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Boston Biking

Using Boston's data to improve the city for bikers.

Introduction

Dennis, Nuan, and Tony are all Boston residents and avid bikers. Biking is a healthy and environmentally friendly way to get to different places. So, in order to make Boston a better biking environment for everyone, this project focuses on finding issues with current-day biking (safety, availability) and finding areas for the city to improve on.

Data Sets

Boston Bike Lanes: Provided by BostonGIS, this contains information on all of the bike lanes in Boston.
Boston Collisions: Provided by Vision Zero Boston, this data set provides information on all crashes in Boston.
Boston Traffic Signal Locations: Provided by Analyze Boston, this data set contains information all of Boston's traffic signals.

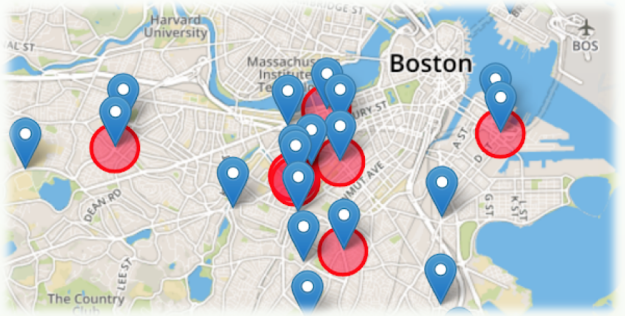
TRANSFORMATIONS
Streetlights Collisions: First, we narrowed down the collisions to focus on only bike collisions.
Then, we aggregate every bike collision at a particular intersection, to help analyze if the intersection is prone to danger or not. We also use the OpenCage API to obtain the latitude and longitudes of each intersection (to be used in our visualizations).

Future Work

Our team plans to continue our research into Boston Biking by expanding our research into causes of collisions using the clusters we locate in our visualization. In addition, we plan to search for more correlations between unsafe biking areas and Boston's roads.

Improvement: Bike Availability (Constraint Satisfaction)

Goal: With this study, we focused to improve the availability of bikes around Boston by finding the best locations for bike stations (Hubway stations).
Tools: Boston Bike Lanes data set, Z3 Solver, OpenCage API, leafletJS.
Method: Using the Z3 solver, we add constraints that: only require 1 station for each bike lane, allow 1 station to cover two streets if they are close enough. The Z3 solver then provides us with a solution to the constraints, which we tighten until we receive a minimal solution (least stations).
Challenges: We had to readjust the Boston Bikes dataset using the OpenCage API to include lat/long values.
(The red circles represent station locations, the blue points are biking paths)



Streetlight / Collision Correlation

Goal: Find if there's a correlation between Streetlights on a street and collisions on that street.
Tools: Streetlights Collisions transformation, pandas (Python Data Analysis Library), OpenCage API.
Method: We took the number of bike accidents that occur on a particular street and accumulated the present number of streetlights on that particular street during the bike accident. After aggregating the two values with the street as the key, we were able to discover the total number of streetlights that were present over all the bike accidents on any particular street that had any bike collisions.
Limitations: We don't take into account length of street or distance a streetlight covers.
Conclusion: We see a positive pairwise correlation between the two values (correlation coefficient = +0.9575), however, because of the limitations cannot reasonable conclude streetlights contribute extensively to bike collisions.

Visualization: Collisions

Goal: With this visualization, we hope to answer questions on where most of the collisions are happening and in what areas we should focus on preventing collisions.
Tools: Boston Collisions (Vision Zero).