Visualizing Accessibility of Chicago's Amenities
CAPP 30122

I.   beautiful_stew Group Members

Name	CNet ID
Irsa Ashraf	*irsaashraf*
Ian Jeong	*ianjeong*
Evy (Yunjoo) Park	*yjp*
Kelley Sarussi	*ksarussi*

II.   Project Overview

Generally, individuals consider basic needs such as cost of living, safety and economic security when they choose where to live. Beyond these factors, there exist other desirable amenities that may play pivotal roles in the quality of life within a neighborhood or area.

Our motivating question asks: What amenities do people value? Is there a relationship between community demographics and the amenities available to its residents? Understanding where desirable amenities are located could help evaluate how quality of life may differ across neighborhoods. We produce a visualization to show which neighborhoods in Chicago have these amenities and in what quantities.

We create a map of pharmacies, libraries, murals, and Starbucks cafes in Chicago's 77 neighborhoods. These particular amenities cover a broad array of what might make a neighborhood an appealing place to live: access to healthcare, education beyond schools, arts, and local gathering places/expected change in housing prices[1], respectively. We also estimate the Shannon Diversity Index[2], to gain a better understanding of the diversity of reachable amenities from any point in the city.

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[1] Glaeser, E. L., Kim, H., & Luca, M. (2018, May). Nowcasting gentrification: using yelp data to quantify neighborhood change. In *AEA Papers and Proceedings* (Vol. 108, pp. 77-82). https://www.aeaweb.org/articles?id=10.1257/pandp.20181034

[2] Graells-Garrido, E., Serra-Burriel, F., Rowe, F., Cucchietti, F. M., & Reyes, P. (2021). A city of cities: Measuring how 15-minutes urban accessibility shapes human mobility in Barcelona. *PloS one*, *16*(5), e0250080.https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0250080

III.   Code Structure

Data Sources:

- City of Chicago Data Portal - accessed via API
  - Mural, Pharmacy, and Library locations
  - Chicago Community Area Shapefile (accessed via download)
- Mapquest - accessed via API
  - Starbucks locations
- The U.S. Census Bureau
  - Demographic characteristics - accessed via CSV from Chicago Metropolitan Agency for Planning
  - Socioeconomic characteristics - accessed via CSV from Chicago Open Data Portal

The location and demographic data is converted to Pandas Dataframes and lists of dictionaries in order to be mapped onto Chicago neighborhood boundaries. The mural, pharmacy, and library locations were standardized and cleaned in cdp.py. Starbucks data was imported and cleaned in starbucks.py. The U.S. Census Bureau data was imported from CSV and cleaned in demographics.py.

