L.A. River: Revitalization or Gentrification?
Mining for Space–Time Patterns in Assessor Parcels Data

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Summary

Situation: There are media and anecdotal speculations that the L.A. River revitalization project has or will cause gentrification.

Task: To fill this quantitative gap using GIS.

Action: Conduct spatio-temporal analyses using tools in the Space Time Pattern Mining toolbox in ArcGIS Pro.

Result: From the sole perspective of assessed parcel value, there are not enough statistically significant High-Low outliers to confirm the presence of gentrification.

Figure 1. *Architect's impression of the L.A. River from the 2007 Los Angeles River Revitalization Master Plan. Image credit: Richard Kreitner, The Nation.*

Methodology

Most gentrification studies researchers have conducted analyses at the Census Tract level. This project contributes value by analyzing parcel level data, which is the most granular level available.

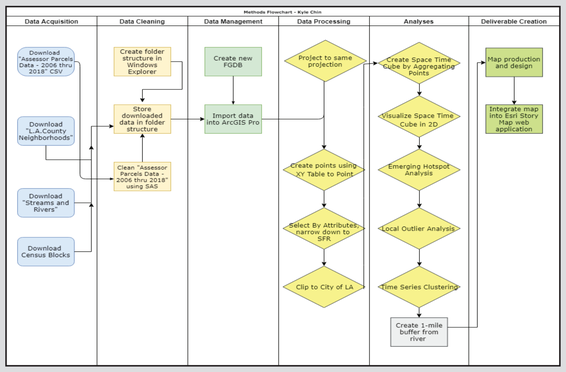


Figure 2. *Methods Flowchart.*

Data Sources & Timeline

Dataset	Source
L.A. County Neighborhoods	LA Times
Streams and Rivers	County of Los Angeles Open Data
Assessor Parcels Data 2006 thru 2018	County of Los Angeles Open Data
2010 Census Blocks	U.S. Census Bureau

Table 1. *List of data and data sources used in this project.*

Task	Start	Finish
Create Project Charter	2/1/2019	2/25/2019
Project Background Research (Literature Review)	2/26/2019	4/16/2019
Data Acquisition & Exploration	4/1/2019	7/10/2019
Develop Project Management Plan	4/29/2019	5/6/2019
Develop Project Methodologies	5/14/2019	7/10/2019
Project Execution	6/1/2019	7/24/2019
Project Deliverables QC	7/2/2019	8/5/2019
Complete Writing Portion	7/16/2019	8/5/2019
Develop Presentation Deliverables	8/1/2019	8/7/2019

Table 2. *Project timeline.*

Results

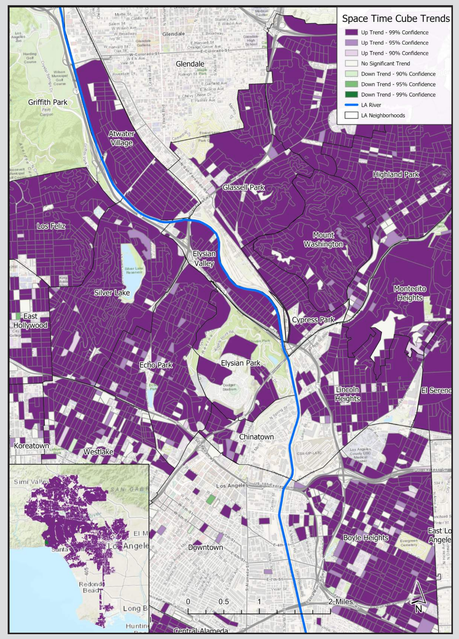


Figure 3. Almost all Census Blocks underwent a statistically significant upward trend between 2006 and 2018. However, this map does not show where the hotspots and outliers are located.

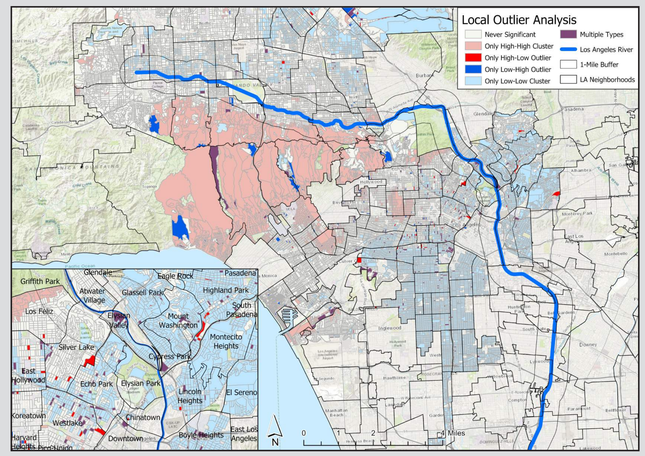


Figure 5. A high-Low outlier represents a statistically significant Census Block that contains high median assessed parcel values surrounded by Census Blocks that have lower median assessed parcel values over time. They can be understood as areas of potential gentrification.

