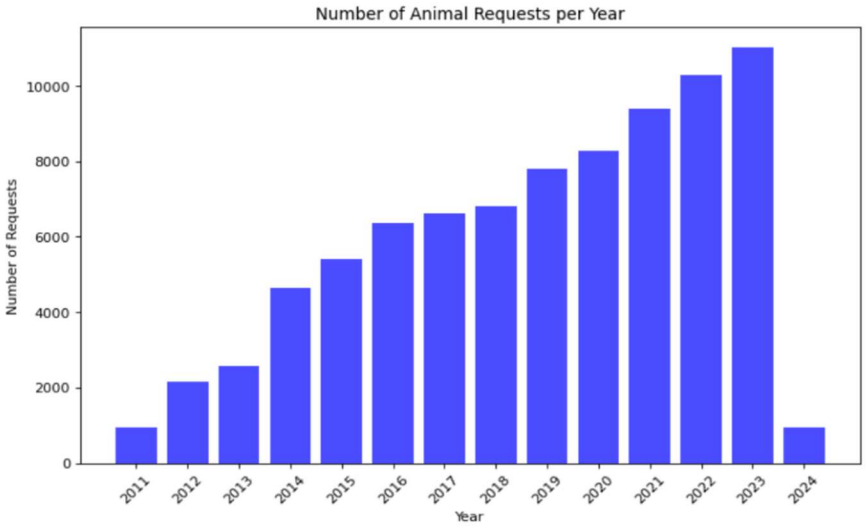
Data Analysis

To address the posed research questions, the data analysis was conducted using a sequence of steps, and the following insights were derived:

1. Analyzing Report Trends Over Years:
Firstly, we organized the service request data by year and created a stacked bar chart to visualize the overall trends. This chart was instrumental in identifying how many reports there were in the year 2011-2024. The increasing height of the bars year-over-year indicated a positive trend in both total requests and animal-related requests. The chart also showed percentages, confirming that animal requests, while fluctuating slightly, constitute a growing proportion of total requests over time.



P2.1 Animal Requests as a Percentage of All Requests per Year



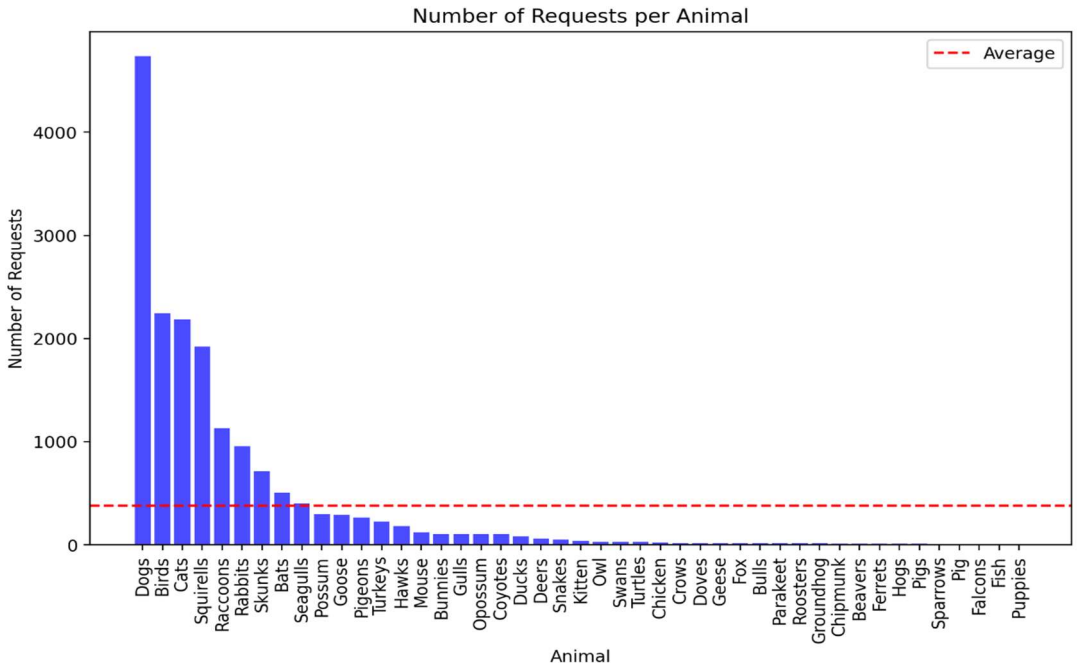
P2.2 Number of Animal Requests per Year

2. Identifying Common Animals in Complaints:
Our analysis started by scrutinizing the *closure_reason* texts from service requests, where employees describe the resolution of cases, often mentioning specific animals.

By employing natural language processing techniques, we tokenized the texts and identified nouns, pinpointing references to animals.

Refining the extracted list, we filtered out infrequent mentions and irrelevant terms, resulting in a distilled dictionary of animals ranked by the frequency of mentions. This approach revealed that dogs, cats, rats, birds, and squirrels were most commonly reported, which aligns with the expected urban wildlife and pet population in Boston.

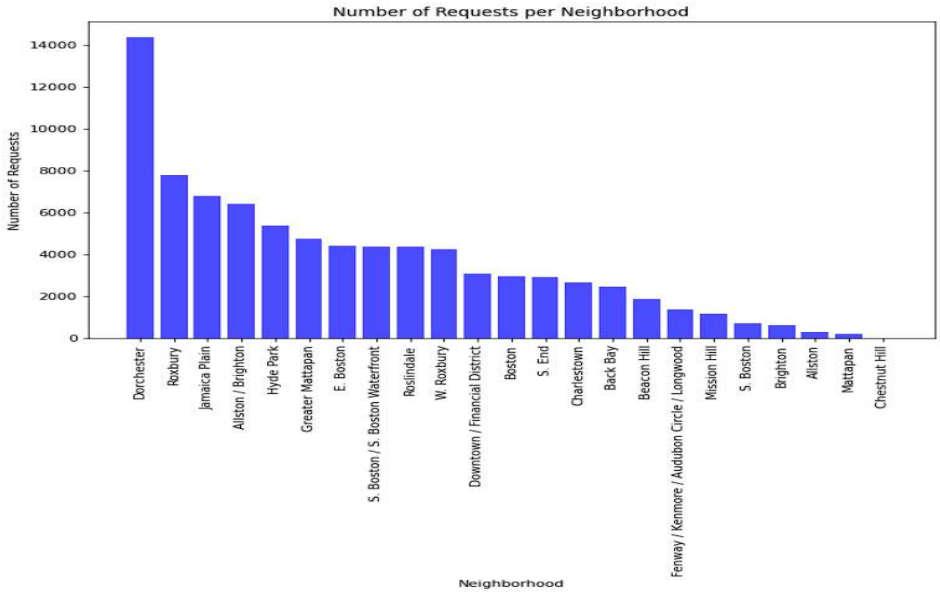
We merged singular and plural animal names to avoid duplication and to ensure accuracy. Our final step involved correlating these refined animal names with the number of related service requests, giving us a clear indication of which animals are most commonly involved in complaints. A bar chart depicted the annual counts, revealing that pets, particularly dogs and cats, along with urban wildlife such as Birds and squirrels, were the most frequently reported. This answered the question regarding which animals were most common in complaints.



