Isla Vista Housing Guide

Edwin Gutierrez, Zhuo Tang, Juliet Bachtel, Jerald Zhao

Background

Isla Vista is a 1.86 square mile community that contains a population of over 20,000 people. The majority of Isla Vista's residents are transient students of the University of California, Santa Barbara or Santa Barbara City College. It can be difficult to fully understand the dynamics of Isla Vista when deciding on where to rent an apartment. And our project aims to provide a guide people can rely on to find the housing that is best suited to them.

Abstract

Our research question is: What are the most optimal housing parcels based on someone's personal preferences for the following factors: estimated monthly rent, noise, crime, proximity to recreations such as the beach, gyms and parks and proximity to conveniences such as campus, bus stops, and supermarkets. The methods we used included data entry, kernel density analysis (for noise), line density analysis (for crime by roads) and network analysis (for distance to proximity points). We then normalized the data and had people assign a preferred weight to each factor (with the weights adding up to 20). The weights then were calculated into a final score that is displayed on a map with blue being more optimal and red being less optimal. We then created maps for each of our team's personal preferences. Overall, our results were that noise appears to be highest around 6500 and 6600 blocks of Del Playa Rd and crime highest in the 6800 block closest to the beach. More optimal housing near conveniences appears to be in the 6500 block closer to El Colegio Rd while more optimal housing near beach access is near the streets closer to the ocean. However, some drawbacks from our project as some of the data was not precise such as the estimated rent, crime and noise data that may skew some of our results. Going forward, we hope to turn this project into an interactive online interface using leaflet.