app.py imports the lists of dictionaries for each data source and calls on map_util.py to generate an interactive map in Dash-leaflet.
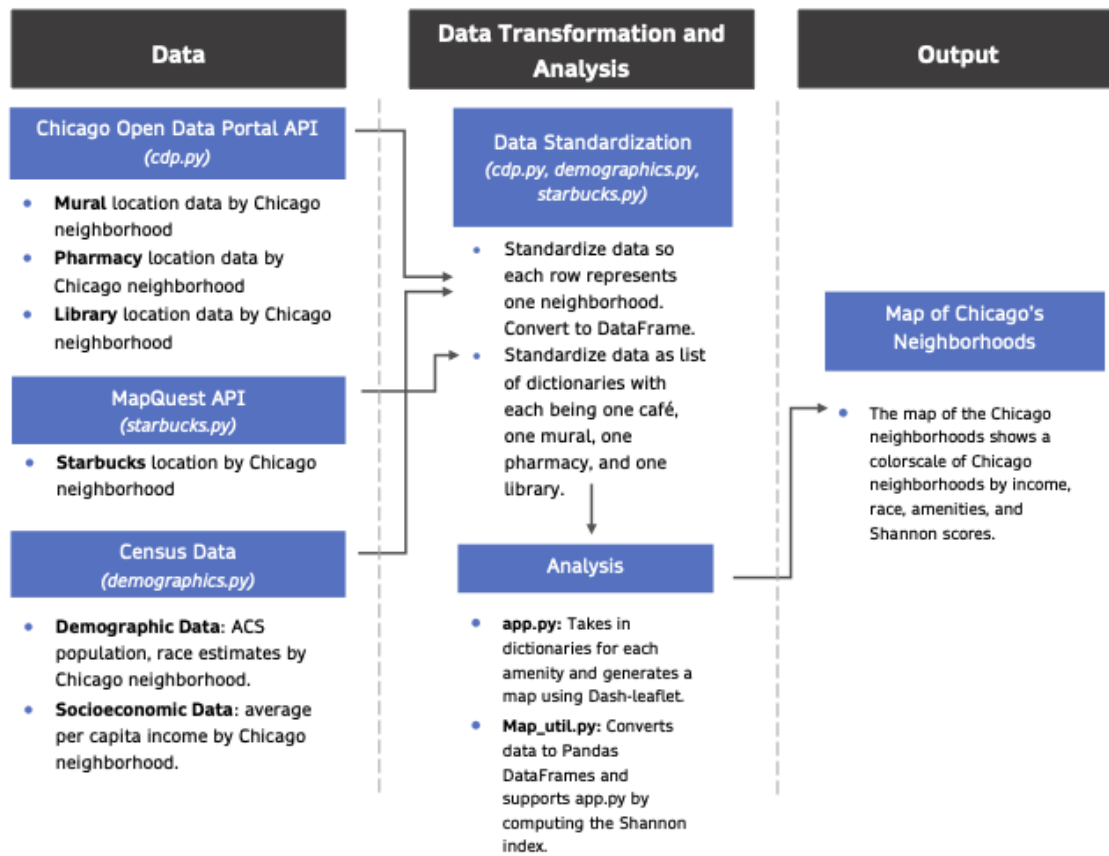
IV.   Code Responsibilities
- Irsa and Kelley were responsible for the data gathering, importing, and wrangling from Chicago Open Data Portal (cdp.py).
- Kelley collected and cleaned demographics data (demographics.py)
- Evy gathered and cleaned Starbucks data (starbucks.py).
- Irsa wrote the shell scripting file to automate the project (install.sh).
- Ian wrote the scripting files to calculate the (map.py, map_util.py)
- Ian and Evy created the map in Dash (app.py)

Each teammate also contributed to more than just the files listed in parentheses by giving feedback, ideas, and comments on each other's code and files. Individuals also collaborated, even if the Git edit history shows that only one person pushed their code.

V.   Description on interaction/outputs

The final output is a map showing the neighborhoods of Chicago with options to toggle layers for the locations of the amenities we are looking at, racial and income data, and an option to click on the map and see the estimated Shannon index for that particular point. Here is more detail on the interactivity:

Clustering: each amenity clusters when there are several concentrated within an area. They split apart when the user zooms in.

Neighborhood selection: clicking on a neighborhood will allow you to zoom in on the selected area.

Layers: the user can select which layers they wish to view by using the list on the top right corner of the map.

Hover: hovering over an amenity marker will give you the name of the amenity.

Shannon score: clicking a point on the map will generate the Shannon score for the selected coordinates. A Shannon score of at least 0.0273 indicates that there is at least one amenity from each amenity category within 1 mile (1 Starbucks, 1 mural, 1 library, 1 pharmacy), or there are several amenities from a few of the categories.

VI.   What we tried to accomplish

Our goal for this project was to analyze the accessibility of certain amenities in Chicago. Chicago has a long history of disinvestment in lower-income neighborhoods and communities with higher Black and Latino populations, so we hoped that this visualization would allow us to draw insights regarding neighborhood amenities within these areas.

Ultimately, we produced a map that allows a user to see which amenities are located in which neighborhood across the city. The map includes layers that express income and race by neighborhood, and allows the user to filter out certain amenities. We sought to quantify these amenities by calculating our version of the Shannon Diversity Index and incorporated this data into the map as well.

We originally hoped to include a dashboard that would allow someone to see the statistics on these data for each and any neighborhood by choosing neighborhoods and categories from a dropdown, in order to incorporate another facet of data presentation that may better inform the user. However, we did not have enough time to produce this along with the map.