Wide Open Spaces

abstract: “Parks, pools, and golf courses.”

II. Introduction

For more than a year, Covid-19 has created a environment in which many around the world remained in isolation from one another. In an effort to find respite, many have ventured to outdoor spaces, but for others, these spaces may be less easily experienced. The objective of this paper is to determine whether Austinites have equal opportunity to access outdoor spaces. To accomplish this objective, I used data derived from the parks departments for the City of Austin and Travis County. Moreover, the Austin Business Journal provided 2018 data specific to each zip code of relevant characteristics, such as educational attainment, median household income, and median home value.

III. Methods

Since individuals seek relaxation a wide variety of ways, I applied a wide definition in determining an outdoor space. Within Austin, these not only include local and state parks, but also include public pools and private golf courses - totaling 335 outdoor spaces. Of these locations, 319 were obtained through the parks departments for the City of Austin and Travis County. However, the remaining 16 locations were derived individually from Google Maps and corresponding parks departments of Bee Cave and Wells Branch. Although, Bee Cave and Wells Branch are not technically within the city limits of Austin, their respective zip codes are categorized as city of Austin zip codes, thus both Bee Cave and Wells Branch were included in the data set.

The city of Austin zip codes became a useful tool in the methodology applied to the model. This information was derived from the Austin Business Journal, which provided data of relevant characteristics, such as educational attainment, median household income, and median home value. In addition to using several of these features and data of outdoor spaces, I created an interactive variable between post-secondary educational attainment as a percentage of zip code population and median household income, mapping the outcome on Google Maps so as to discover any patterns.

To best solve the objective of this paper, I determined hierarchical clustering was the best approach. First, I created a large data set of numerical vectors, in which I then centered and scaled before using the euclidean method to find the distances between each point. Next, I determined the Ward method was appropriate in use of hierarchical clustering as it produced a well-balanced cluster denodrogram. Lastly, I used k-means and the elbow method to find the optimal k to cut the tree, and discerned k = 2 would be optimal.

