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Section 1: Introduction

People work everyday so that they can better their lives. Some people however, have an easier time doing so compared to others. The people who have it easy, will gain more faster than people who don't, which creates a barrier where the unfortunate can't catch up to the fortunate. In order to help these people who aren't as fortunate as others, we need to think of equitable solutions. Equitable solutions, and equity in general, is when we provide a proportionate amount of support to people who need it the most. Otherwise, if we give an equal amount of support to an entire population, those who need support will be helped, but those who didn't need support have gained more. With that being said, unfortunate groups can't catch up to the fortunate ones when all groups are receiving equal and not equitable relief.

Section 2: Technical Report

In order to learn more about equity analysis and create solutions, my team and I created our own case study. It is titled "Equity Analysis of Los Angeles County", and we wanted to know if underrepresented groups in Los Angeles were allocated enough resources to reach an equitable outcome. We chose Los Angeles County because it is known for having a large

population of people who either live lavish lives, or live in poverty. Our problem is that we don't

know which groups of people live in poverty and we don't know which resources are at their

disposal. It's important that we determine these factors because if the rich have access to the

majority of the city's resources, then we are presented with an inequitable scenario where the rich

get richer and the poor get poorer. Our solution to bridging the gap between rich and poor is to

find out who needs support, what type of resources they need, and where they need to be given.

Data Sets[1]

Data Content	Data file format	Data type	Description
California County, Drinking Water Pctl, Tox. Release Pctl, Traffic Pctl, Haz. Waste Pctl, Poverty, Unemployment, Education, Housing Burden, etc.	Geodatabase, csv, excel sheet	Polygon Vector, data table	California Office of Environmental Health Hazard Assessment SB 535 tract list contains the list of census tracts identified as disadvantaged communities (DACs)
Address, city, zip code, name, grade level	Shapefile	Point Vector	Los Angeles Unified School District school campuses

Our main data set was discovered through reading about poverty levels in LA. From there we did

further research on where the author got their data, which led us to the California Office of

Environmental Health website. From there we downloaded our first dataset, a geodatabase

consisting of polygon vectors of Los Angeles County with over thirty attributes for all the

neighborhoods in LA county. Some of the attributes that we used were population, percentage of

population under poverty threshold, and percentage of population that didn't receive a high

school diploma. Our next data set was a shapefile consisting of point vectors of K-12 schools in

[1] Download link for all project materials including project shapefiles, Map Project, etc:
https://drive.google.com/drive/folders/1TKz-KSUcCWqvwNMt3A2yj3MV8tfMbMqW?usp=sharing

the LAUSD. Some of the attributes in this shapefile were address, city, grade level, school name, latitude and longitude.

Analysis

We used a few different methods of equity analysis. First, we layered the point vector layer of schools on top of the polygon vector layer of LA County to get an overview of where all the schools were located. Next, we placed a 1 km buffer, which is a circle, around every single school vector. After dissolving overlapping lines within the entirety of the school district, we were able to get a service area for LAUSD schools in LA County. Once the service area boundary has been established, we can compare variables such as poverty, population, percent Hispanic, percent Asian, percent White, percent Black, and percent Native American. Our second analysis method consisted of a correlation heatmap which compares our main variable, poverty, with the other variables in the dataset. Our last analysis method is spatial autocorrelation which determines whether areas closer to each other will have similar characteristics.

Role

My role in the group was to research the concept behind equity analysis, find data, and create our maps and perform the related analysis in ArcGIS pro. Some of the tasks that I have done for the group included finding our main dataset, its variable dictionary, and our secondary dataset of school in Los Angeles. Using ArcGIS pro, I created multiple drafts of our maps and ultimately our two main maps in our presentation. Additionally, I used the built in geoprocessing

tool to calculate spatial autocorrelation using Moran's I. In order to better understand our project concept and to help my teammates understand it, I also read a handful of articles and journals related to equity analysis. Last, I created group chats in a chat server named Discord where we coordinated ideas and shared data and articles with each other.