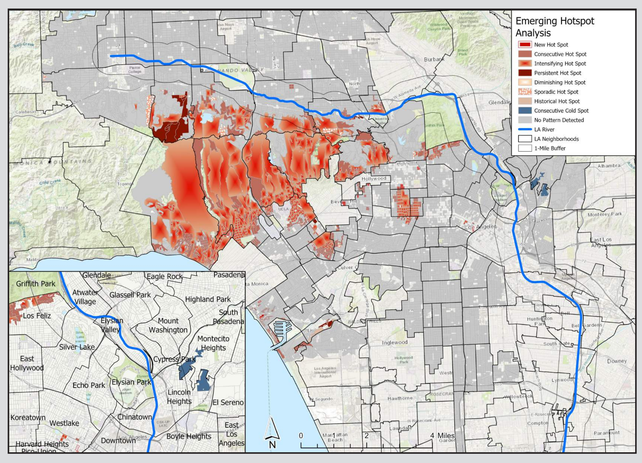
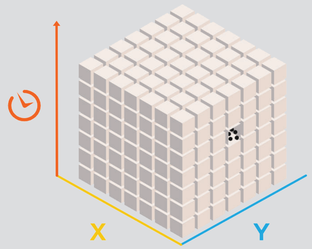


Figure 4. Most of the Census Blocks in the Elysian Valley riverfront area do not have a significant pattern detected. The only hot spots there are the Census Blocks in Los Feliz. Montecito Heights and Lincoln Heights each have a Consecutive Cold Spot. Elsewhere in the City of L.A., there is a cluster of hot spots in the Hollywood and Westside areas, which suggests that the median assessed parcel values there are significantly higher than the rest of the City of L.A.

Figure 6. Almost all Census Blocks have a value of 1 as their time-series cluster ID, which means almost all riverfront Census Blocks have the same pattern of assessed parcel value across time between 2006 to 2018.

What is a Space Time Cube?



According to Esri's documentation, the Create Space Time Cube tool "summarizes a set of points into a netCDF data structure by aggregating them into space-time bins. Within each bin, the points are counted, and specified attributes are aggregated. For all bin locations, the trend for counts and summary field values are evaluated" (Create Space Time Cube By Aggregating Points—ArcGIS Help | ArcGIS Desktop).

Figure 7. A visualization of a Space Time Cube. Image credit: Esri.

Potentially Asked Questions (PAQs)

1. Why use assessed parcel value instead of home sale value?
   Home sales happen sporadically and not in uniform each year. This will cause a lot of inconsistencies and lead to incomplete comparisons. Furthermore, home sale value is notoriously difficult to standardize due to buyer/sellers' personal and subjective preferences. Assessed parcel values provide consistent year by year data for analysis.

2. Why aggregate to the Census Block level?
   To yield a more consistent areal unit, and to account for any change in parcel location due to a merge/subdivision.

3. Why choose the City of L.A. as study area and not the entire County of L.A.?
   The size of houses is not controlled for in this project. Bigger houses are likely to be more expensive (higher assessed parcel value).

4. What does the Emerging Hot Spots Analysis tool do in this project?
   For each of the 13 years of data, it compares the median assessed parcel value for all of the parcels in a Census Block to its neighboring Census Blocks and categorizes them into hot spots or cold spots.

5. What does the Local Outlier Analysis tool do in this project?
   For each of the 13 years of data, it compares the median assessed parcel value for all of the parcels in a Census Block to its neighboring Census Blocks and categorizes them into clusters or outliers.

6. What does the Time Series Clustering tool do in this project?
   It answers this spatial question: Where are the clusters that have the same patterns of assessed parcel value across time?

Limitations, Future Work, & Conclusion

The limitations of this study include:
1. Several parcel points in the Griffith Park area were excluded from the study due to erroneous XY coordinates.
2. One factor that is not controlled for in this project is the size of houses—bigger houses are likely to be more expensive (higher assessed parcel value) than smaller houses.
3. This study does not account for the fluctuations/absolute numerical differences in assessed parcel value over time. It is a year-by-year analysis, not year-to-year.

The results of this study could be expanded through the use of the Forest-based Classification and Regression tool in ArcGIS Pro, which is a supervised machine learning tool. In accordance to the second limitation mentioned above, this tool would account for explanatory variables of house size such as square footage and number of bedrooms. This tool would produce a column of residuals, which can be used to create a space time cube. Then, it would be possible to look at temporal patterns of over/under-prediction of assessed parcel value.

Without factoring in other explanatory variables such as education level, median income level, rent, house size, and other demographic data, it is safe to at least deduct that the red Census Blocks in the Local Outlier Analysis map (Figure 5) are areas of potential gentrification. From the sole perspective of assessed parcel value, there are not enough statistically significant High-Low outliers to confirm the presence of gentrification.

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