

VISUALIZATION OF ORIGIN-DESTINATION COMMUTER FLOW USING LEHD ORIGIN-DESTINATION EMPLOYMENT STATISTICS (LODES) DATA



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abstract

Analyzing the origin-destination commuter flow is important for understanding workers' commuting patterns particularly from regional planning perspectives. Southern California Association of Governments (SCAG), the nation's largest metropolitan planning organization representing six counties and 191 cities, has conducted an origin-destination flow analysis and visualization for all census tracts in the region. To analyze and visualize the origin-destination flows, SCAG staff has developed the automated workflow using ArcGIS, Python scripting, Statistical Analysis Software (SAS) and Longitudinal Employer Household Dynamics (LEHD) Origin-Destination Employment Statistics (LODES) Data. The maps depict the commuter flows between home and work place throughout the region and help local jurisdictions, business communities and residents to visually understand where workers are employed and where workers live in the region.

objectives

- Understand the commuting patterns of workers in the SCAG region at a smaller geographical level using LODES data.
- Access and investigate the relationship between workplace and residence based on Census tracts in the SCAG region
- Visualize commuter flow by utilizing LEHD LODES data, SAS, Python and GIS applications

data specifics

- Source: Longitudinal Employer Household Dynamics (LEHD) & LEHD Origin-Destination Employment Statistics (LODES)
- Statistical Analysis Software (SAS): The workflow steps of converting the LODES dataset from Census block groups to tract level for SCAG Region, calculating the total number of commuters between Origins and Destinations, calculating the top 50 destination tracts per origin tract and the top 50 Origin tracts per destination tract, were all done via SAS.