P2.3 Number of Requests per Animal

3. Geographical Distribution of Complaints:

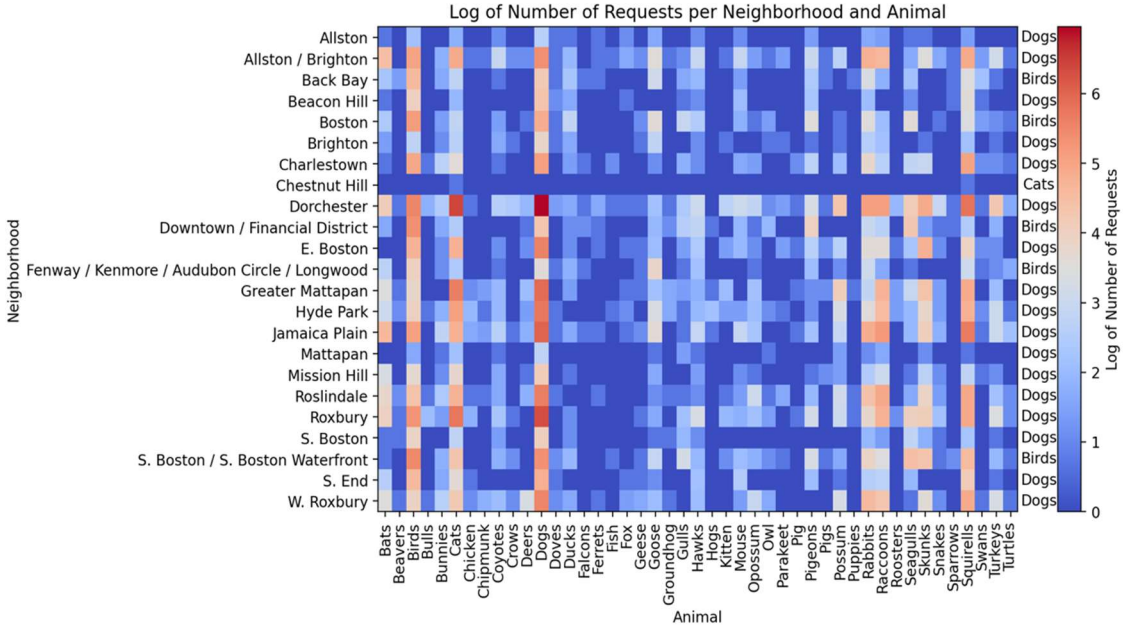
Trying to solve this problem, we took a closer look at the distribution of animal-related requests across different neighborhoods and zip-codes. Initially, we discovered that out of 83,281 requests, 263 did not have any neighborhood assigned. After cleaning the data to remove such instances, we examined the number of requests per neighborhood and presented this data in the following bar chart.



P2.4 Number of Requests per Neighborhood

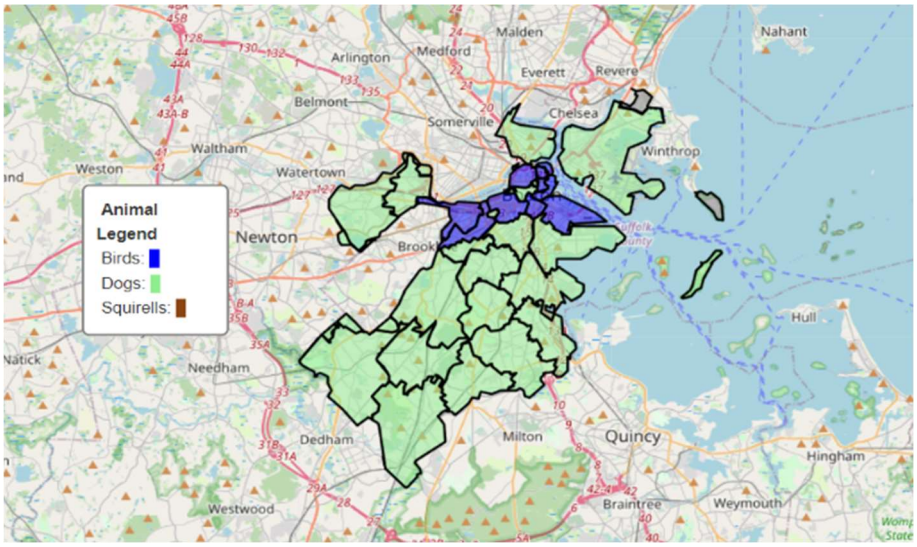
This graph prompted us to naturally question whether the population or other demographic features of each neighborhood influence the number of requests. We delve into this inquiry further in our proposed extension questions.

Moreover, we created a heatmap to visualize the frequency of requests for each type of animal across neighborhoods. To address the wide range of values, we applied a logarithmic scale to the heatmap, which allowed for a clearer representation of the data, especially for less common requests. We then highlighted the most frequently reported animal in each neighborhood by adding a marker on the colored map. This helped us identify patterns, such as certain animals being more prevalent in specific areas. The primary insight gleaned from this heatmap lies in its final column, which explicitly indicates the most requested animal for each neighborhood.

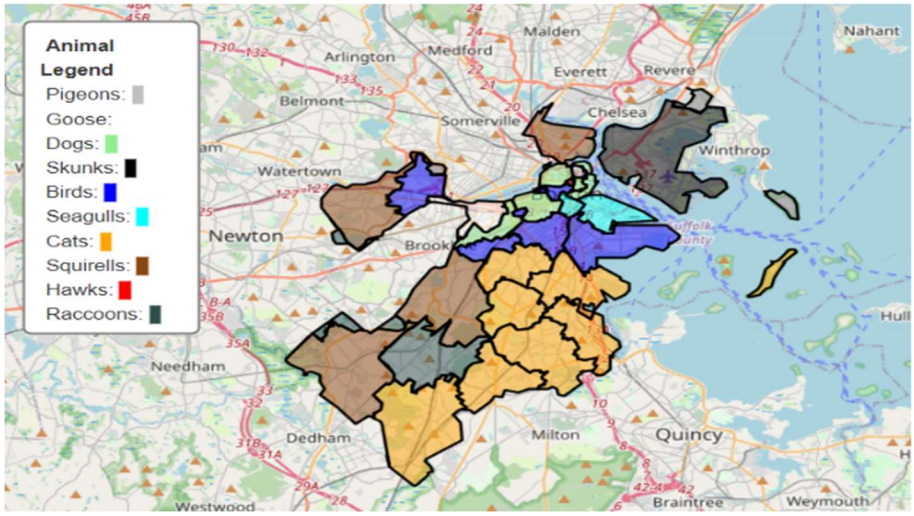


P2.5 Log of Number of Request per Neighborhood and Animal

To enhance the visualization of our findings, we developed interactive maps that allow users to explore various neighborhoods and filter data based on the top requested animal in each area. Below is a preview of the interactive map, showcasing neighborhoods where birds, dogs, and squirrels are the most requested animals, represented by blue, green, and brown markers respectively. Our findings revealed that dogs were the most reported animal in the majority of neighborhoods, with birds being the most common in a few areas like Back Bay, the Downtown/Financial District, and the South Boston Waterfront. This geographical analysis of animal requests helps understand community trends and could be vital for city planning and resource allocation for animal control.