Data

- Parcel data from Z-world as a polygon and extracted to a point shapefile.
- Estimated monthly parcel rent data derived from Zillow.com.
- Accessibility point data created from a base map on ArcGIS online.
- Road data from Santa Barbara County as a line shapefile.
- Crime and noise data (noise being noise violations) from UC Police Department ARMS Database as a PDF table from May 30th 2017 to May 30th 2018
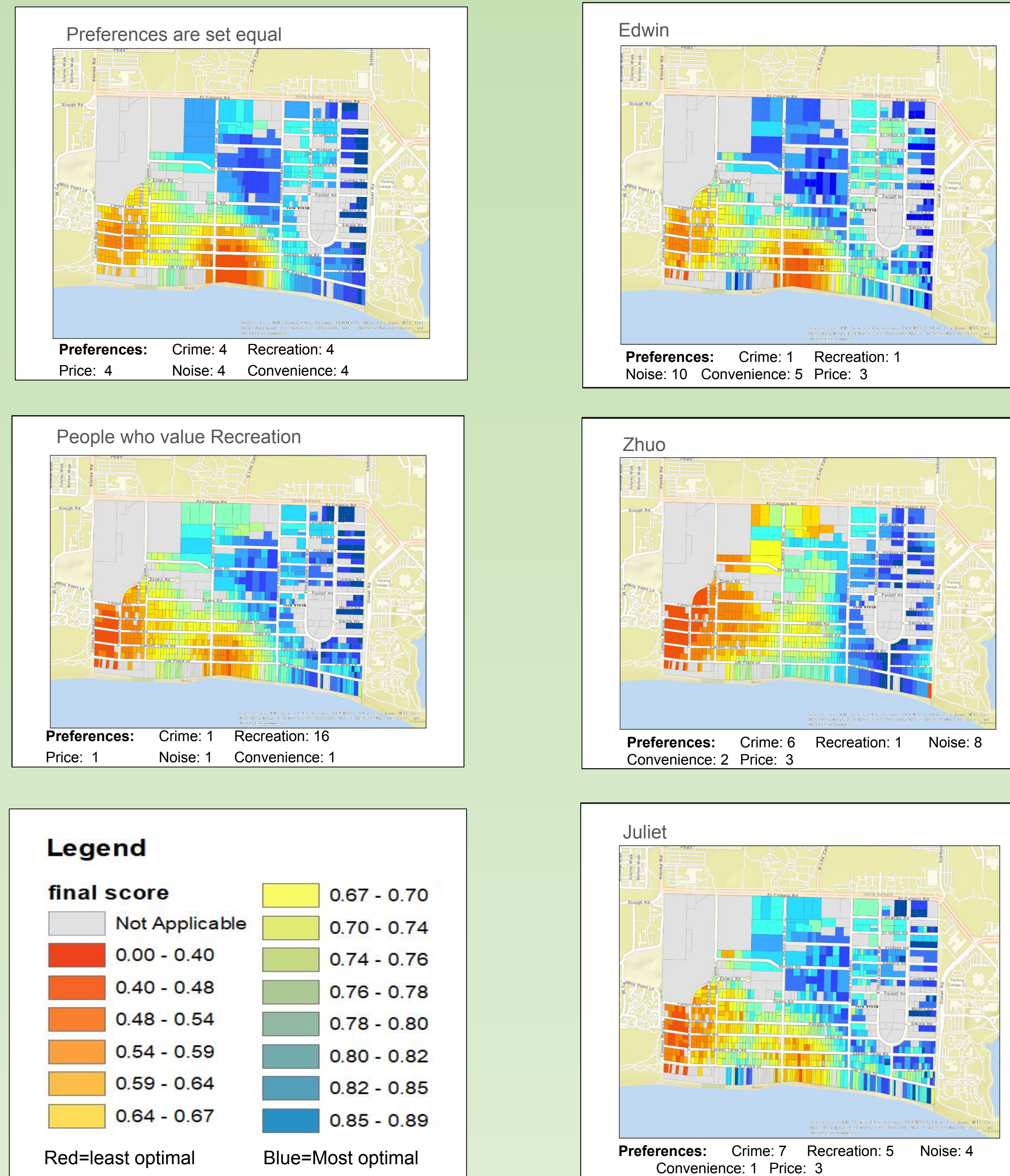
Methods
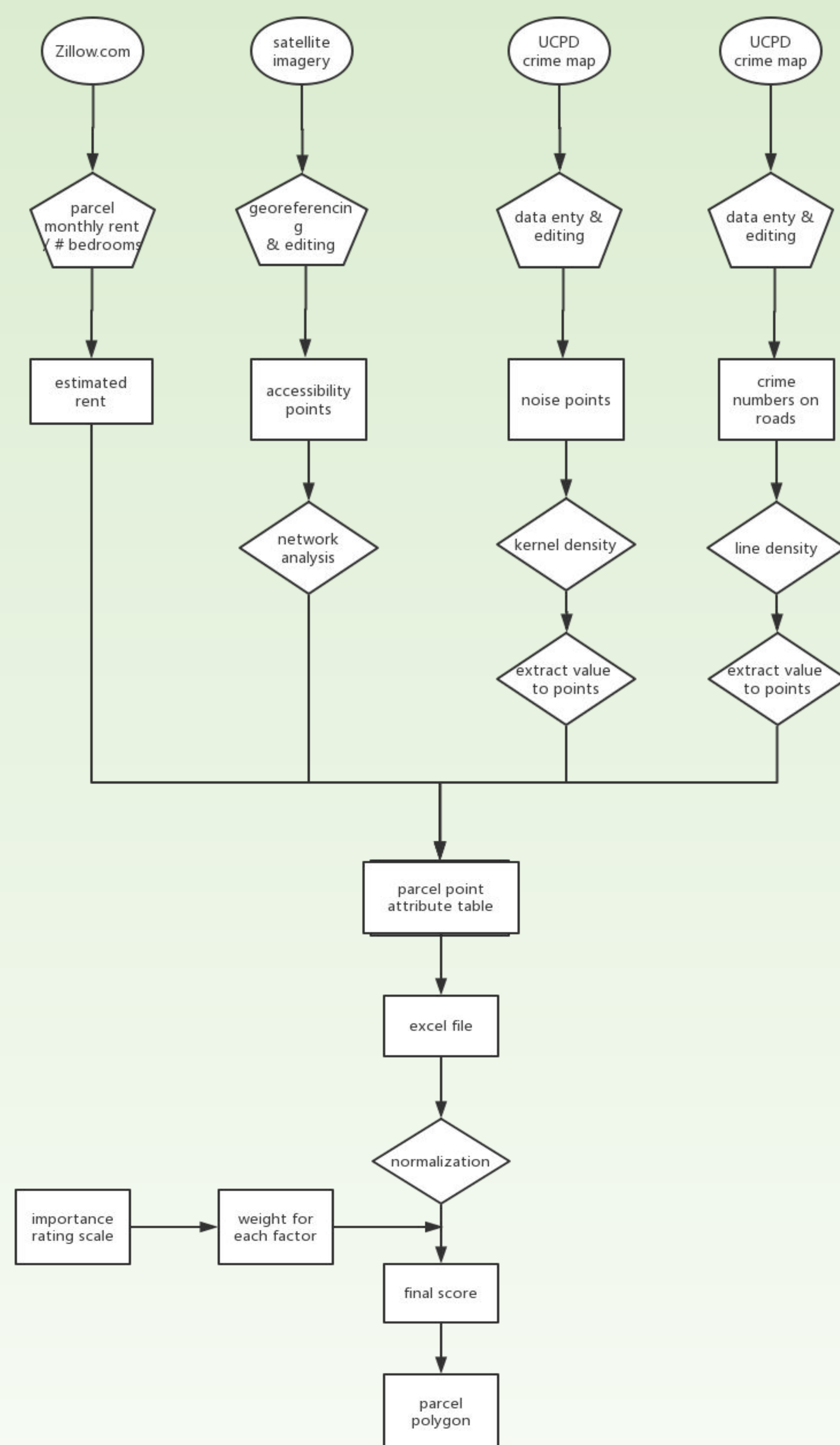