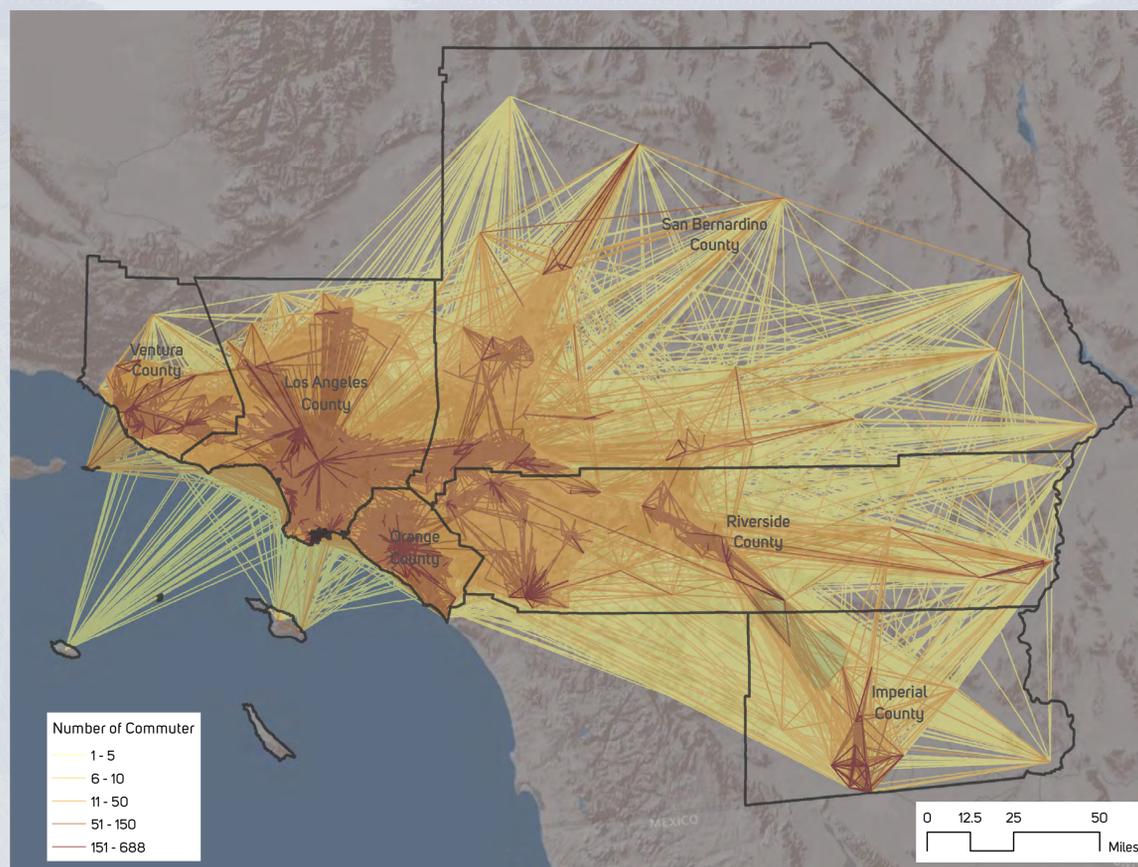
methodology

To analyze and visualize origin-destination flows in the SCAG region at a smaller geographical area, SCAG staff developed an automated workflow by using LODES data, ArcGIS, Statistical Analysis Software (SAS) and Python scripting. LODES data for the entire state of California was downloaded from the Census website and aggregated using SAS to extract data files for SCAG's region. Original downloaded data files are at a census block geography. To better visualize the data and avoid overwhelming record results, SAS was also used to convert LODES data from block groups to census tracts. SAS outputs generated tables that were imputed into GIS software. The automated workflow GIS system effectively visualized the origin-destination commuter flow for 3,956 Census tracts, which generated over 2.4 million OD commuter routes. The output resulted in an overwhelming amount of records to organize, classify and map in a visually appealing way. Because of abundant data files, SCAG staff filtered the data files to only include the top 50 commuter origins for each destination tract in the SCAG region. SAS scripting was utilized to sort and filter data files and rank total of commuter routes from origins to each destination tract.

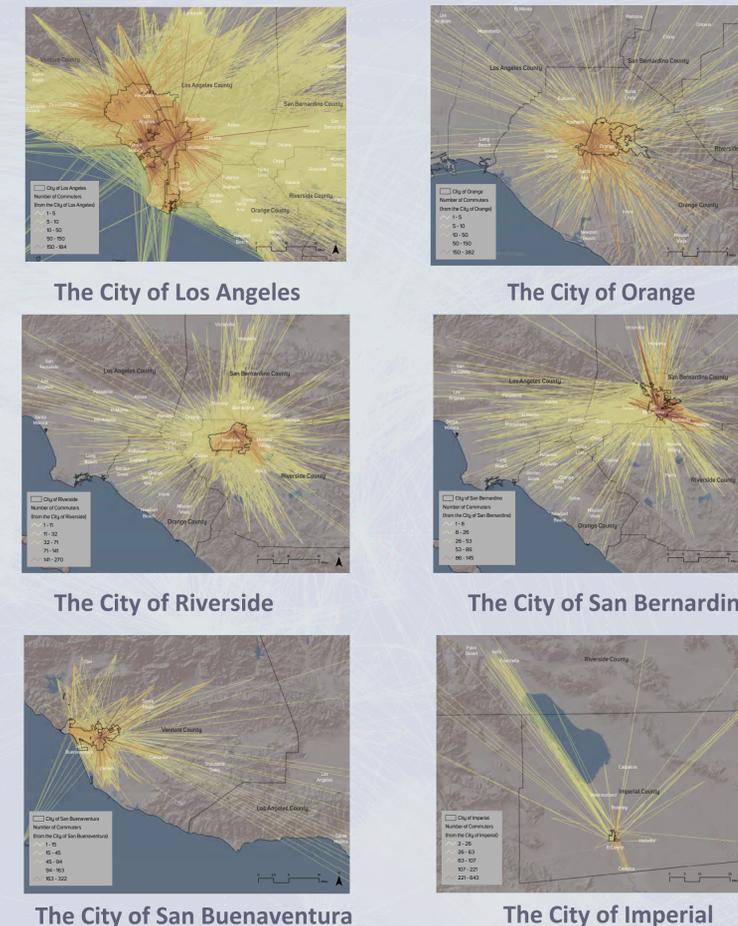
conclusion

This analysis clearly shows the vast spatial separation of origins and destinations that contributes to the jobs housing imbalance in the region and creates commuting flow patterns between spatially mismatched points. Further research could apply this same analysis on a census block level to see in further detail which census blocks are experiencing the larger burden of mismatched housing and job opportunities. Future analysis could also compare Census Transportation Planning Products (CTPP) and Longitudinal Employer-Household Dynamics (LEHD) Origins - Destination Employment Statistics (LODES). Potential research could also include the modeling and forecasting of commuter flows against various planning scenarios.