P2.6 Most Common Animals Reported per Zip-code

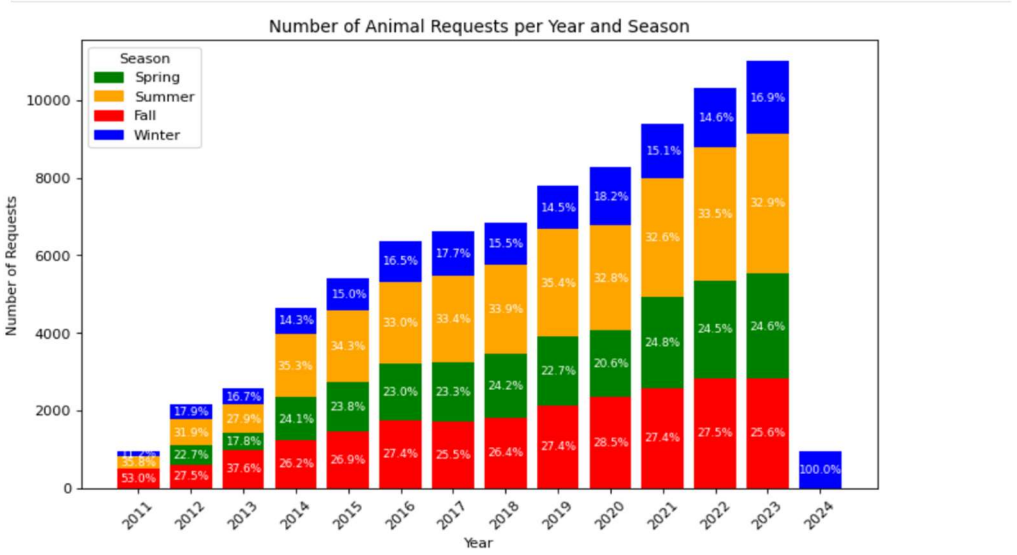


P2.7 Second Most Common Animals Reported per Zip-code

4. Seasonal Impact on Complaints:

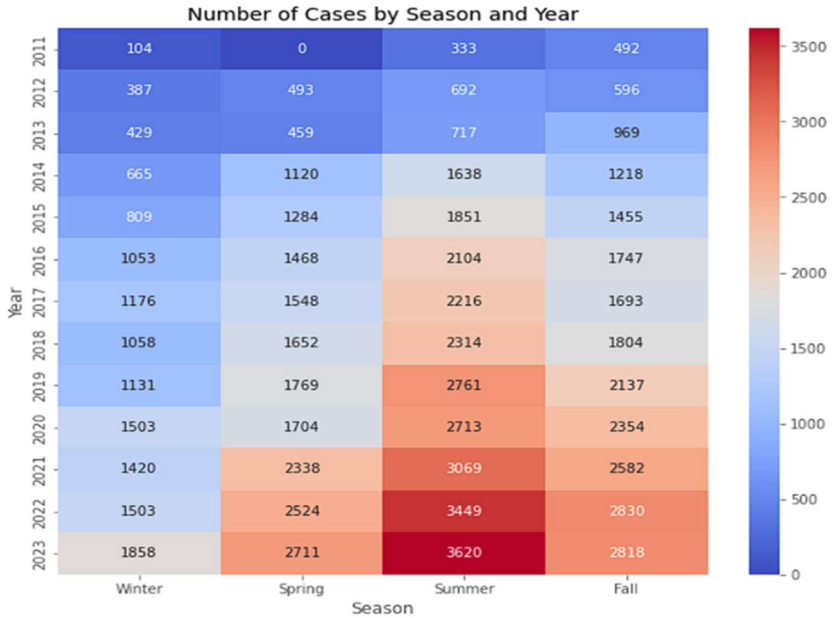
We assessed the impact of seasonality on the nature of the complaints. The dataset was enriched with seasonal information, and a multicolored bar chart for each year displayed how the volume of requests was distributed across the seasons. The dominance of requests in summer months was apparent, suggesting that there are indeed more complaints during warmer seasons, potentially due to increased wildlife activity and human-animal interactions. We do note a slight deviation from this pattern during the onset of the COVID-19 pandemic, wherein the volume of complaints decreased

during the summer months while exhibiting an opposite trend during the winter season.



P2.8 Number of Animal Requests per Year and Season

Below is an enhanced graphical representation known as a heatmap, which employs varying color intensities to visually communicate data values arranged in a grid format. It is constructed by extracting and converting the year and season from a dataset containing timestamped records of events. The number of cases is aggregated by year and season, and these aggregated values are plotted in a matrix where each row signifies a consecutive year and each column corresponds to a specific season. The color intensity within the grid cells reflects the frequency of cases—darker or warmer colors denote higher frequencies, while lighter or cooler colors indicate lower numbers. This method effectively captures temporal trends and seasonal variations in the data, providing a clear visual summary that highlights patterns and anomalies over an extended period, from 2011 to 2023, facilitating a rapid assessment of changes and aiding in predictive analyses and decision-making processes.



P2.9 Number of Animal Requests by Year and Season Heatmap

Conclusion

Trend Analysis: The data shows a notable uptick in requests over time, with a concurrent rise in those pertaining to animals. This could reflect a rise in public awareness and reporting, as well as actual increases in animal activities in these areas.

Common Animals in Complaints: The analysis reveals that requests frequently involve domestic animals, particularly dogs, alongside significant numbers related to urban wildlife such as birds, squirrels, and raccoons. This insight helps us understand the prevalent wildlife and pet-related issues that urban communities face.

Geographical Distribution: Dogs dominate the reports in nearly all neighborhoods, reflecting their widespread presence across various urban environments. In contrast, bird-related complaints are most frequent in densely built areas, emphasizing the adaptation of certain wildlife species to highly urbanized settings. Cats, squirrels, and raccoons also have notable appearances in complaints, suggesting a rich urban biodiversity that requires thoughtful management strategies.

Seasonal Impact: The data indicates a relative increase in complaints during summer and fall, suggesting that the interaction between humans and animals is more pronounced during these seasons. This could be attributed to more active wildlife and increased human outdoor activity, necessitating seasonal adjustments in urban wildlife management strategies.

Extension Analysis

After completing the initial four analyses, we decided to delve further into this dataset. Our group members proposed the following three directions for our extended analysis.

Weather Influence:
Our initial analysis indicated a significant uptick in animal-related complaints during the summer and fall months, suggesting that these periods feature more frequent human-animal interactions. To further explore this phenomenon, we hypothesize that specific weather conditions such as temperature, humidity, and precipitation significantly influence these interactions. Therefore, we plan to integrate comprehensive daily weather data for Boston into our dataset. By correlating weather variables with the frequency of complaints, we aim to identify critical weather patterns that could potentially inform public awareness and preventive measures during high-risk periods.

Demographic Factors:
The consistent annual increase in animal complaint reports observed in our preliminary findings appears to correlate with demographic trends, particularly the population growth in Boston. To delve deeper into this correlation, we will analyze census data and demographic changes across various Boston neighborhoods over several years. Our goal is to determine how shifts in population density, age distribution, and possibly socio-economic factors influence the frequency and types of animal complaints. This analysis will provide insights into whether increased urbanization and population growth directly contribute to the rise in animal-human interactions.

Analysis of Request Timeliness:
We are examining the timeliness of responses to animal complaints by analyzing the resolution times for these service requests. Our focus is on distinguishing between on-time and late resolutions to assess the operational efficiency of city services. This part of the analysis looks at the distribution of resolution times, aiming to uncover patterns or potential inefficiencies in handling these complaints.

The extended analysis of weather and demographic influences could significantly enhance the effectiveness and efficiency of Boston's 311 services. By understanding how weather patterns and demographic changes impact the frequency and nature of animal complaints, the 311 system can improve resource allocation and service delivery. This targeted approach allows for better preparedness during peak complaint periods and more personalized service across diverse neighborhoods, which could lead to higher public satisfaction and more efficient use of city resources.

Furthermore, analyzing the timeliness of responses to these complaints helps pinpoint operational inefficiencies, providing a basis for improvements in workflow and resource management. This not only enhances the responsiveness of the 311 services but also builds trust among residents, as they experience more reliable and timely resolutions to their issues. Together, these insights from the analysis can guide strategic planning and policy development, ultimately improving the overall quality of urban life in Boston.

Weather Influence

Data Preparation

For the data preparation phase of our analysis, we sourced historical weather data spanning the past twenty years from the official National Weather Service website. This dataset includes comprehensive weather metrics, which are crucial for our study to explore the impact of weather conditions on the frequency of animal-related complaints in Boston.

Our team carefully extracted and organized the data into a structured format suitable for analysis. The final dataset includes detailed daily records of weather metrics such as temperature (highs, lows, and averages), precipitation levels, humidity percentages, and wind speeds. Each entry is dated, providing a precise timeline that is essential for correlating weather conditions with the frequency and distribution of animal-related complaints in Boston. This curated dataset offers a comprehensive overview of the weather variables that we hypothesize influence human-animal interactions.