Normalizing the data: (create a factor index value)
1. (Max value - observed value) / (Max value - Min value)
   a. Put on a 0 to 1 scale (1 = lowest factor and 0 = highest factor)
2. Allocate weight scores to each factor by importance from a total score of 20.
   a. (rank value / total rank values) * factor index
3. Add all of the weights to create a final score for each
4. Final score: larger values are more optimal, smaller values less optimal

Results

Preferences are set equal — Preferences: Crime: 4 Recreation: 4 Noise: 4 Convenience: 4 Price: 4

Edwin — Preferences: Crime: 1 Recreation: 1 Noise: 10 Convenience: 5 Price: 3

People who value Recreation — Preferences: Crime: 1 Recreation: 16 Price: 1 Noise: 1 Convenience: 1

Zhuo — Preferences: Crime: 6 Recreation: 1 Noise: 8 Convenience: 2 Price: 3

Juliet — Preferences: Crime: 7 Recreation: 5 Noise: 4 Convenience: 1 Price: 3

Legend
final score

|	
Not Applicable	0.67 - 0.70
0.00 - 0.40	0.70 - 0.74
0.40 - 0.48	0.74 - 0.76
0.48 - 0.54	0.76 - 0.78
0.54 - 0.59	0.78 - 0.80
0.59 - 0.64	0.80 - 0.82
0.64 - 0.67	0.82 - 0.85
	0.85 - 0.89

Red=least optimal   Blue=Most optimal

Analysis

In general, the line density results have shown that there is more crime in 6800 blocks. However, we believe that this is due to the line density not being clipped to the road geometry. The streets are closer together in 6800 blocks which shows a higher density of crime in that area despite the crime being highest on Del Playa Drive (especially on 6500 block of Del Playa Drive). The kernel density results have shown that there is more noise near the intersection of 6600 and 6500 block of Del Playa Drive going up towards Trigo Road. This makes sense as Del Playa Drive and Sabado Road are very popular streets to hold parties. The network utility analysis results have shown that 6800 block is less optimal as it tends to be farther away from conveniences such as food areas, bus stops and campus access. The parcel property estimated monthly rent also shows higher prices on 6500 block Del Playa Drive and 6800 block.
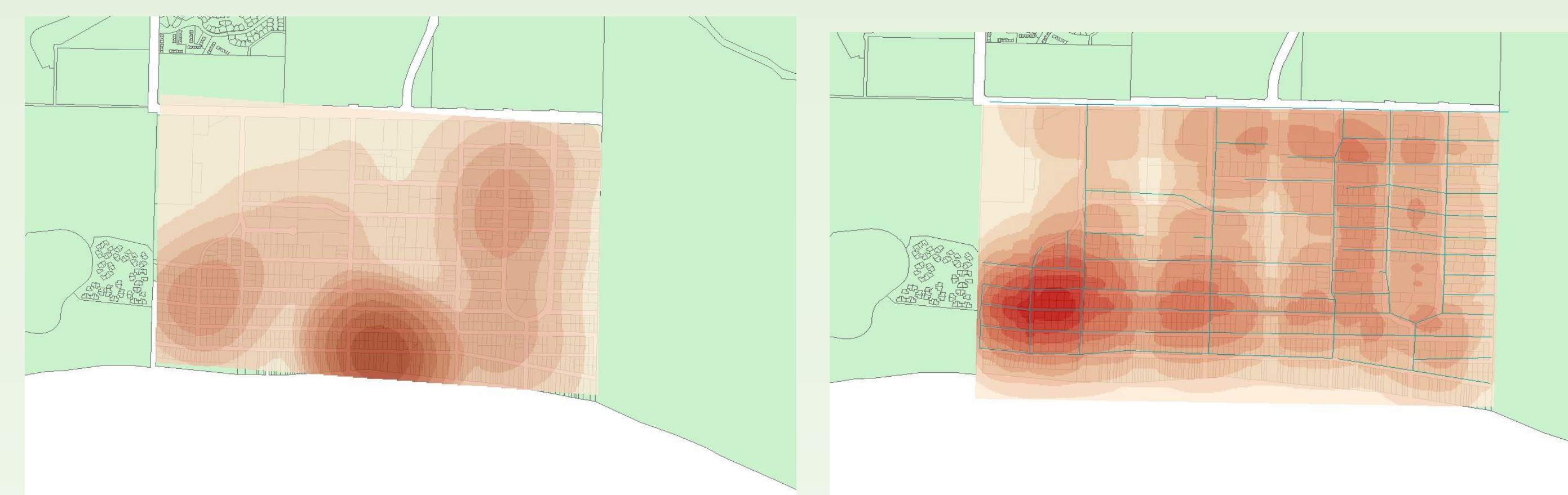
Kernel Density

