Social Determinants of Health

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Introduction

According to the CDC, social determinants of health (SDOH) are the conditions in the places where people live, learn work, and play that affect a wide range of health risks and outcomes. This project seeks to visualize disparities in SDOH, such as limited access to healthy foods, to aid in advancing health equity.

Data

- **Measurement to Understand the Reclassification of Disease of Cabarrus/Kannapolis (MURDOCK)::** A longitudinal survey primarily conducted in Cabarrus County, NC whose aim is to identify common traits and patterns among leading causes of illness/death.
- **American Community Survey (ACS):** An ongoing annual survey conducted by the U.S. Census Bureau.
- **Google Places API:** A system with a database of places and their respective addresses, user ratings, and reviews.

Goal

Create a dataset and visualization tool that assists the MURDOCK research team in exploring health outcomes in Cabarrus County, NC.

Methods

- Create a database of resources within the county
- Visualize spatial distributions of these resources
- Map MURDOCK participants' proximity to resources
- Visualize distributions of MURDOCK participants' health outcomes

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Phase I: Database Creation

A database of the resources within Cabarrus County was compiled using Yelp and Google Places' API. There were 17 categories for the resources compiled, ranging from grocery stores and schools, to Starbucks locations and vape stores.

Each entry was then flagged using a binary system based on which categories the entry belonged to. This was done to facilitate efficient subsetting of the data.

Table 1: An example of how the database is organized and the information it contains.

id	name	rating	rev. count	lat / lon.	add.	source	cat. 1	cat. 2	cat. 3
12	ABC	4.2	97	x,y	add. 1	Yelp	0	1	0
34	XYZ	3.1	6	x,y	add. 2	Google	0	0	1

Phase II: Resource Distribution

Using data from the ACS and the database compiled in Phase I, we created an interactive mapping application using R Leaflet and Shiny packages that provide a visual distribution of resources within Cabarrus county.

Users can toggle which underlying demographic from the ACS and resource from the database they want to view.

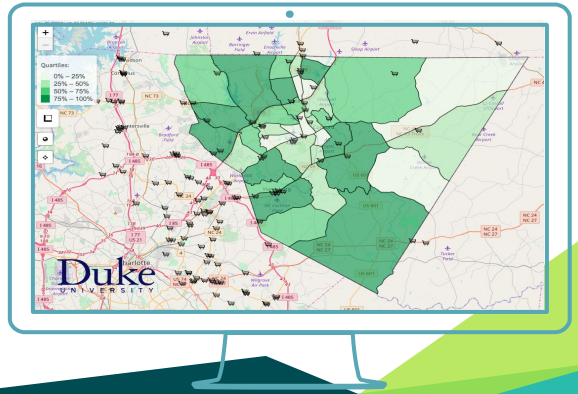

Figure 1:
An image of the tool, currently showing the distribution of total population in the county by census tract, overlaid by grocery store locations.

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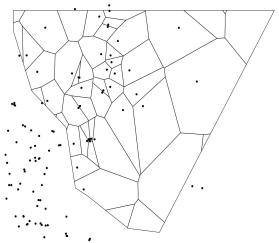
Phase III: Determine Proximity

Voronoi mapping was used to determine which resource was closest to each address. Each polygon represents a resource's region of influence. The dots represents the location of the resource itself. The polygons, voronoi cells, indicate the resource the addressee is most likely going to use.

Figure 2:
A voronoi diagram of grocery stores, clipped to the shape of Cabarrus county.



Using Google's API, the driving/walking time and distance from an addressee to their closest resource was determined.

Table 1: A database of addresses and their respective distances to two types of resources.

ADD_ID	MI TO R1	MIN TO R1	MI TO R2	TIME TO R2
43428	4.3	15	2.4	7
42349	3.7	10	1.8	5

Next Steps:

1. Determine MURDOCK participants' proximity to all of the resources compiled in Phase I.
2. Map the distribution of health outcomes in Cabarrus county, such as prevalence of diabetes, heart disease, and depression.

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