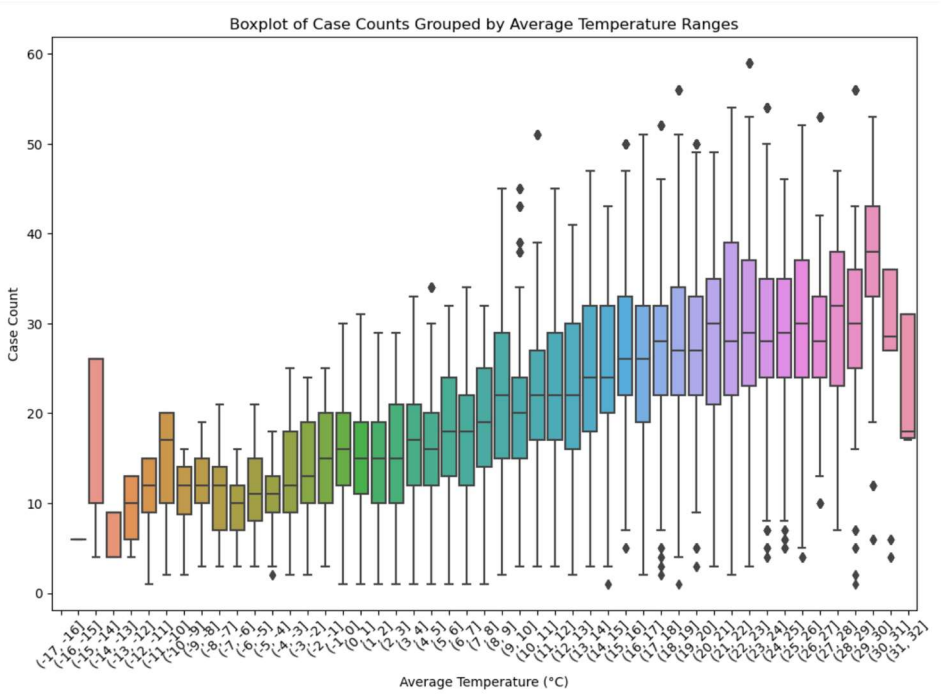
Temperature

We hypothesize a potential correlation between temperature fluctuations and complaint frequencies.

To test this hypothesis, we integrated a decade of historical temperature data from 2013 to 2023 with our existing complaint records. After ensuring data consistency through methods such as filling missing temperature values and standardizing date formats, we merged the datasets to assess the relationship. The analysis yielded a correlation coefficient of 0.524, indicating a moderate positive relationship between average daily temperatures ('tavg') and the number of complaints every day ('case_count'). This suggests that higher temperatures are associated with an increase in animal-related complaints.

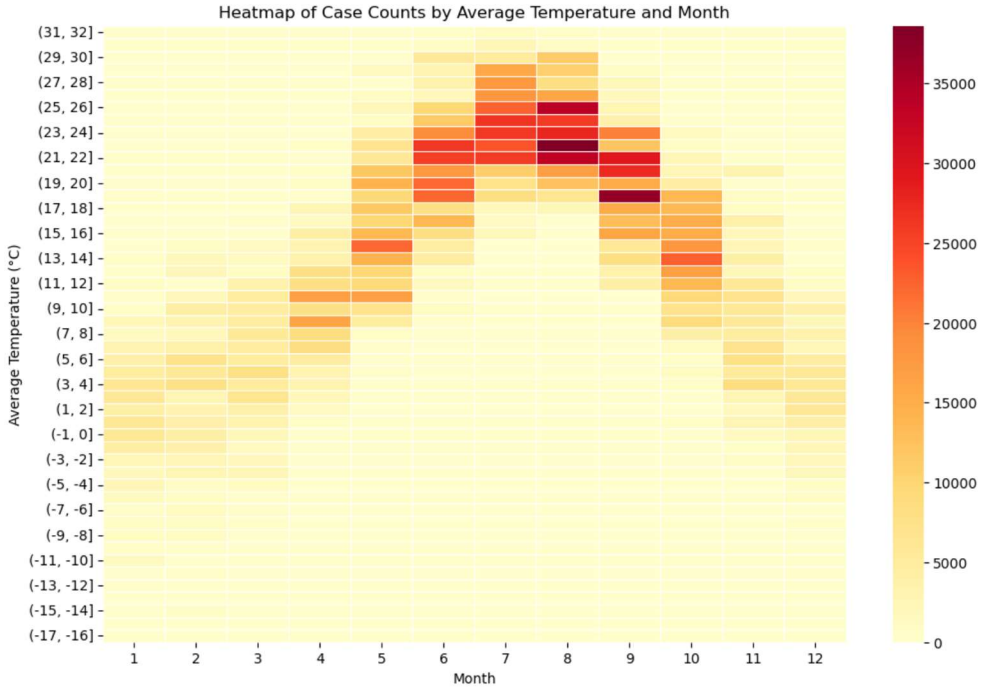
Further analysis utilized advanced visual techniques to enhance our comprehension of the relationship between temperature and animal-related complaints. Initially, we generated box plots, organizing the data into temperature bins. These plots revealed variations in the number of daily complaints across different temperature ranges, highlighting how extreme temperatures are correlated with higher frequencies of complaints.

The boxplot analysis of daily case counts grouped by daily average temperature ranges demonstrates a clear positive correlation between temperature and the number of animal-related complaints in Boston, with a significant increase in complaints as temperatures rise from cold to moderate levels. However, this trend notably reverses at extreme temperatures, where very cold (-16°C) sees an increase in complaints and very hot (32°C) conditions sees a decrease in complaints. Focusing on the bigger picture, this pattern indicates that while warmer weather generally promotes more human-animal interactions, leading to more complaints, extremely harsh conditions tend to suppress these interactions.



P3.1 Boxplot of Case Counts Grouped by Average Temperature Ranges

Subsequently, we created a heatmap that displayed the distribution of complaints across these temperature bins over different months. This visualization effectively illustrated seasonal trends, showing how complaint volumes vary with temperature fluctuations throughout the year. The heatmap's color gradients emphasize periods of high complaint frequency, allowing for an immediate visual grasp of peak complaint times relative to temperature changes.



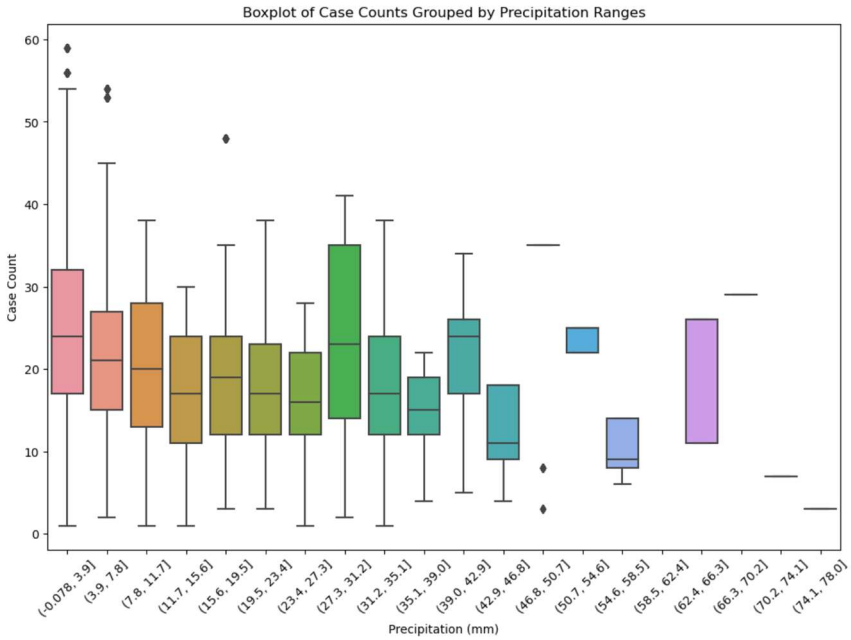
P3.2 Heatmap of Case Counts by Average Temperature and Month

In the continuation of our research into the effects of weather conditions on animal-related complaints in Boston, we extended our analysis to include precipitation, wind speed, and atmospheric pressure, following the methodology applied in our temperature study.

Precipitation

After observing the pronounced influence of temperature on complaint frequencies, we were intrigued to explore how precipitation affects these interactions. Contrary to our expectations, the initial statistical analysis showed a very low correlation between precipitation levels and the number of complaints. To uncover any underlying patterns that raw correlation coefficients might obscure, we turned to more detailed visual analyses.

