Determining "Safe" Locations to Host Happy Hours

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CS591 L1 Fall 2017

Boston University

Introduction

"Happy Hour" are two words that many people who reside in cities are always glad to hear – whether it be about food or about drinks. When it comes to the latter though, Massachusetts is one of the many states that have a ban for such a thing because of a major incident involving a young female and drinking/driving during one of these happy hours. With that said, we are striving to create a solution in which we can bring it back by generating a set of probable coordinates/radii that can theoretically host happy hours based off a set of "safe" standards built by correlations.

End Goals

Our project's end goals consists of:

- Determining whether there is a correlation between highly dense areas and crimes

- Apply this correlation as a metric accordingly in terms of population density

- Generate a set of coordinates using k-means of restaurant coordinates and applying said correlation-metric on it to choose the "best" locations and their radii
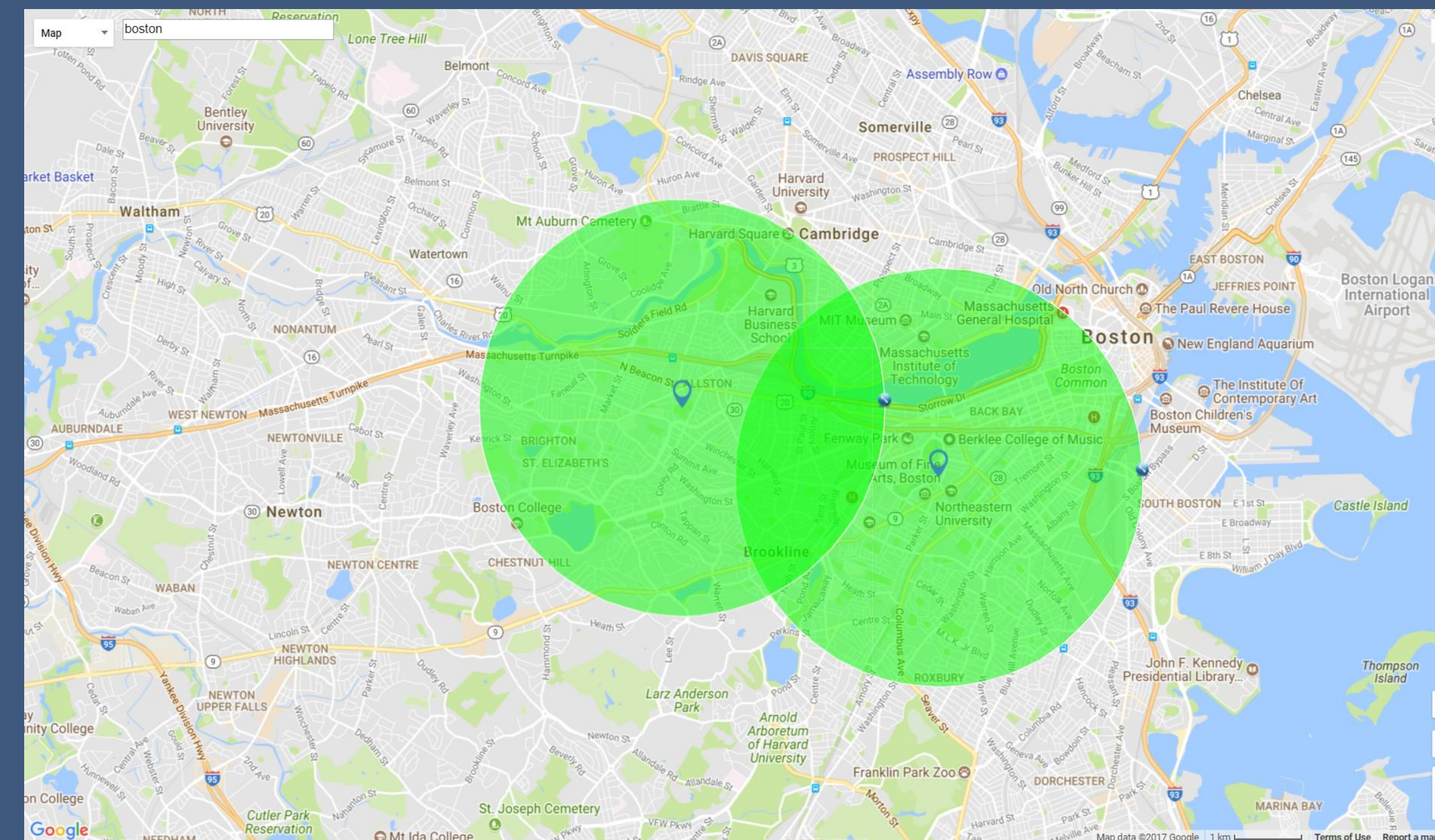
Methods & Data

First acquired data about crimes, properties, and restaurants all over Boston.

Algorithms used:

- Manipulated the crimes and properties to give us correlations based on population density.

- Used an "elbow test" to determine that we needed a total of 5 k-means. Then applied the k-means algorithm to Restaurant data to find optimal location coordinates to place a set of radii around. Chose 2 of the 5 k-means using the correlations produced as a metric.

Results

* Note: These three figures are results generated from our 2 algorithms. As you see, we have created 5 "optimal" locations to be our radii centers for hosting happy hours using k-means. We can also see that as the population density increases, the stronger the correlation that it has with crimes associated. Which is why we used that as a metric – choosing the 2 k-means with the smallest radii in order to get smaller portions of the population.

Generated K-Means	
Centroid (latitude, long)	Radius (km)
(42.34444150597612, -71.06143274501994)	7.056903575
(42.34152172340425, -71.09143748226946)	3.715178918
(42.286093032967045, -71.11360539560437)	6.622821797
(42.368445129629634, -71.04660057407406)	5.14957234
(42.350705047619044, -71.13836019047618)	3.505063108

Correlation Coefficients		
vs.	Low Population Density	High Population Density
Crimes	0.691001073	0.720337136

Conclusion & Future Works

As we can all see from our results, there is an increasing correlation between population density and # of crimes as we increase population density in an area. And so, as a solution to bring back happy hours, the two green circles on the map represent the proposed restaurants that are allowed to host happy hours in hopes that these areas will reduce crime incidents and other dangerous situations. There is of course more work that can be applied to this in the future. One being that we are only using two sets of correlations as of now. Our standards of safety can definitely be improved by comparing more and more correlations between things such as "crime vs college locations" or "crime vs household incomes" , etc.