IV. Results

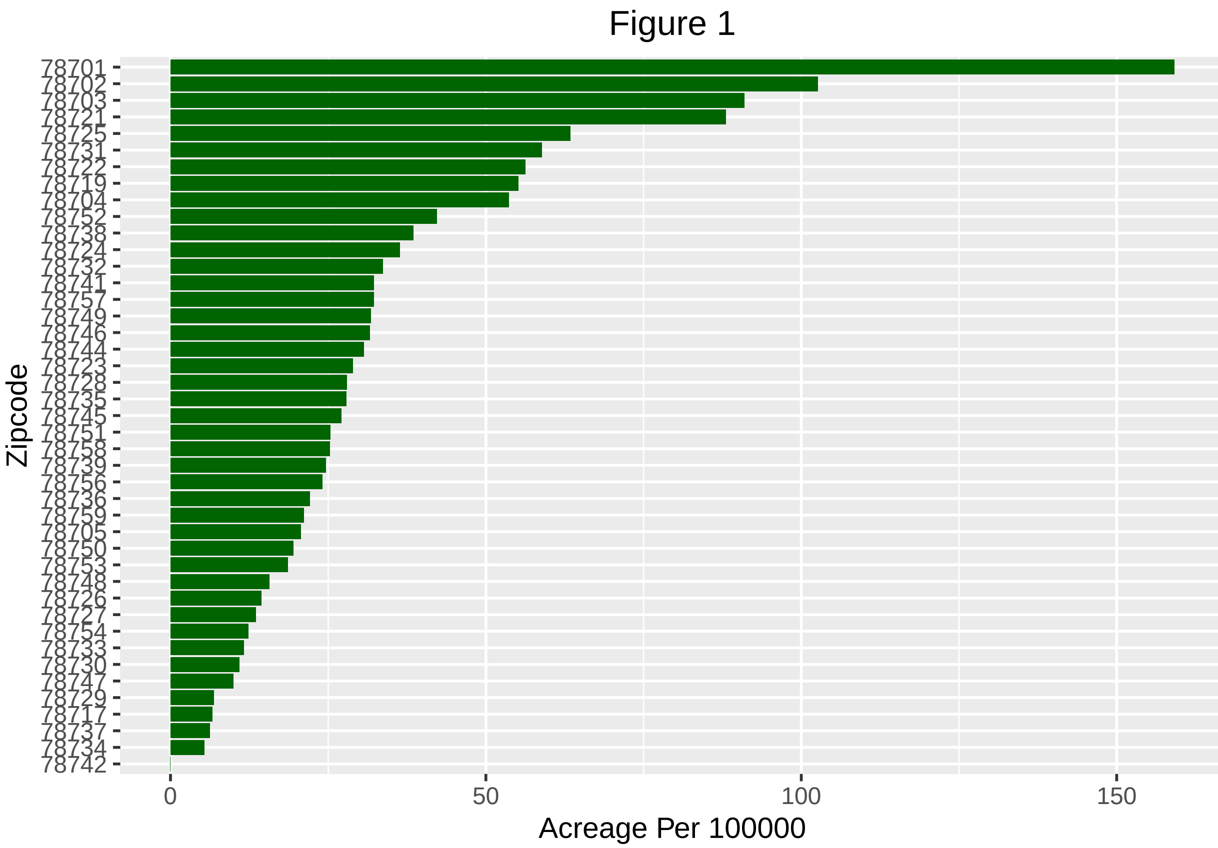


Figure 1 displays the park distribution in Austin measured in acreage per 100000 people. Zip code 78701 has the highest acreage per 100000 of 159.12. Alternatively, zip code 78742 the lowest acreage per 100000 of 0.