Results

We have found out that among the five main races, the White ethnicity is shown to have the largest majority of the population that isn't in poverty. We can see that there are more Hispanics and African Americans that are in poverty versus not in poverty.
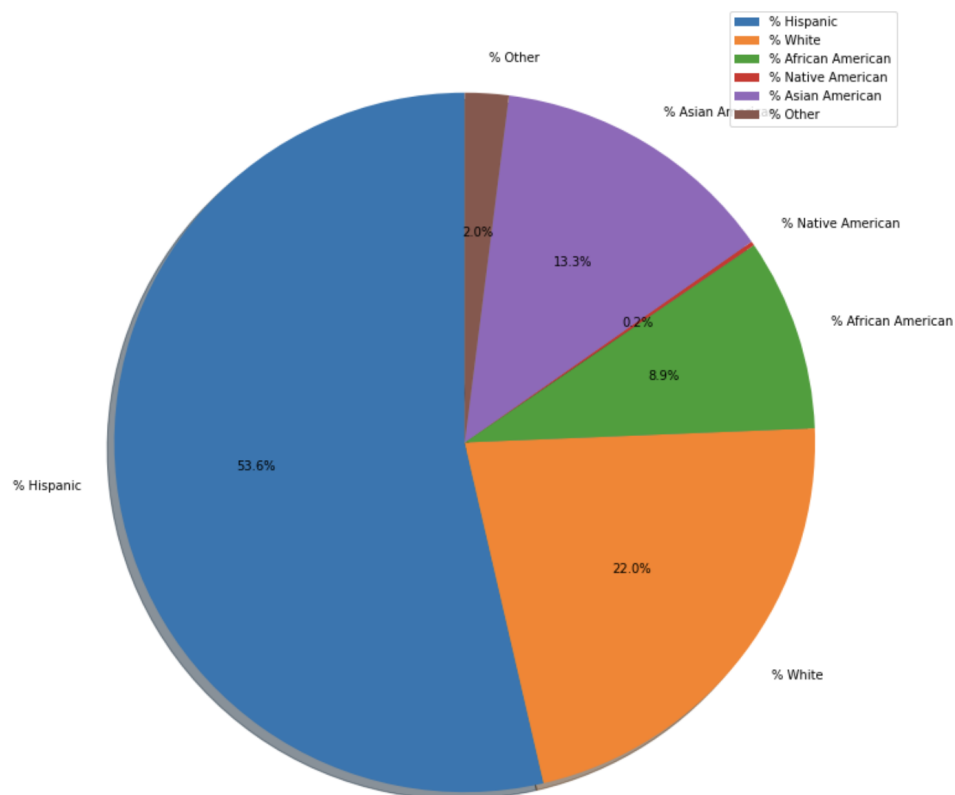

*Distribution of races in impoverished neighborhoods in LA County*
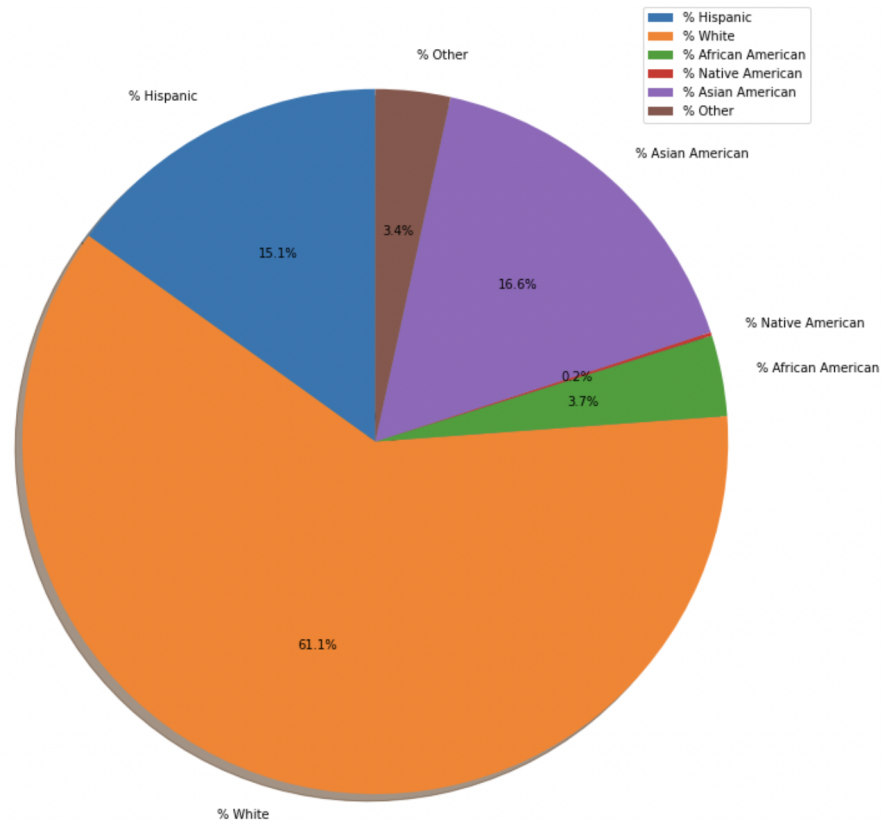
Distribution of races in wealthy neighborhoods in LA County