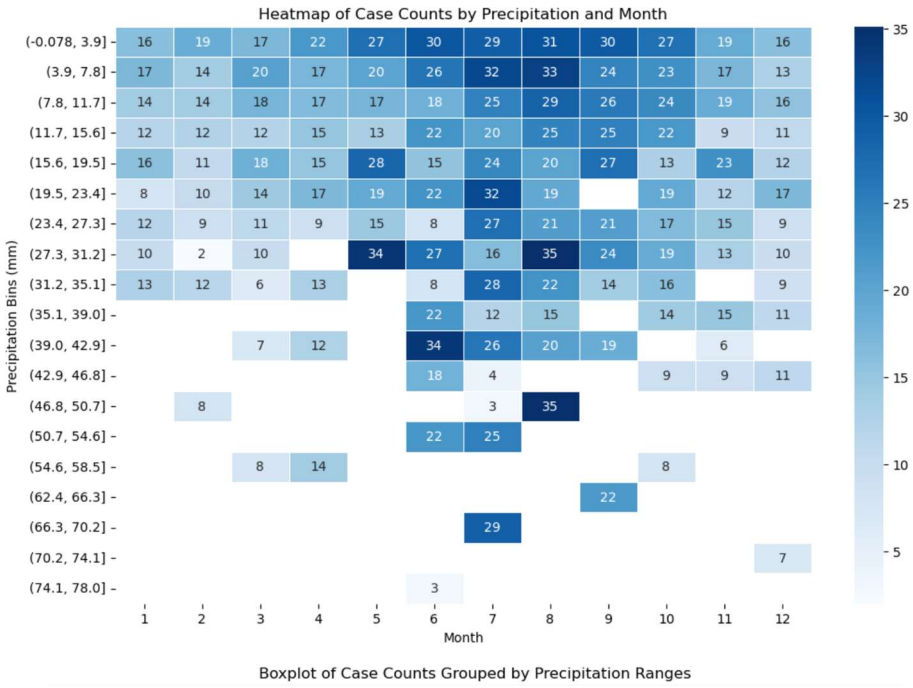
The first step in our visual exploration involved creating boxplots to observe the distribution of complaint counts across finely segmented precipitation bins. This method, like our approach with temperature, allows us to visually assess variances and outliers in complaint frequencies relative to different levels of precipitation.



P3.3 Boxplot of Case Counts Grouped by Precipitation Ranges

The boxplot of daily case counts by precipitation shows that while there is no strong relationship between rainfall and animal-related complaints, but heavy rains lead to a noticeable increase in complaints, suggesting that severe conditions rather than moderate rainfall influence animal-related incidents.

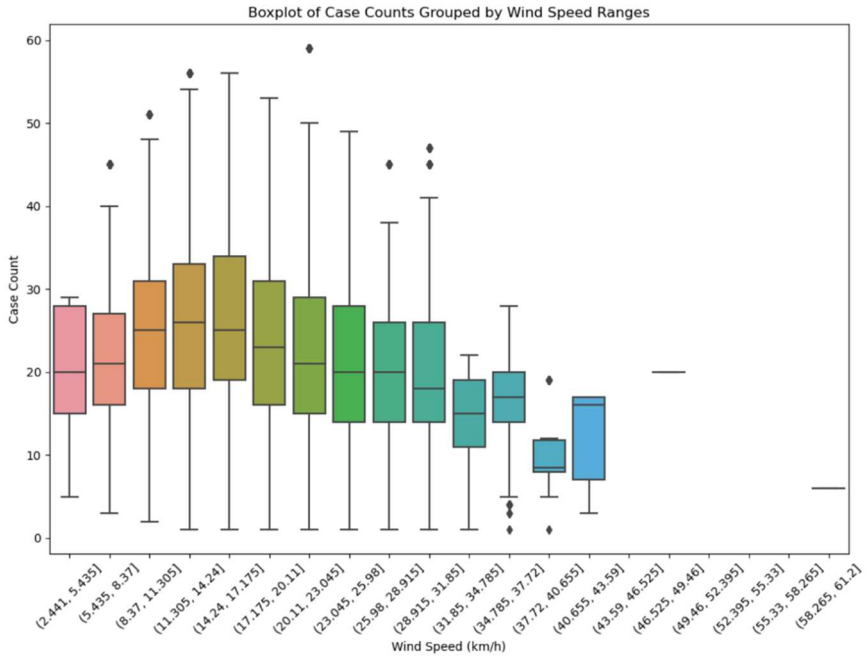
Continuing with our in-depth analysis, we proceeded to create heatmaps to further explore the relationship between precipitation and animal-related complaints over time.



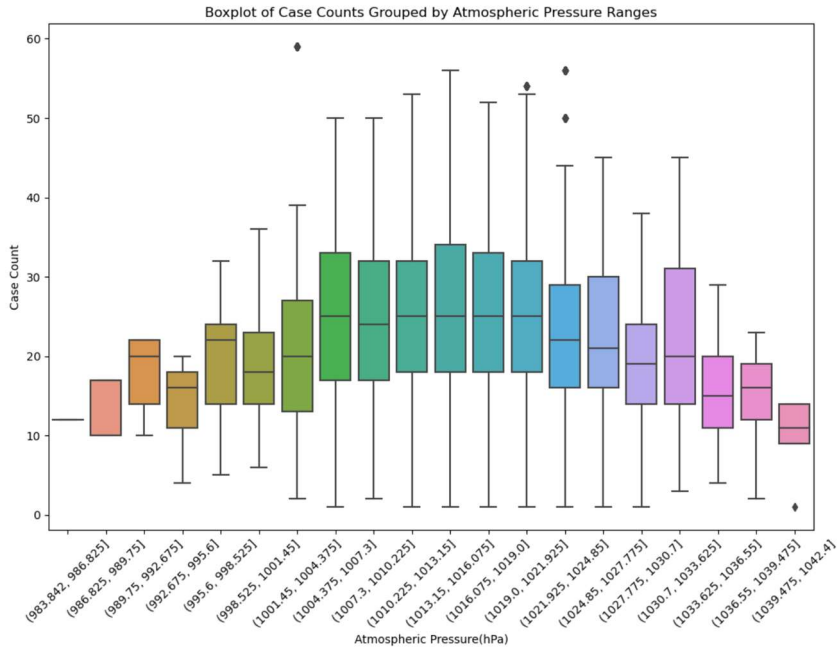
P3.4 Heatmap of Case Counts by Precipitation and Month

The heatmap analysis of daily case counts by precipitation did not reveal a clear relationship between rainfall levels and the frequency of animal-related complaints. Instead, the visualization highlighted the impact of seasonal factors, suggesting that the variability in complaint numbers is more significantly influenced by seasonal changes than by variations in precipitation.

For the remaining weather factors—wind speed and atmospheric pressure—we applied similar visualization techniques to analyze their relationship with animal-related complaints.



P3.5 Boxplot of Case Counts Grouped by Wind Speed Ranges



P3.6 Boxplot of Case Counts Grouped by Atmosphere Pressure Range

The boxplot analysis for wind speed did not reveal any clear relationship with the frequency of animal-related complaints, suggesting that wind speed may not be a significant factor influencing these incidents. However, the analysis of atmospheric pressure shows that case counts tend to be more consistent when the atmospheric pressure is neither too high nor too low, indicating a relative stability in animal-related complaints under normal pressure conditions. In contrast, there is a noticeable decrease in complaints when the pressure is extremely high or low, suggesting that extreme atmospheric conditions might deter outdoor activities, thereby reducing human-animal interactions and subsequent complaints. This implies that extreme weather conditions, characterized by significant deviations in atmospheric pressure, may lead to a reduction in animal-related incidents.