Line Density
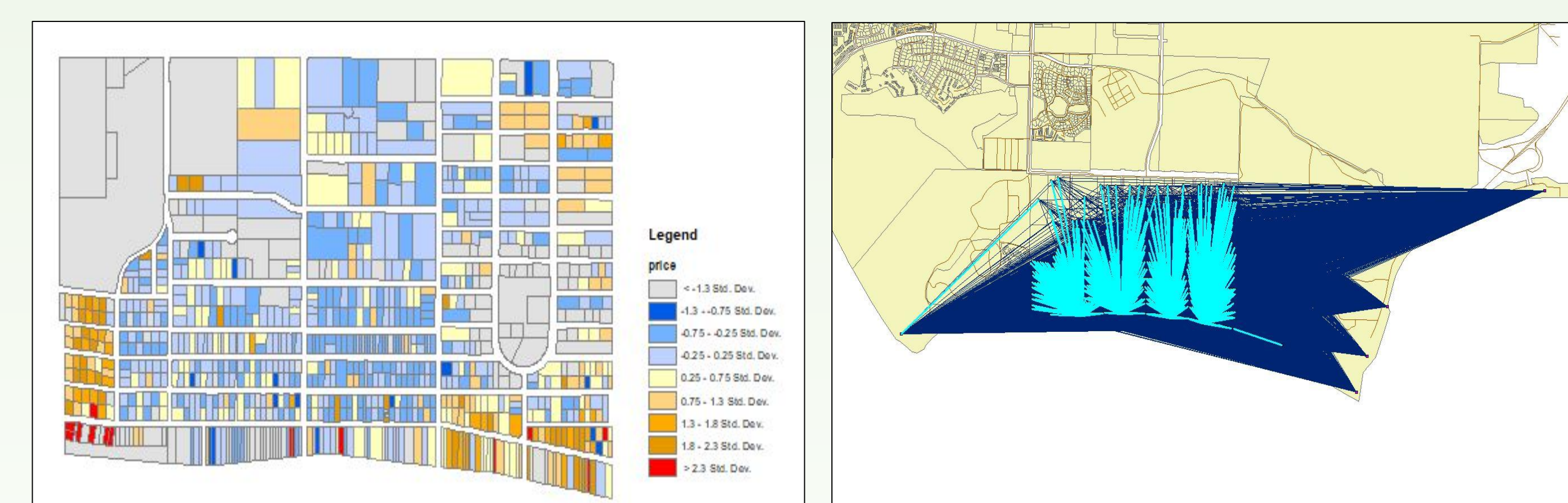
Estimated monthly rent per parcel

Network Analysis (OD Cost Matrix)

Challenges

Some challenges included the tedious and time consuming nature of the project. We had to shift through a year of crime reports from the UC Police Department (76 pages) which limited how far back we could feasibly use the crime and noise violation data but it did help us stay current. In addition, the estimated monthly rent by parcel had to be entered by hand for each individual parcel using Zillow.com as a reference (there are hundreds of parcels. Another challenge was figuring out the weighing scale and how many total points should be allocated to each factor.

