Vacay-Away

Short term home rental recommendations

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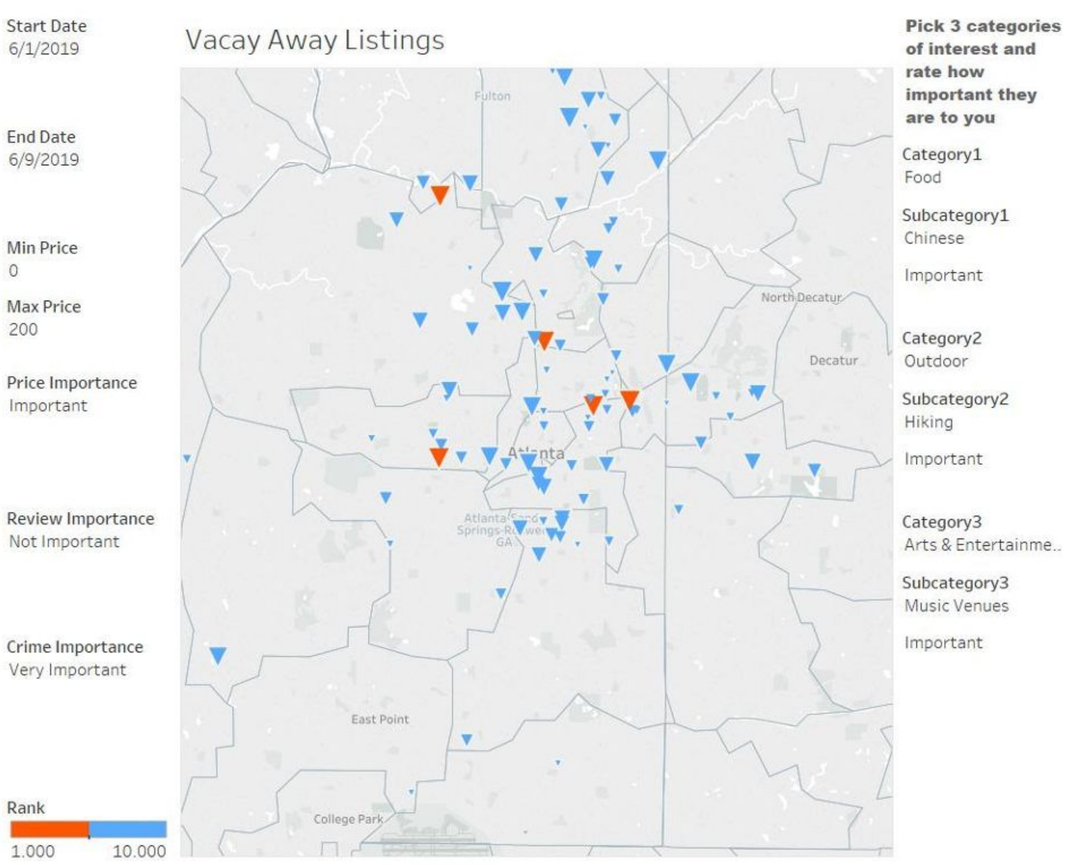
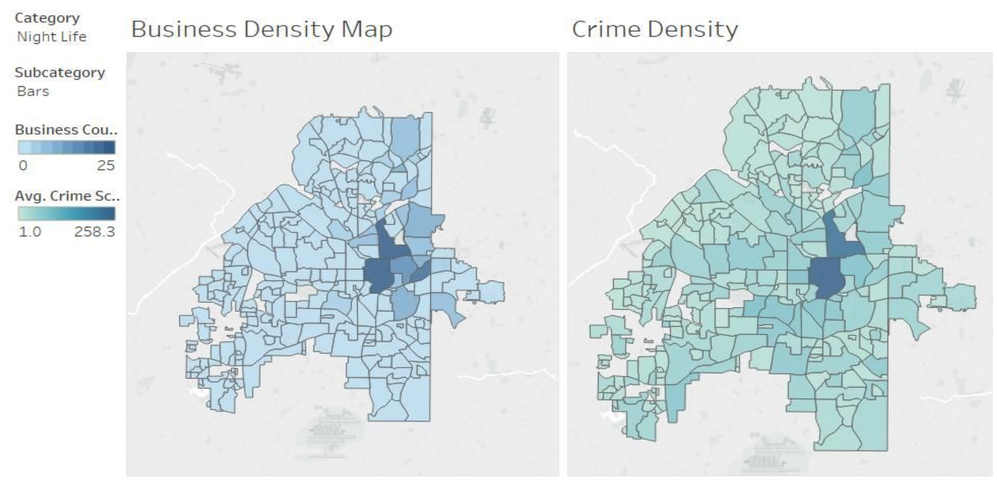
Motivation

There is a need for an improved way to find a vacation rental that fits your needs and interests. Currently, consumers have to do their own research about the area to find the location they want. Our application allows users to pick their own customized criteria and set customized importance weights for each, all in an integrated application. We return a ranked list of rentals that best fulfill their needs.

