

A Model for Placing New Urgent Care Centers in Saint Louis

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1 Introduction

Urgent care centers are walk-in clinics that serve communities (1). The U.S. urgent care market size was estimated at USD 19.0 billion in 2017 with over 10,000 clinic locations across the country. This market is anticipated to exhibit a compound annual growth rate of 6.2% (2, 3).

Urgent care centers are not a substitute to emergency rooms; however, their presence reduces the

load on hospitals. There are guidelines of what is considered urgent care and when it should be used (4). Urgent care centers are effective in dealing with many health conditions in a cost effective and timely manner. Many hospitals, physicians and corporations are interested in founding urgent care centers in communities that need them (2). My model will provide these stakeholders with information on the presence of urgent care centers in city neighborhoods. My model will highlight neighborhoods with potential opportunities for new urgent care centers. I use St Louis, the city where I live, to build my model. However, my approach can be applied to any other city.

2 Data

Data on St Louis neighborhoods is available on Wikipedia (5). Using a notebook on IBM Watson, I converted the St Louis neighborhood names and demographics from Wikipedia to a pandas data frame. Note that data do not include the neighborhoods in the St Louis metropolitan area as that is beyond the scope of this project. The coordinates of the neighborhoods were then obtained from Nominatim and added to the data frame. The neighborhoods were then visualized on a map of St Louis using Folium. I used Foursquare to search for the urgent care centers in St Louis. Results, which include addresses and coordinates, were then converted to a second pandas data frame.

3 Methodology

A. St Louis Neighborhoods

This project involved acquiring data about neighborhood names and demographics from Wikipedia, and then getting coordinates of these neighborhoods from Nominatim. This method was freely available; however, it required some data cleaning to get a data frame that contained the neighborhood names with their corresponding demographics and geographical locations. One

of the issues I encountered was that some of the neighborhood names on Wikipedia were different from the names on Nominatim. After data cleaning, I performed some data exploration, where I visualized the neighborhoods on a map of St Louis using Folium. I then examined the population distribution in the three different corridors: north, central and south. I plotted a histogram with matplotlib to examine the population distribution in the neighborhoods. I then used seaborn for a boxplot of the population in the different neighborhoods. To get a better understanding on the population distribution, I used numpy to bin the neighborhoods based on population size into three bins: low, medium and high. I then plotted the resulting bins in a histogram format.

B. Urgent Care Centers

After acquiring, cleaning and exploring data about St Louis neighborhoods, I acquired data about urgent care centers in St Louis from Foursquare. Results were then converted into a second data frame. I then performed data cleaning, where unneeded columns were removed, some columns renamed, and centers that were duplicated or were outside St Louis removed. I then visualized the Centers on a map of St Louis using Folium.

C. K-means Clustering

After acquiring, cleaning and exploring data about St Louis urgent care centers, I used K-means clustering to cluster the neighborhoods based on their coordinates. First, I used StandardScaler to fit transform the coordinates, then used K-means clustering algorithm to determine the best number of clusters. Neighborhoods were clustered by K-means into six clusters and the cluster labels added to the neighborhoods data frame. The clusters were then visualized on a map of St Louis using Folium. I then created a second Folium map that included the neighborhood clusters and the urgent care centers.

4 Results

St Louis is divided into 79 neighborhoods. These neighborhoods are grouped into 3 corridors: north, central and south. The southern corridor has the highest population, while the central corridor has the least. Population of St Louis is not equally distributed amongst the neighborhoods. There are 4 neighborhoods with population of more than 12,000 people each, while most neighborhoods have a population of less than 5,000 people. Foursquare results show that there are 10 urgent care centers in St Louis (note that does not include centers that are outside city limits). Clustering neighborhoods into 6 geographical clusters and visualizing them on a map that also included the urgent care centers demonstrated that the centers were not evenly distributed among the St Louis neighborhoods. For example, cluster 5 which is in the southern end of St Louis has a population of 64,216 with no urgent care centers. While, cluster 3 which is in the western part of St Louis has a population of 54,009 with 4 urgent care centers.

5 Discussion

Using publicly available data and Data Science, I built a model that showed the distribution of urgent care centers in different neighborhood clusters of St Louis. This model is valuable for hospitals, physicians and corporations looking to invest in the urgent care market. This in turn will provide benefit to the residents of the neighborhoods by increasing their access to healthcare. My model used St Louis where I live, but my approach can be applied to other cities. My model is based on examining the distribution of existing urgent care centers in the different city neighborhoods. K-means clustering aids in highlighting areas for new centers.

6 Conclusion

My model showed potential locations for new urgent care Centers. In St Louis these areas include the northern and southern parts of the city.

7 References

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