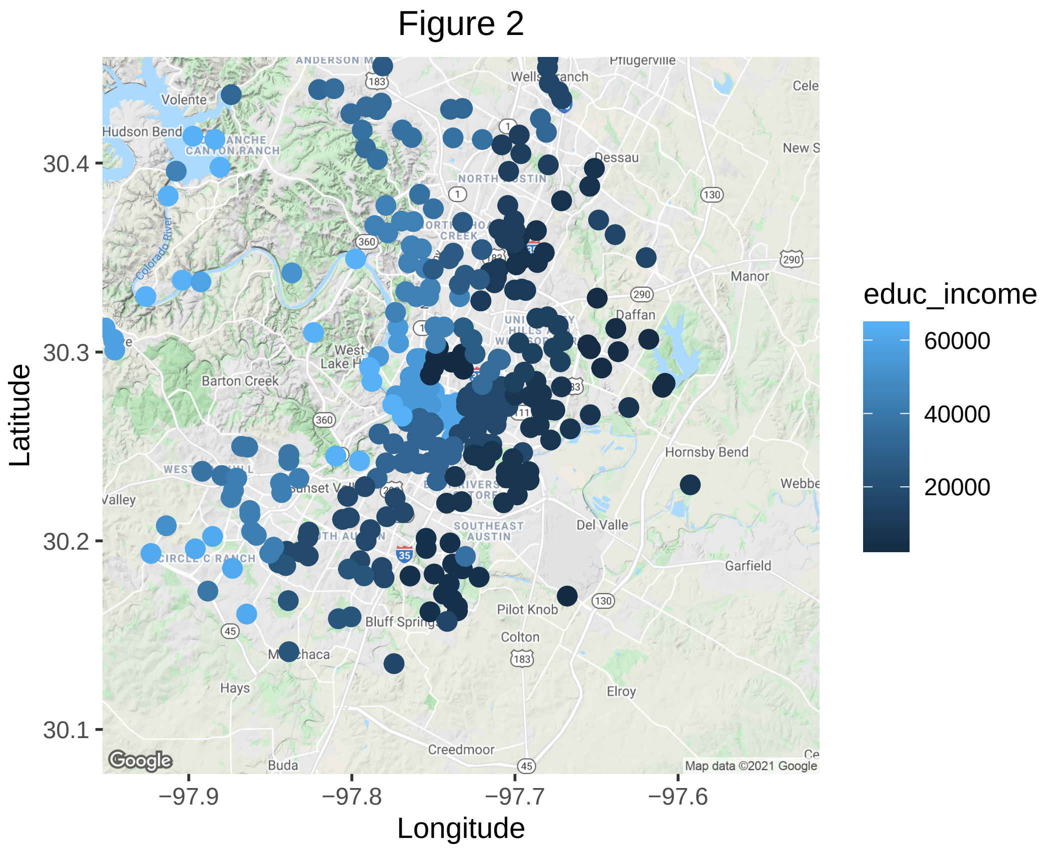
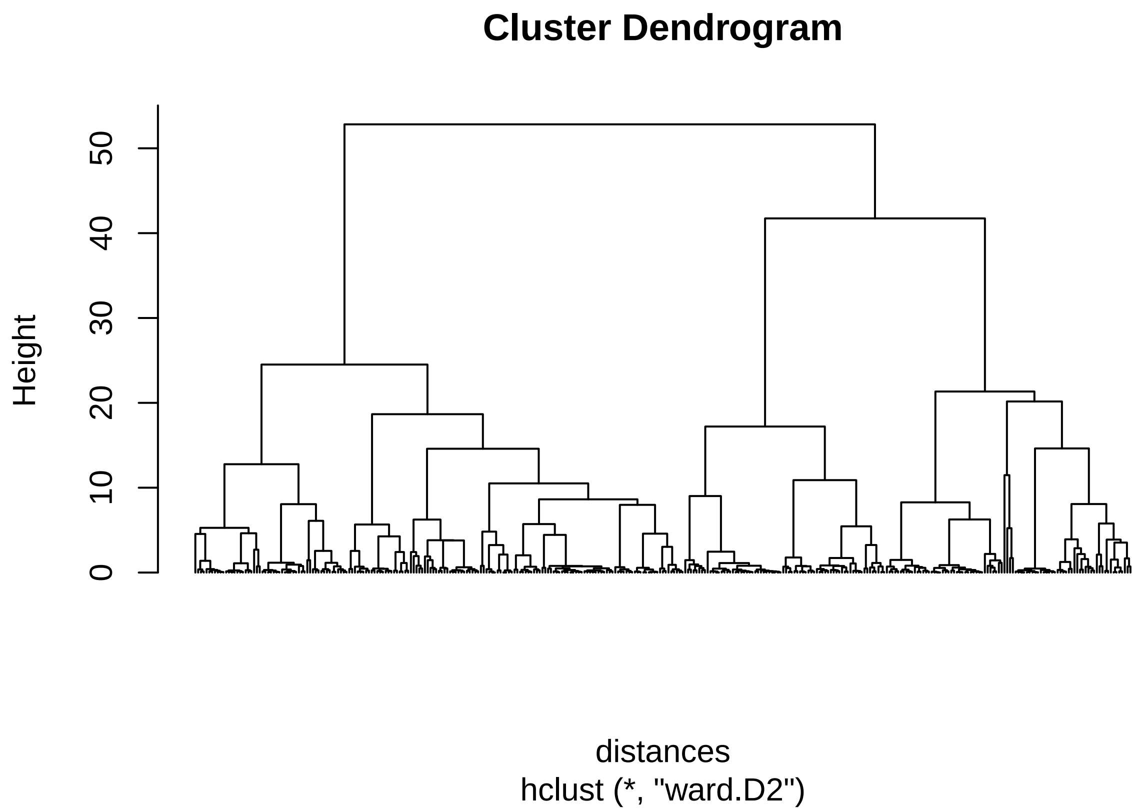
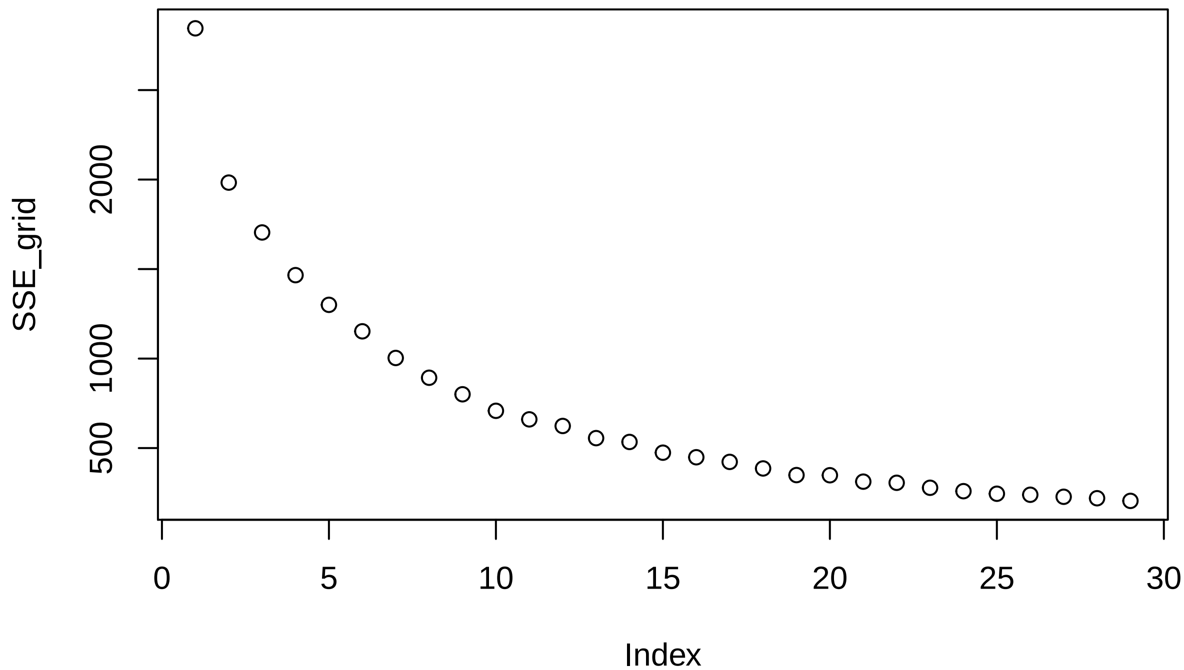