In order to find out what type of resource these people in poverty need, we created a table which lists the correlation of all our variables and poverty. We learned that one of the highest variables correlated with poverty is the percentage of people without high school diplomas, or low education. Knowing this, we can find out if there is an equitable distribution of schools in LA County.
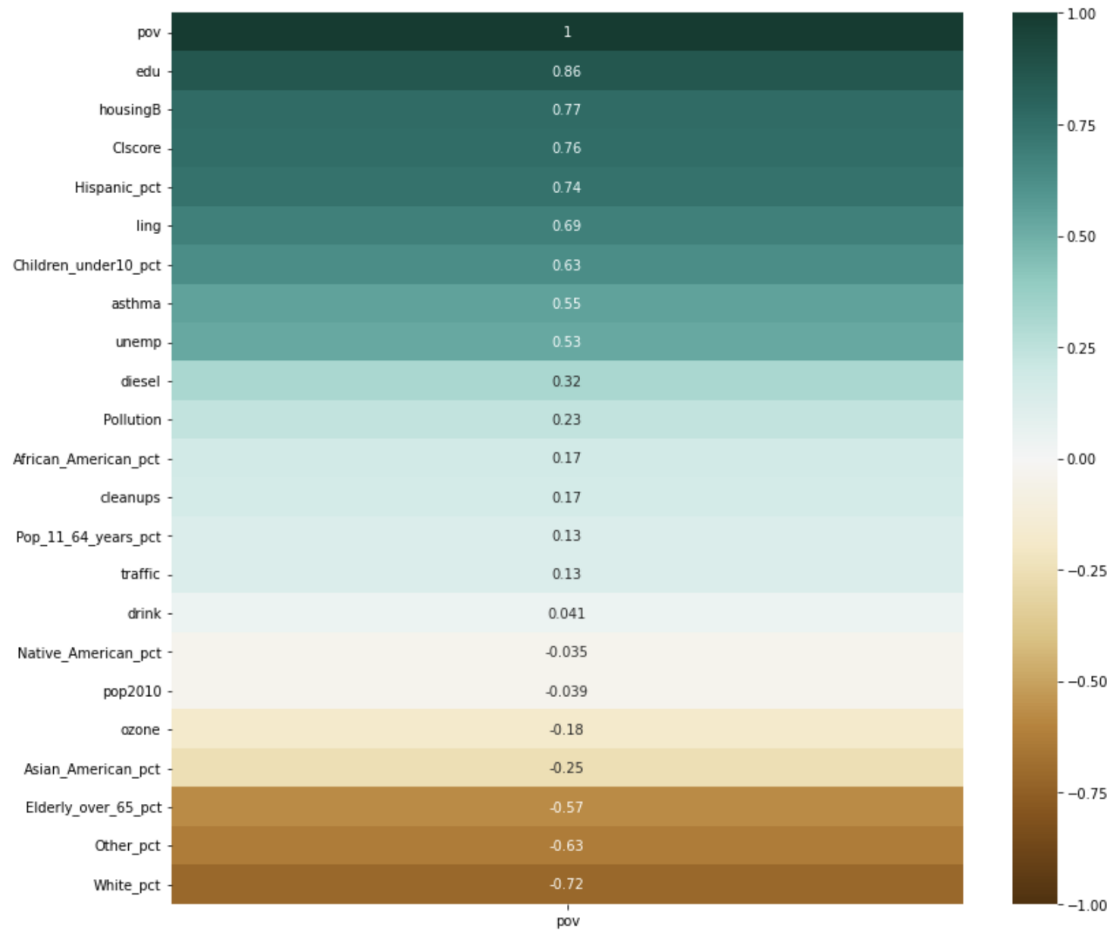
Correlation heatmap of the percentage of people living under the poverty line (pov) and other

variables

Using our maps, we can see that the population within the service area that we created using buffer tools lives below the poverty level and a very small percentage of people outside the service area live below the poverty level. This tells us that we have an equitable distribution of schools in LA County because the service area of the schools covers the population that needs it the most.

