Ad-Opt

Companies spend millions of dollars on advertisements every year. It's important to find optimal locations to place them for the most impact on consumers.

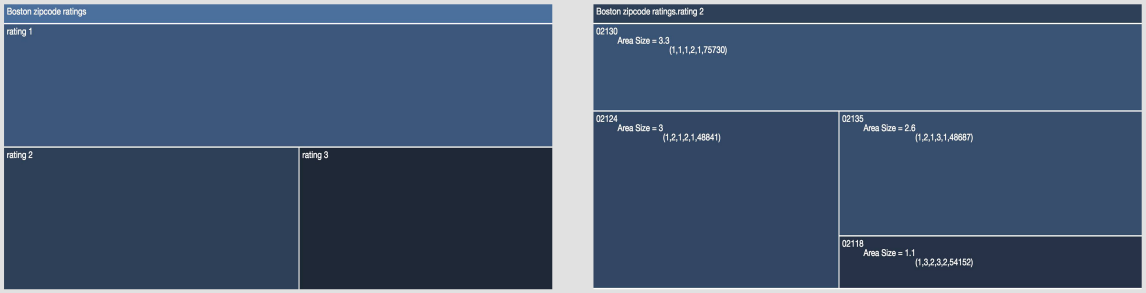

Figure 2a: Visualized zoomable treemap that illustrates overall zip code ratings on a gradient based on outreach level.

Purpose

Eliminating ineffective advertisements can minimize waste while increasing competition and boosting a city's economy. Accomplishing this not only helps businesses, but also reaps benefits for any given city. In this project, our main focus of research is looking into optimal zip codes in Boston. By looking into physical forms of advertisement around Boston (MBTA bus stops, MBTA T stops, Big Belly garbage locations, college campuses, and Hubway stations), we created an optimization tool in the form of a web service to determine the best locations by zip code in Boston, adjusted to individual need.

Data (Statistical Analysis)

We were interested in potential trends that may exist in the correlation between any two landmark ratings. If a majority of the similarity comparisons yield a strong correlation, similar datasets could be combined/eliminated or chosen over another. Would this be beneficial or detrimental to our optimization tool?

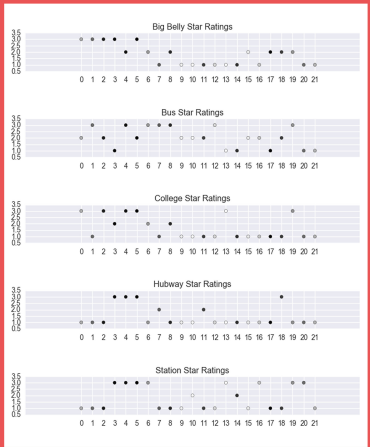

Figure 1: Results - Ratings plotted for all the landmarks to check for correlations, suggesting that no strong correlations exist among any of two landmark ratings.

Data (Visualization)

Web Service (Optimization)

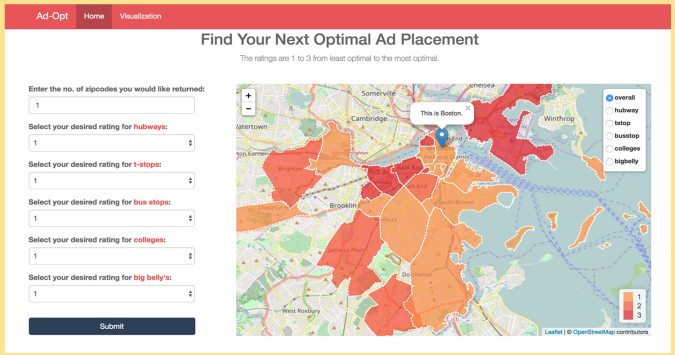

Figure 2b: Ad-Opt Web Service User Interface

To address the ultimately goal of recommending the optimal zip codes, we created a rating system. Zip codes will be rated on a 3-star scale:

☆ least outreach ☆☆ ☆☆☆ most outreach

Ad-Opt allows users to query in two ways: by ratings for each of the 5 landmarks or an overall zip code rating. Users can also provide a number of optimal zip codes that is returned from their query. Our algorithm will generate the optimal result given the user's constraints by focusing on maximizing the viewing population (highest population density), which is most relevant to further analysis.

Additionally, we display the median household income for each zip code in the users' results to provide a better idea for their target audience. In the same way, we also determined the corresponding level (High, Medium, Low) for these income values based off of ratings calculated from standard deviation, which our tool will display in accordance to the resulting zip code(s).

Using standard deviation to define the range of the system, a single numeric overall rating is calculated for each zip code within gradients of that range. These overall ratings are stored in a database, which our algorithm uses to recommend optimal locations for advertisement placement based on user query on our web service.

Conclusions/Future Work

The web service is capable of effectively handling user queries and succinctly displays the full zip code ratings dataset, improving user experience and information organization. Changing the definition of "optimal" could take advantage of the opportunity to determine whether the chosen landmarks were good determinants of optimal ad placements or which landmarks work better than others. For example, maximizing profit, amount of attention (views), viewers' interest in advertisement subject, etc. More future endeavors include utilizing more landmarks to improve the optimized results for a given query, refining/running the algorithm on larger dimensional datasets (which in turn could allow further statistical analysis to beneficially impact any algorithmic changes), and incorporating revenue measurement of advertisements placed from recommendation of our optimization tool by user query. Revenue could open new doors to altering our rating system; it could integrate monetization and/or use real-time data to verify how accurate the results from our optimization tool are.

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