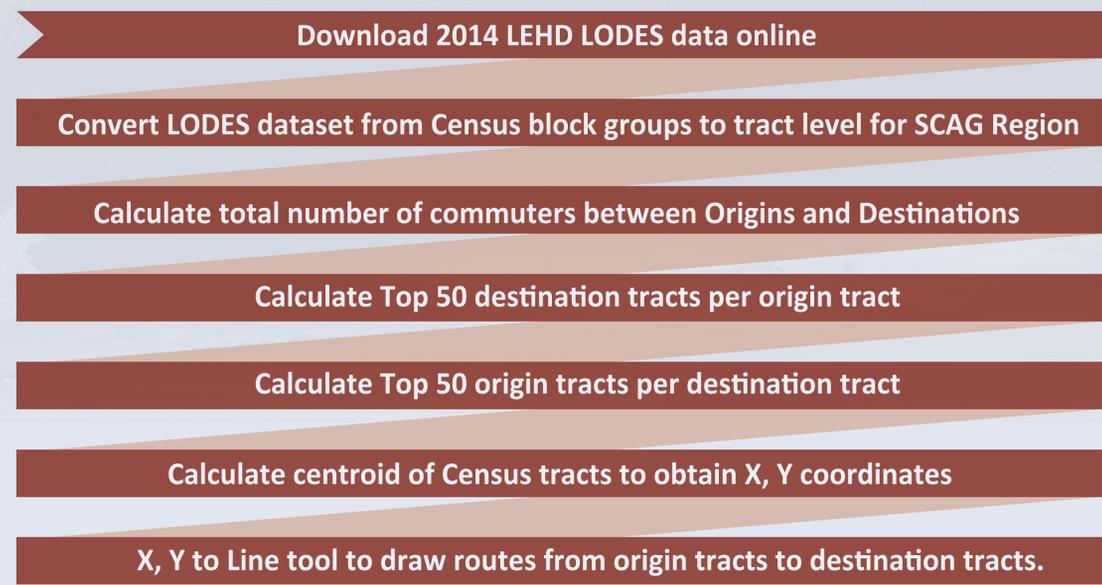
commuter flow map of entire SCAG REGION



city commuter flow maps



workflow



Origins of the Largest Number of Commuters in Southern California

Location	County	Tract Number	Total Commuters
Fontana	San Bernardino	06071002304	7,197
Irvine	Orange	06059052420	7,090
San Bernardino	San Bernardino	06071009118	6,815
Corona	Riverside	06065041409	6,362
Irvine/Tustin	Orange	06059075515	6,310
Irvine	Orange	06059052525	5,495
Oxnard	Ventura	06111003100	5,342
Newport Beach	Orange	06059062604	5,242
Rancho Cucamonga	San Bernardino	06071002034	5,197
El Centro	Imperial	06025011000	4,984

Destinations with the Largest Number of Commuters in Southern California

Location	County	Tract Number	Total Commuters
Downtown Los Angeles	Los Angeles	06037207400	133,643
Irvine/Tustin	Orange	06059075515	70,321
John Wayne Airport	Orange	06059062610	57,815
Downtown Los Angeles	Los Angeles	06037207710	57,166
Burbank	Los Angeles	06037310400	49,145
El Segundo	Los Angeles	06037980013	45,969
Century City	Los Angeles	06037267901	39,807
Los Angeles Int'l Airport (LAX)	Los Angeles	06037980028	38,989
Vernon	Los Angeles	06037532400	37,154
Culver City	Los Angeles	06037703001	36,213