Conclusion

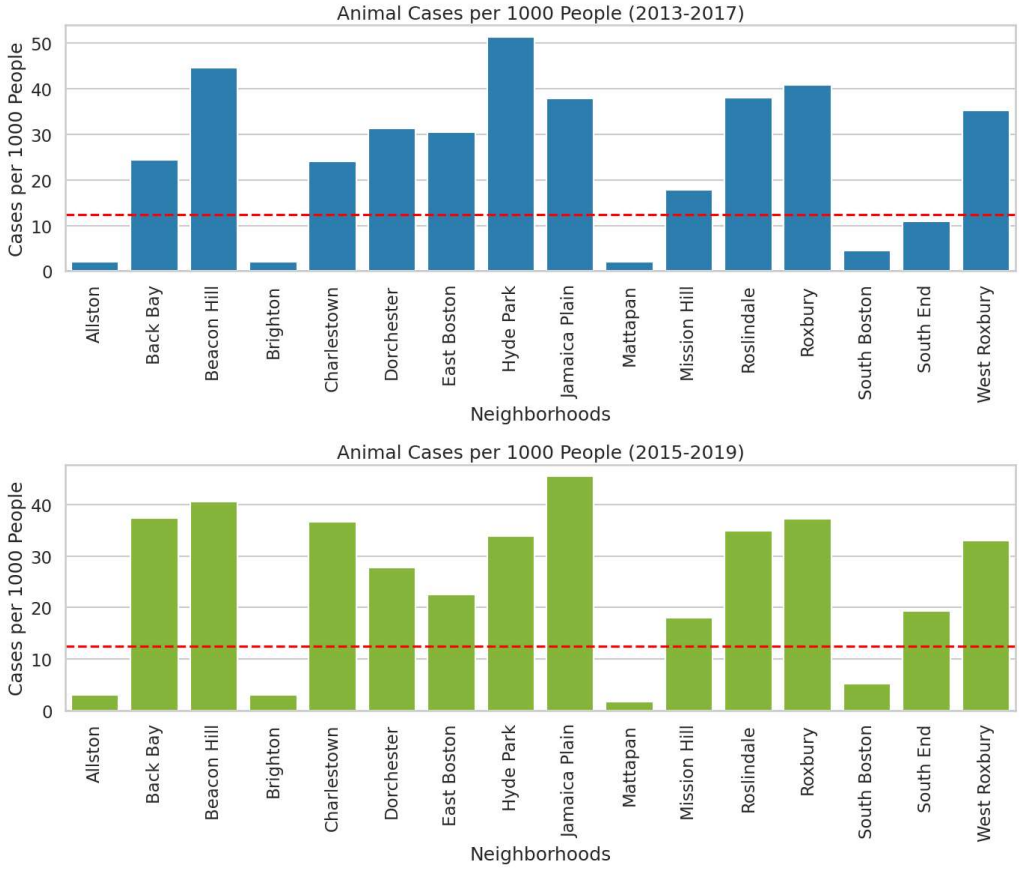
In conclusion, our analysis of temperature, precipitation, wind speed, and atmospheric pressure revealed distinct patterns in how these weather factors influence animal-related complaints in Boston. We found a positive correlation between higher temperatures and increased complaints, with extremes showing fewer incidents due to reduced outdoor activities. While average precipitation doesn't significantly impact complaint frequencies, extreme rainfall leads to a noticeable surge in complaints. Wind speed and atmospheric pressure showed less influence, except under extreme conditions where complaints decrease. These findings highlight that while typical weather variations have minimal impacts, extreme weather conditions significantly affect the dynamics of animal-related incidents.

This research offers valuable insights for 311 services, enabling more targeted response strategies and resource allocation during extreme weather conditions, thus enhancing the effectiveness of managing animal-related complaints in urban environments.

Demographic Factors

Overview of Animal Cases Relative to Population in Boston Neighborhoods

This section of the report examines the relationship between animal complaint cases and population shifts across various neighborhoods in Boston. The analysis leverages census data available online for two time frames: 2013-2017 and 2015-2019. Across these periods, the density of animal cases reported remained relatively stable citywide, with an average of 12.43 and 12.48 cases per 1,000 residents respectively.



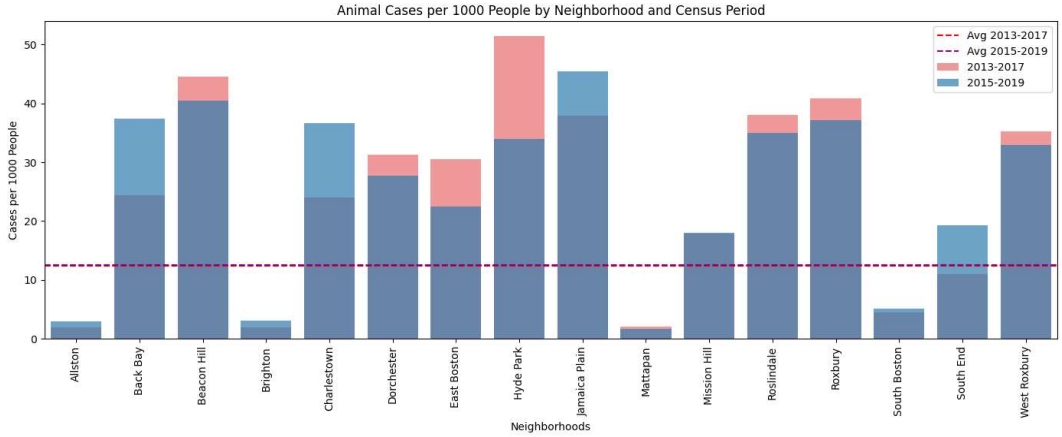
P3.7 Comparative Analysis of Animal-Related Complaints in Boston Neighborhoods (2013-2017 vs. 2015-2019)

Detailed Analysis by Neighborhood

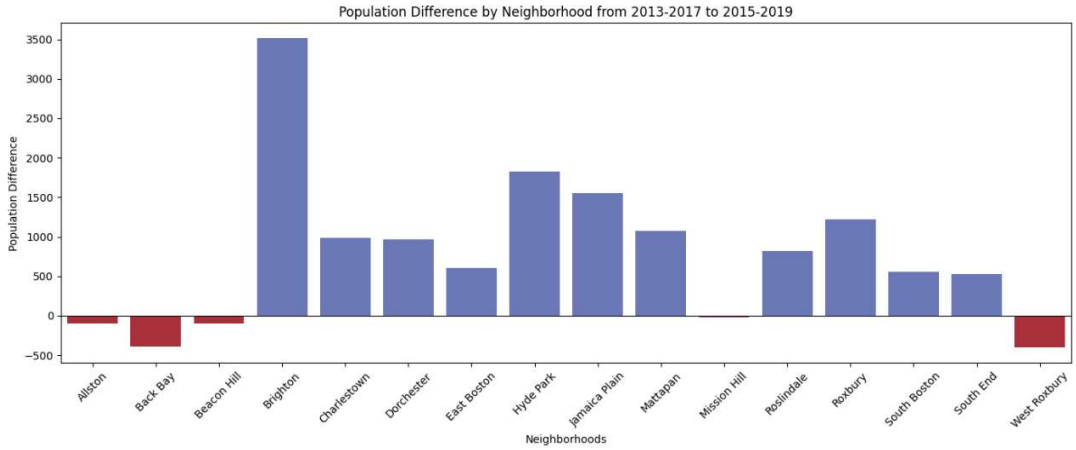
Significant variations were noted in specific neighborhoods. For instance, neighborhoods such as Allston, Brighton, Mattapan, and South Boston reported anomalously low numbers of cases per 1,000 people, consistently below both the average and median rates of 24.47 and 30.37 for the respective periods. Statistical analysis, including t-tests, yielded p-values of 0.017 for 2013-2017 and 0.011 for 2015-2019, indicating a statistically significant difference from the citywide data. These discrepancies suggest that either these neighborhoods have effective management strategies for animal-related issues or there is underreporting to the 311 system.

Comparative Analysis of Animal Cases Across Census Periods

By comparing data across the two census periods, disparities in the change in animal case rates per 1,000 residents become evident. The analysis highlights that the evolution of animal-related issues is localized, rather than consistent across Boston.



P3.8 Animal Cases per 1000 People by Neighborhood and Census Period



P3.9 Population Difference by Neighborhood from 2013-2017 to 2015-2019

For example, Hyde Park and East Boston exhibited notable reductions in animal cases per 1,000 people, potentially reflecting successful animal control measures or community initiatives. Conversely, neighborhoods like Back Bay and Jamaica Plain, where high or rising case rates persist, may require additional resources or targeted interventions to address the root causes of these high incidence rates. Notably, Back Bay's challenges could be compounded by a significant population decrease, potentially indicating a scarcity of community resources for animal welfare.

Limitations and Recommendations for Future Research

The insights derived from the provided figures are constrained by the absence of continuous, detailed monitoring of population changes. The significant drop in animal cases per 1,000 residents in neighborhoods like Hyde Park and East Boston suggests effective strategies that could serve as models for other areas. However, a comprehensive understanding of these trends demands ongoing, longitudinal data collection to verify the sustainability and efficacy of local animal control measures.