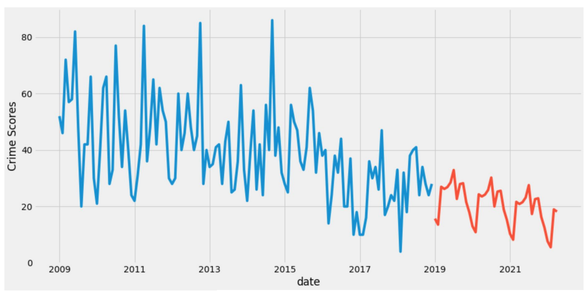
Visualization

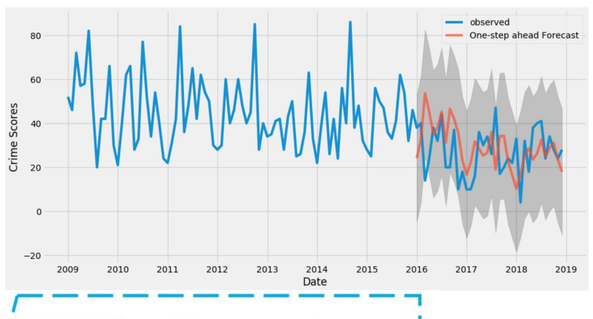
Visualization and interactivity created in Tableau.



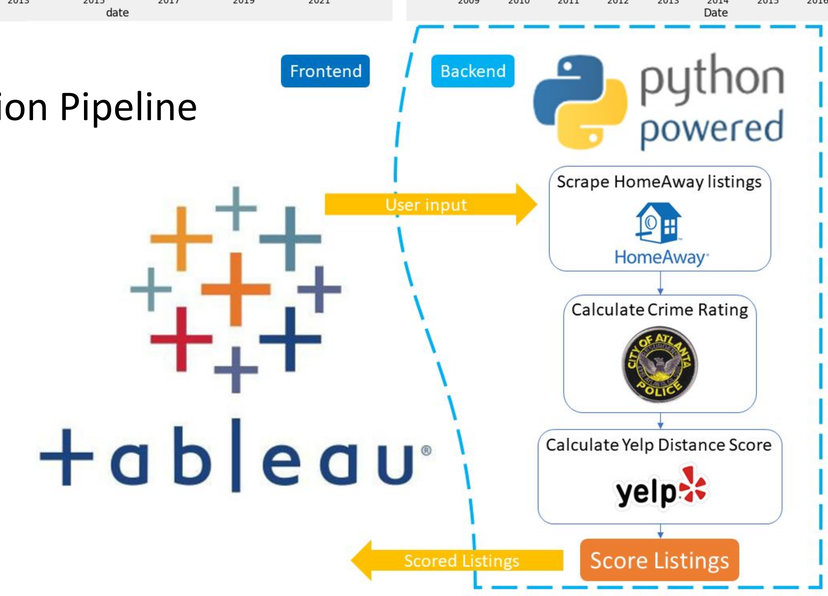


Crime Forecast & Evaluation





Application Pipeline



Data

- **Atlanta crime data:**
  - Size: ~300,000 rows
  - Source: Atlanta Police Department Website
- **Atlanta business data:**
  - Size: ~22,000 rows
  - Source: Yelp API Scraping
- **Rental listings data:**
  - Size: ~1,000 rows
  - Source: HomeAway API Scraping
- **Atlanta Neighborhoods:**
  - Size: ~245 rows
  - Source: Atlanta Department of City Planning GIS Data

Methodology

- PostgreSQL database hosted on AWS RDS free tier to store data
- Perform Seasonal ARIMA Time-Series Forecasting to forecast monthly crime-scores for the nearby area of each rental listing in order to capture the seasonality effects of the crime rates
  - Weight crimes based on Florida sentencing data and Cambridge Crime Index Methodology in the above series
  - Sum up the monthly crime scores within 300m around each home listing
- Find distance to five nearest locations under the User Input Categories (UCs)
  - Analyzed Yelp business tags to come up with user categories and classify businesses
- Yelp Distance Scores for each listing (D_x) for each UC calculated as the weighted sum of the 5 closest UC-related businesses' distance (d_i) reciprocals:

$$D_x = \sum_{i=1}^{5} \frac{i}{d_i}$$

- Combine Crime and Yelp Distance Scores, along with listing-specific information (price, reviews, etc.), into an importance-weighted Rental Score based on weights supplied by user.
- Visualize the locations with the highest Rental Scores on a Tableau map
  - Top 5 are highlighted in orange
  - Size of listing scales with rental score

Evaluation & Results

Model Evaluations:

- Crime Forecast: Based on the comparison between the forecasted crime scores and the real crime data, our model shows a good performance and reasonably captures the seasonality and trends. However, for some neighborhoods that lack the historical crime data, it forecasts negative crime scores which we had to manually give 0 value.
- Survey: Overall people are satisfied with the app. More than half like the UI design, but 10% find it messy. 70% people find it sometimes hard to find the categories they want. 60% find our recommendation match their results from manual search.
- Results of user survey shown below from 20 participants:

Conclusions & Future Work

- Initial feedback mostly positive
- Improve performance of the application
- Improve category list
- Include more cities beyond Atlanta by working with data providers to get access to more data
- Include housing listings from other websites such as Airbnb, or hotel listings
- Sentiment Analysis on HomeAway/Yelp reviews to improve user satisfaction