Introduction & Business Problem

Food insecurity affects over 910,000 Indiana residents. Of those, 280,000 are children. Having to go without food is one issue, but the number of individuals who live in food deserts, especially in major metropolitans like Indianapolis can be far greater. It’s estimated that nearly 200,000 residents of Indianapolis like in a food desert. Food deserts are defined in terms of proximity to grocery stores and/or farmer’s markets. For a city, where residents are expectedly less often owners of their own vehicle, a desert is defined as having no fresh food options within a mile. If cities like Indianapolis want to learn how they can utilize their funding from HUD and other private and public sources for combating hunger and inequitable health in their city, they will want to identify the areas in most need of assistance. So, where are these food deserts in Indianapolis? Using, foursquare location data, along with publicly available Indianapolis zip codes, the city can find the relation of each region to these fresh food options. To further visualize the zip codes in most need, open data source code used to outline each of Indianapolis’s zip codes can be linked with the collected data to create a choropleth map. Key decision makers can use this map to pinpoint neighborhoods and potential locations to advocate for an addition of fresh food venues, so their residents can feel secure with their health and food.

Data

Indianapolis zip codes with corresponding longitude and latitude coordinates can be downloaded via a csv file from a public website and read into the python notebook. Along with these zip codes, the foursquare api will provide a list of venues that match the fresh food option categories set up in the notebook. Lastly, a geo json file found from an open data source can be used to create the choropleth map by linking the zip codes to the table of foursquare results.

Methodology

First step was finding all the zip codes in Indianapolis and the longitude and latitude coordinates associated with each. These values are used in the foursquare search. These zip codes and coordinates were found on a public site1 and formatted in a csv file before being read into the model. Data cleaning was done outside of the code, but only required parsing as all of the table’s data was used as model inputs.

Next, a function was created to call the foursquare location data using their python api. The function searches for venues with a category id matching either a grocery store, farmer’s market, organic food store, or supermarket. The coordinates of each zip code are used as inputs with a proximity radius of 1 mile from each point.

The results were then grouped by zip code and records counted to create a table for the number of grocery stores by zip code. The final model step links the grouped table to a geo json file outlining the zip code boundaries. These boundaries were provided through an Indianapolis open source data site2. A choropleth map is used to visualize the density of stores by zip code, thus indicating residential areas that are classified as food deserts.

Results

The choropleth map shows 13 of the 47 zip codes in Indianapolis have only 1 nearby fresh food option. These neighborhoods are surround the outer region of the city. While some seem to have inadequate options, the map also shows the city’s smallest residential zip code by area, located downtown, has the largest number of 12 store options nearby.

Discussion

The results of this model indicate an inequality of food options between residents living in different zip codes. Fortunately, it also identifies the specific regions where funding to prevent food insecurity would provide the most benefit. Starting with the zip codes with only a single current option, the city might look to fund a farmer’s market or given various project options facilitate the development of businesses looking to sell fresh food in these neighborhoods.

Conclusion

The use of zip codes as clustered regions to investigate and providing a visual map will ensure better decision making on the city’s behalf. And while this model is a good starting point for visualizing food deserts in Indianapolis, further investigation can be done to maximize the benefits to residents. Modelers could look at population density or expand on the foursquare results to categorize grocery stores further based on healthiness of their products, or even look at linking food to health trends in various neighborhoods. These additional details can help the city make best use of their money to tackle the root problem.

1 <https://indianapolis.areaconnect.com/zip2.htm?city=Indianapolis&search=zip>

2 <https://data.indy.gov/datasets/bba987ced0cf4b7086650e3656b30d69_7>