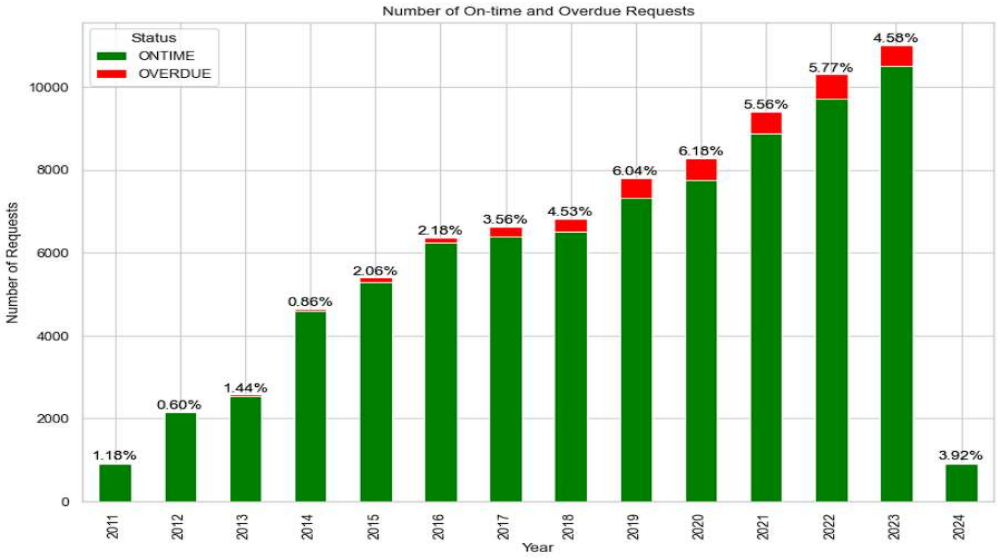
In conclusion, this analysis underscores the importance of localized strategies and continuous data monitoring to effectively manage and mitigate animal-related issues in urban environments. Further studies could explore the specific factors contributing to the success of interventions in neighborhoods with declining case rates and apply these learnings to enhance animal welfare across Boston.

Analysis of Request Timeliness

Resolution Time Analysis

The dataset we obtained includes timestamps for each request, documenting the date and time of filing, closure, and the anticipated resolution time as recorded by the individual processing the request. This allows us to categorize requests as either *'On-time'* and *'Overdue'* , enabling a focused analysis of operational efficiency. Our analysis serves a dual purpose: streamlining the request filing process for users and offering recommendations to departments on optimizing resource allocation. To accomplish this goal, we examine the average response time required to resolve complaints at both the animal and neighborhood levels.

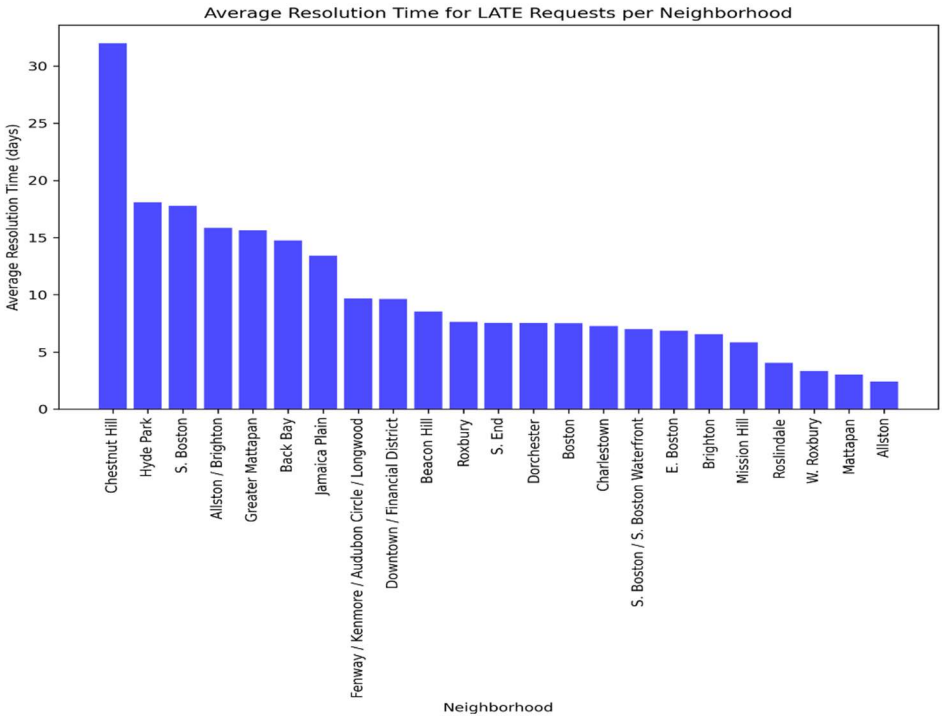
To start, we illustrate the number of on-time and overdue requests per year. While there has been a trend of increasing overdue requests, there was a notable decrease in 2023, which may indicate a shift in the trend moving forward.



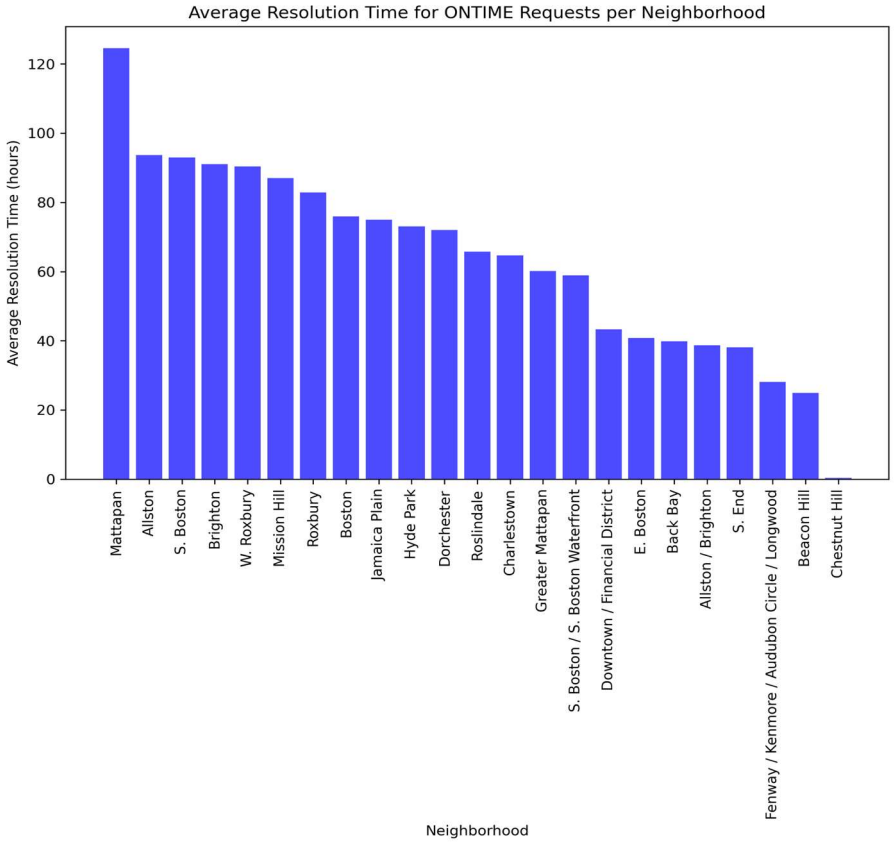
P3.10 Number of On-time and Overdue Requests

With the goal of offering valuable insights to departments to optimize resource allocation, we graph the average resolution time for late requests in each neighborhood.

Then, to empower users with insights into estimated response times, thereby managing their expectations effectively, we additionally graph the average resolution time for on-time requests per neighborhood. This provides users with a clear understanding of what to anticipate when submitting a request from a specific neighborhood, serving as a reference for expected resolution times.