Figure 2 displays a map of Austin and the location of each recorded outdoor space. Moreover, each point displays the result of the interaction variable between post-secondary education as a percentage of population within each zip code and median household income.



Using the Ward method to implement hierarchical clustering, each location of an outdoor space is clustered in a well-balanced denodrogram.



Using k-means and the elbow method, k = 2 along the curve is observed to be optimal.

Table 1: Results

Cluster	Population	No.of.Parks	Share.of.Parks	Total.Acres	Average.Acres	Acres.Per.100000
1	461961	160	0.48	10557.93	65.99	2285.46
2	624313	175	0.52	8165.25	46.66	1307.88

Figure 3

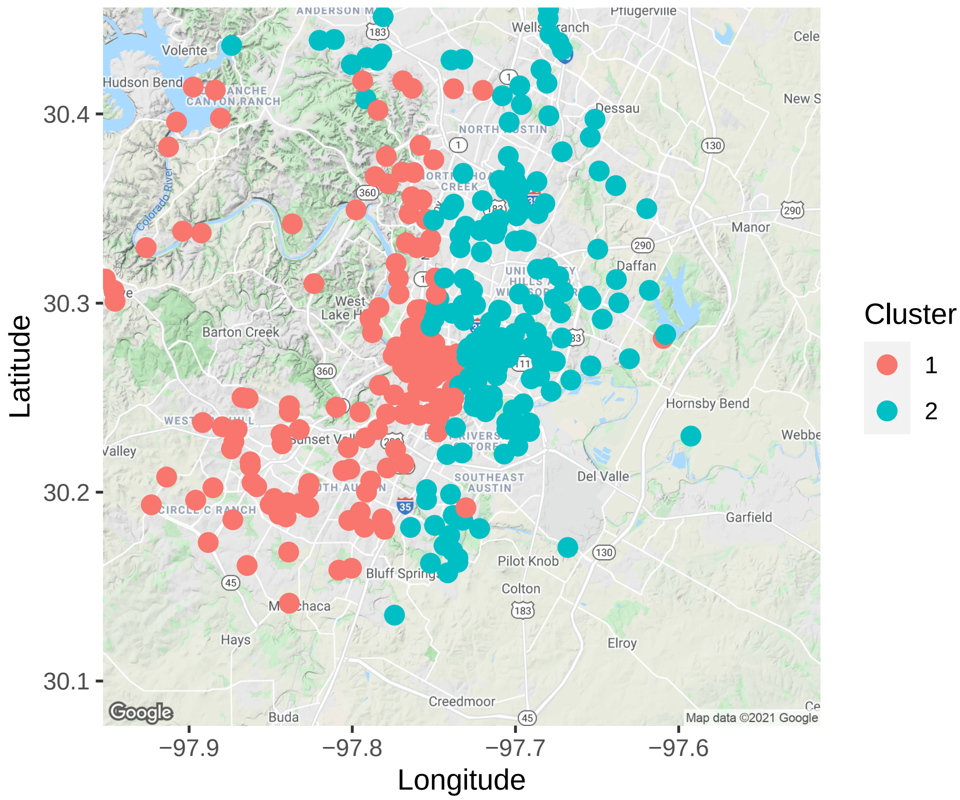


Figure 3 displays a distinguishable pattern of the location of each outdoor space in terms of respective cluster.

V. Conclusion