Service Areas for LAUSD Schools in Los Angeles
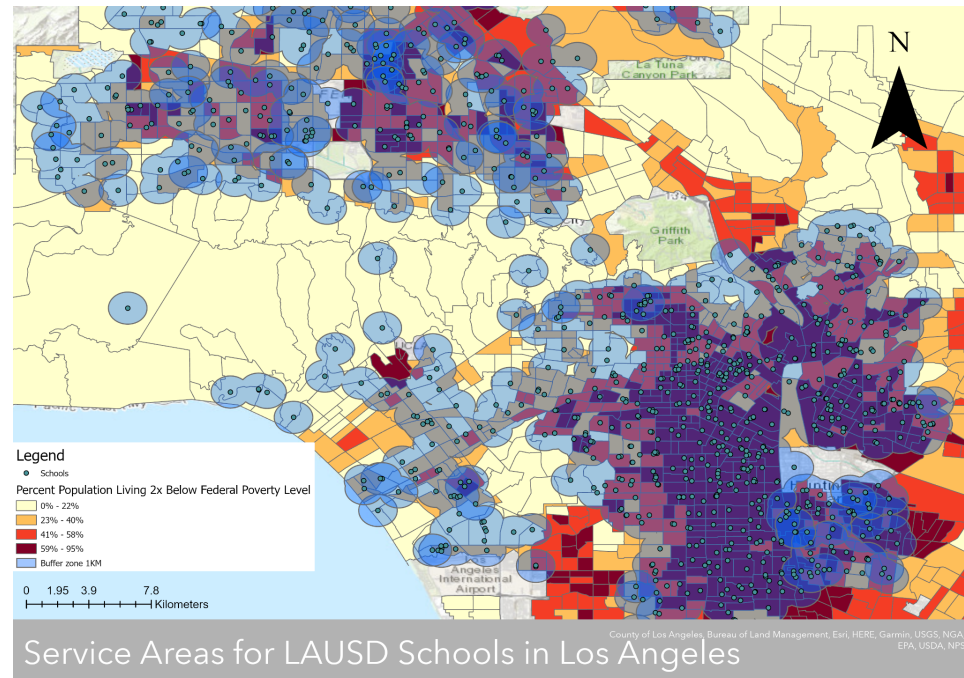
Section 3: Conclusion

A vital element of spatial analysis that we are lacking is a transit analysis for schools in LA. This adds more depth to the study because the service area doesn't provide a realistic view of whether or not people are in the vicinity of these schools. To get from one place to another, we primarily use roads. Using this information, we can see the shortest and cheapest route one has to use to get to the nearest school. To simplify, although a person lives within a school's service area, it doesn't mean that that school is the most efficient school to travel to. We need to take into account the most efficient route a person needs to take to get to the nearest school. This factor can potentially influence our map because in general, the transit view of the service area can be smaller than the buffer zone.

After completing this project, I learned the difference between equality and equity. I learned from my groupmate different ways to put meaning to the data we collect. A new thing I

learned in ArcGIS Pro that I didn't learn in class was how to calculate spatial autocorrelation and how to create thiessen polygons.

One of the challenges that I faced when I was working on this project was finding a topic that I am interested in. I am someone who is interested in a variety of topics, so narrowing down to just one is hard. Another challenge I faced was understanding and conducting an equity analysis on a region. This was very challenging because equity analysis is a very broad topic. Determining who is underrepresented, what they are lacking and whether or not the situation is equitable is difficult because there are multiple factors to consider to make a conclusion. The next challenge I've faced was trying to quantify equity. Performing various statistical analyses on our data was difficult to understand and implement.

If I were to do this project again, I would take into consideration accessibility as a factor in equity analysis because the level of accessibility for a location is a solid criteria to assess the degree of equity. As stated earlier, adding a transit analysis layer to complement the service area buffer would be beneficial because it will add a more realistic viewpoint of who can access a certain location using roads. A final thing that I would do is learn more about the topic before proceeding with the project. I think that our project could have been more convincing if I had a better understanding of what factors I need to consider in order to perform equity analysis on a region.

Section 4: Career-Readiness Component

In one sentence (25 words or less), describe this course to your friend who might be interested in taking the course.

Intro to Geographic Information Systems is a data analysis class that teaches students how to create or find data, then manipulate, analyze and display that data with maps.

In one sentence (25 words or less), describe how what you learned in this course could contribute to the society or community in which you are involved.

What I learned in this class can be used to contribute to society because I can take data that someone can't understand at face value, and turn it into something people can use to understand better, solve problems, and make decisions.

In one sentence (25 words or less), summarize how what you learned in this project could apply to your future career in research or GIS industry.

I learned how to turn data into something that people can understand at a glance using ArcGIS and python.

If you were to interview for a GIS position, describe how would you articulate your readiness and qualifications for that position (in one or two sentences, less than 100 words)

I can demonstrate that I am capable of utilizing GIS skills for data processing, analysis and mapping by finding solutions to, or unraveling, real life problems in both independent and collaborative research projects. Doing so allows me to further develop my teamwork, critical

thinking and problem solving skills. I've shown that I am comfortable communicating what I've learned in a straightforward manner through oral presentations in front of my peers, and in writing.