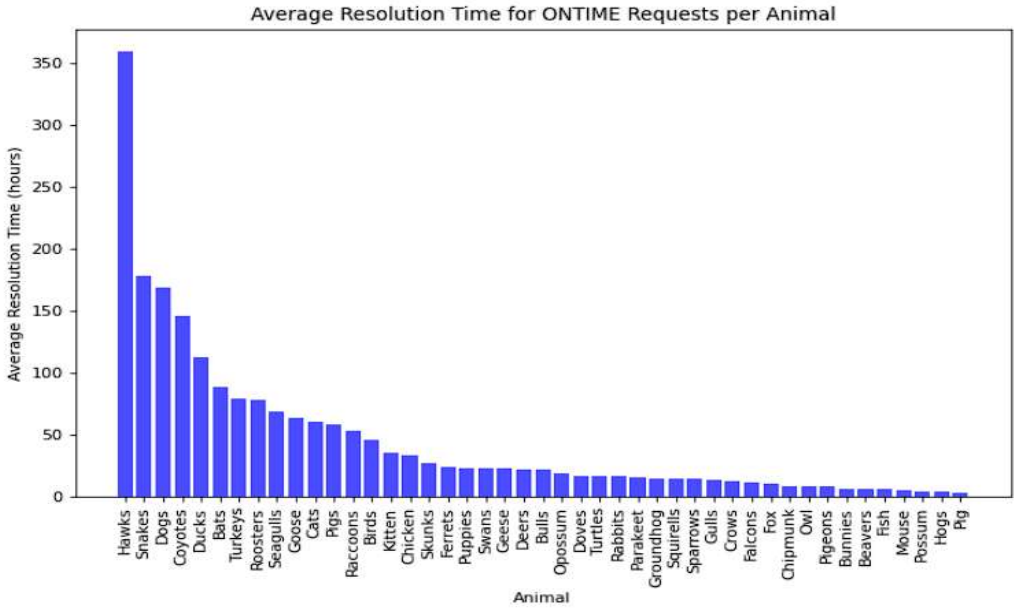


P3.11 Average Resolution Time for LATE Requests per Neighborhood



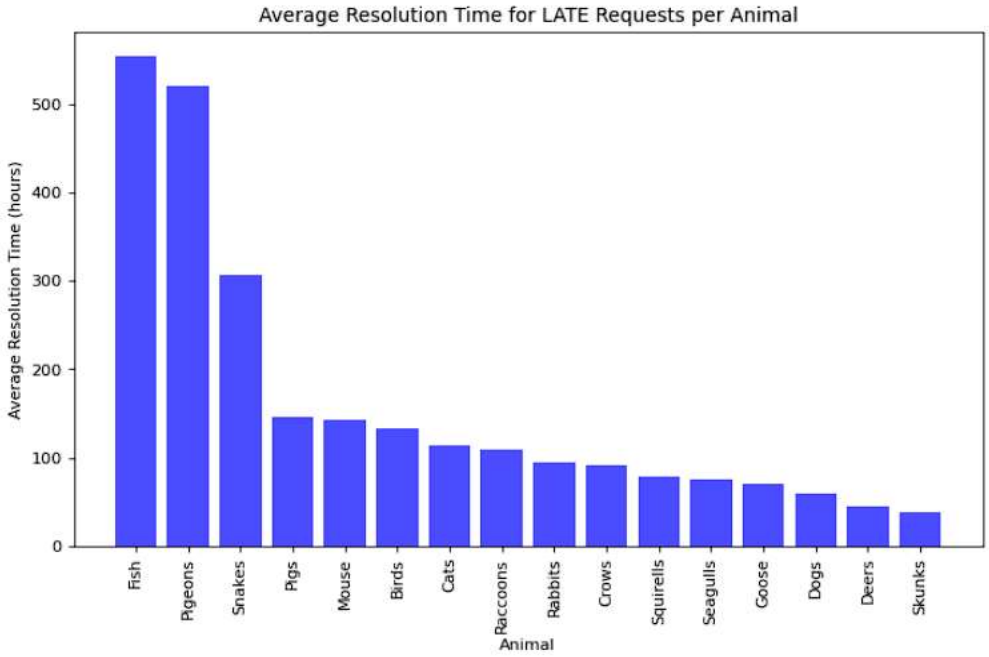
P3.12 Average Resolution Time for ONTIME Requests per Neighborhood

Lastly, we showcase the average resolution time for on-time requests per animal. As expected, most animals display short resolution times, with exceptions observed in two categories: uniquely distinct animals like hawks and snakes, and animals with high request volumes, such as dogs and cats.



P3.13 Average Resolution Time for ONTIME Requests per Animal

Extended resolution times for fish and pigeons in overdue cases may indicate specific challenges in dealing with these animals or a lack of prioritization.



P3.14 Average Resolution Time for LATE Requests per Animal

Correlation Analysis

Our investigation extended to examining potential correlations between the nature of complaints, geographic factors, and timeliness. Detailed correlation findings are intended to be used to pinpoint factors that significantly impact response times, though specific results are detailed elsewhere in the full analysis.

Recommendations and Observations

Based on our findings, several recommendations were made to improve the efficiency of response times:

Enhancing resources in neighborhoods with high complaint volumes.
Developing specialized protocols for handling less common but time-intensive animal complaints.
Continuous monitoring and evaluation of response practices to adapt to changing trends.

Conclusion

This analysis provides critical insights into the timeliness of response to animal-related complaints in Boston, highlighting strengths and areas for improvement for both departments and user. It underscores the importance of adaptive management strategies to enhance service delivery and operational efficiency in urban animal management. The comprehensive visual and statistical analysis serves as a foundation for future policy-making and resource allocation to better serve the community's needs.

Future Scope

Advanced Predictive Analytics
Implementing machine learning models could significantly enhance our ability to predict trends in animal-related complaints. This predictive power would allow for proactive resource allocation and preventative measures, potentially reducing the frequency and impact of these interactions.

By utilizing advanced predictive analytics, we can attempt to forecast the number of cases in a specific area on a specific date based on all available data. This would facilitate resource allocation for 311 services. Additionally, we can predict the time required to resolve each case based on case descriptions and additional information, providing users with an expected resolution time at the time of case submission.

Through the utilization of historical data, machine learning models can accurately predict the number of cases for a specific date and area, leveraging various data sources such as time, location, and case types. This predictive ability will enable city managers to make timely decisions and allocate resources efficiently, thereby minimizing the adverse impacts of animal-related cases.

Integration of Additional Data Sources:
Expanding our research to integrate additional data sources, such as real-time wildlife tracking, public health records, and social media analytics, could enrich our understanding of human-animal interactions in urban settings. By incorporating these diverse datasets, we can gain a more comprehensive perspective on the dynamics of animal-related complaints. For instance, real-time wildlife tracking data can provide insights into animal movements and behavior patterns, while public health records may reveal correlations between animal-related complaints and public health issues. Furthermore, social media analytics can offer valuable information on public perceptions, concerns, and incidents related to urban wildlife. By synthesizing these various data streams, we can better identify underlying factors contributing to animal-related complaints and develop more targeted interventions.

Impact of Urban Policy Changes:
Evaluating the impact of urban policies on animal-related complaints is crucial for refining city strategies and promoting harmonious coexistence between humans and urban wildlife. By systematically analyzing the effectiveness of policies such as zoning laws and green space management, we can assess their role in mitigating or exacerbating conflicts between humans and animals. This research not only provides insights into the efficacy of current policies but also informs future policy adjustments to better address emerging challenges in urban wildlife management. Ultimately, by leveraging empirical evidence on the relationship between urban policies and animal-related complaints, cities can enact more informed and responsive measures to foster sustainable urban ecosystems.

Individual Contribution

Themistoklis Nikas:
Performed data exploration and data preprocessing, including manual extraction and annotation of different animal types. Addressed key questions concerning complaint volumes, animal types implicated, geographic complaint clusters, and seasonal patterns. Investigated the extension question related to the request status. Additionally, led the presentations to the client.

Wangyi Chen:
Downloading the 311 cases dataset and the demographics data. Preliminary analysis on the data, answering the overview questions. Plot the boston map with zip code and k most common animals in each zip code area. Analysis on the demographic factors of the animal cases.

Dayu Li:
Participated in answering the seasonal factor question, completed coding and visualization. Discussed the research logic with team members, based on which completed writing the base analysis for the all four basic questions in the report. In the extension study, responsible for the weather section, collected weather data of the Boston area, completed visualization and research, and completed writing the corresponding part in the report.

Shengwen Ouyang:
Performed the data analysis and data preprocessing for one of the main questions “Seasonal Impact on Complaints”, and extended this question by creating a few geographical distribution heatmaps, which were shown in in the github. Mainly in charge of writing the final report.