Limitations and Improvements

- The data for all factors could have been more standardized to ensure better accuracy when comparing the data to each other. With our method, we simply limited the maximum and minimum values but it allowed for outliers to skew the data. Standardizing all of the data would make it more uniform and accurate to compare to each other with less outlier influence.

- The imprecision of the crime and noise data. The precise location of some crimes is not available to the public in order to protect the privacy. And in the database, incident points close to each other are also merged, making it less accurate. Most were given the roadblock location but many were given just the street name so we added the street name only crimes to every block in that street. This results in some roads having more crime that they really do. The noise data was similar but put more accurately on intersections.

- Many parcels have multiple dwelling units with different numbers of bedrooms that affected the estimated number of rent. We averaged those dwelling units out but actual rent may be more or less depending on our average. Some rent prices were unavailable so we had to make educated guesses and our rent only included the rent for one bedroom while it is widely known that many students double or triple up in a room (which would skew the monthly rent data).

- Timeliness of the crime and estimated rent must be updated. We tried our best to use the latest data, however, the data must be updated regularly to provide a timely recommendation.

- Combining accessibility factors (bus stops, marketplaces, and campus access). To simplify the calculation, we combined six accessibility factors to two by combining similar factors, however, this procedure fixed the relative weight between these factors, which may impair its validity.

- Our kernel and line density maps could have also been smaller to provide more accurate density data which would alter our results a bit. We should have used a triangle shaped kernel density to better match how sound spatially degrades and a negative exponential function should be used in the utility network analysis to better match distance decay over time. The linear density function should have been clipped to the road geometry to avoid the skew in 6800 block.

Conclusions

In conclusion, the maps have a general trend where 6800 block and 6500 / 6600 block of Del Playa Drive, Sabado Tarde Road, and Trigo Rad are considered not optimal for housing. For 6800 block, this probably due to the generally high cost of rent in the area, high density of crime (due to the streets being closer together) and farther distance to proximity points (excluding beach access). Having three not optimal factors in one area will probably skew most of the results to showing that area being less optimal regardless of the weight of each factor. The factor weight will still have an effect, but it appears that it slightly extends or retract that hotspot area. This is similar to 6500 / 6600 block of Del Playa, Trigo and Sabado Roads since there is a very high density of crime in that area (and high rent) that will make that area a bit more prone to be less optimal. However, the weight still affects the results. Zhuo's result had the 6500 / 6600 block have a yellow (medium optimal) score while Edwin and the default equal preferences result had that in bright red (extremely less optimal). It appears that the more optimal housing is closer to El Colegio (closer to bus stops, farther from noise and crime) and 6500 blocks (closer to campus and food shop access while being farther away from crime). Although the maps tend to have general trends, the weight factors do affect the result (which can be most noticeably seen when looking at the red hotspots and how those change from different people's preferences). The grey areas are parcels that have no data which indicates that they are undeveloped plots of land (such as parks and open space) or non-residential areas (such as supermarkets, restaurants, and shops).

Challenges included inaccurate rent or not up-to-date rent due to lack of available data on Zillow.com. Not all rent data was available on the internet so we had to look at building costs and make estimates on what the rent would most likely be. This also only gave the price for one. Combining noise data from incidences with the main road also proved to be challenging due to the difficulty in combining two different types of data and having both properly georeferenced. There was also a challenge in determining what scale factors should be weighed. Lastly, the crime data we received had some imprecise or vague locations. Again, we had to use our best judgment in determining where a crime was accurately located.

Future Direction

We hope to see that this project continues and develops so that it can be used on smartphones as a mobile application one day or on an online website. Possibly expanding outside of the Isla Vista area to all other universities so that students everywhere can have a keen experience when coming to a college town that matches their suitability criteria. This project brings more than just a resource to students looking to live comfortably in Isla Vista, it can also be used to facilitate real estate. Selecting the most optimal house to live in permanently can be stressful. Providing a housing guide that takes into account several factors can reduce the stress on someone when deciding. We are in the early stages of this project and are open to others to help engineer it further to become an application useful to the public.

Contact Information:
Edwin Gutierrez   egutierrez57@yahoo.com
Zhuo Tang   tangzhuo0617@163.com
Juliet Bachtel   julietsroses@gmail.com
Jerald Zhao   zhaojerald@gmail.com

References:
Santa Barbara County Data
UCPD ARMS Database
www.Zillow.com
https://zworldgis.com/
www.Arcgis.com