Maryam Maddahzad- LA-558 3-28-2022

**Project Title: Study on Correlation Between Safety with the Urban Form in Chicago**

**Abstract:**

This study intends to contribute to the overall knowledge base about how the form of urban spaces affects the crime rate (objective safety) by analyzing Chicago's urban intersection. For this purpose, we focus on the top ten percent of least safe urban blocks intersection and collect a set of significant attributes (such as the height of the buildings, the width of the streets, and tree canopies) associated with morphological contexts of the intersections in the 50-meter buffer area of 3986 intersections in Chicago. Two primary regression analyses are used to assess the correlation of morphologic features and the objective safety: (1): Linear Least Squares Methods (Ordinary Least Squares and Weighted Linear regression model); (2) Cluster and Factor Analysis. The results will be presented in interactive maps and graphics using Tableau.

This project is in line with my thesis project subject.

**Overview:**

This study employs an in-depth analysis of Chicago's morphological variables associated with urban intersections using spatial mapping and statistical modeling in Arc GIS Pro 2.9.2 and IBM SPSS 19. For this purpose, we will develop maps and graphic visuals about how Intersections are the spatial locations selected to study the streetscapes' morphology in Chicago.

In the present study, a road intersection was defined as having a 50 m (164 ft) buffer zone from the crossing point of two road centerlines.

First, intersections in the top ten percent urban blocks with the highest crime rates (80 census blocks) were recognized. Secondly, 22 significant indicators correlated with morphological contexts, such as patterns of buildings, blocks, streets, and land use, were collected for a 50-meter buffer area of 3986 intersections in Chicago. The morphological measurements were derived from publicly available building footprint, tree canopy, and street centerline data processed using a GIS-based method.

After developing 50 m buffers around each buffer, these buffers with individual IDs were related to the processed geographical data using spatial join in Arc GIS Pro. A final dataset was derived in which each buffer's ID was associated with a set of morphological data.

To analyze the correlation between intersections' morphology and objective safety, this research employs two main methods: (1): Linear Least Squares Methods (Ordinary Least Squares and Weighted Linear regression model); (2) Cluster and Factor Analysis. The results will be presented in the forms of interactive maps and graphics using Tableau.

**Technology:** Tableau, Arc GIS Pro, IBM SPSS

**Inspiration**:

<https://public.tableau.com/app/profile/anastasia.komissarova/viz/MoscowMap_16242110055380/MoscowCityCenterMap>

<https://public.tableau.com/app/profile/sara.anne.willette/viz/USMultisourceWastewaterData/WastewaterData>

https://public.tableau.com/app/profile/louisyu/viz/BringingbacktheCHARMtoBalitmore/LivabilityScores

**Potential Challenges**: Linking shapes or graphics to special features on the map

**Data**:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Source | Chicago data portal | Chicago data portal | Chicago data portal | Chicago data portal | Chicago data portal | Chicago data portal | Chicago data portal | Chicago data portal | Chicago data portal | Chicago data portal | Chicago data portal | Chicago data portal | Chicago data portal | Chicago data portal | Chicago data portal | redfin.com | Chicago data portal | Chicago data portal | Chicago data portal | Chicago data portal | Chicago data portal |
| Description | Number of parcels per buffer zone | Mean value of parcel areas in SF. | Mean value of parcel perimeters in feet. | Mean value of the straight-line distance from every parcel centroid point to the nearest street centerline. | Number of buildings per Buffer zone | Mean value of building areas in SF. | Mean value of building perimeters in feet | Mean value of the straight-line distance from every building centroid point to the nearest street centerline. | Mean of the height of the buildings | Mean value of the distance between opposing edges | The quotient of height divided by the width | Cumulated street length with sidewalks per acre. | Cumulated bike route length per acre. | Cumulated value of tree canopy area per acre | Bus stop counts per acre | Points are awarded based on the distance to amenities in each category. Amenities within a 5-minute walk. | % of parcel area with mixed land use. | % of parcel area including retail stores,  restaurants, coffee shops, bakery, bookstores, farmers market. | % of parcel area including single-family home/duplex – attached (2–4units); Townhome/condo/apartment housing (5 units or more).  % of parcel area including single-family home/duplex – attached (2–4  units); Townhome/condo/apartment housing (5 units or more). | % of the parcel area, including detached single-family homes. | % of the vacant parcel area |
| Variables | parcel count | parcel size (area) | parcel size (perimeter) | parcel setback | building (count) | building size (area) | building size (perimeters (perimeter) | building setback  (perimeter) | building size (height) | street width | cross-sectional proportion | sidewalk | bike route | tree canopy | bus stop | walking index | mixed use % | commercial % | multifamily residential % | single family residential % | vacant lot % |
| Variable groups | Parcels, and  buildings | | | | | | | | | Streetscape attributes | | Pedestrian-oriented  attributes | | | | | Property land uses | | | | | |