Planning Location of Mobility Hubs in Gainesville, FL

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FDOT

What are mobility hubs?

- A platform where people can connect to multiple modes of transportation to make their trip safe, convenient and reliable.

A sketch of a mobility hub that integrates public transit and shared micromobility (Source: CoMoUK, 2021)

Example: A small mobility hub in Berlin (Source: Traif, 2021)

Why need to site mobility hubs?

Provide transit supply and serve multimodal travel needs

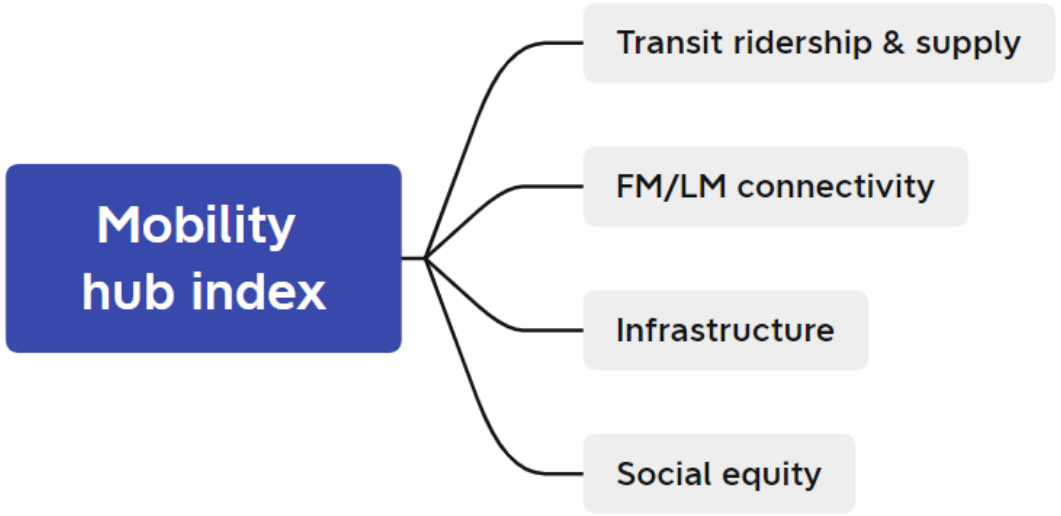
Enhance first-/last-mile connectivity and facilitate transfers

Achieve equitable accessibility for all people

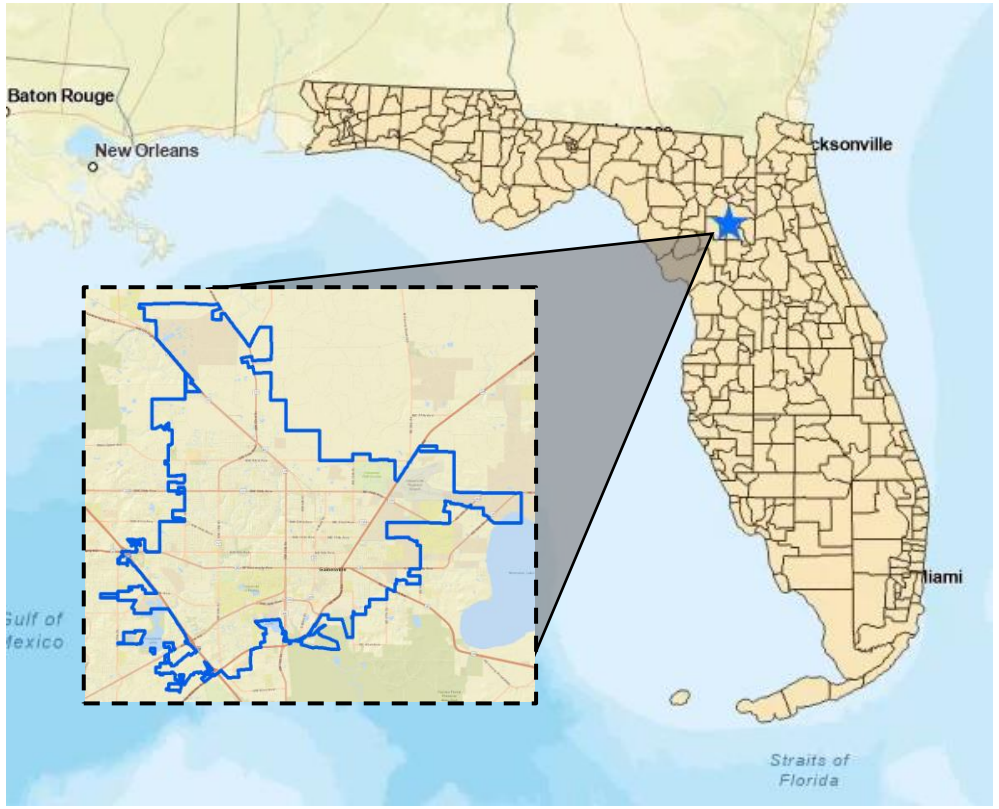
An ideal mobility hub should include these features (Source: City of Boston)

Project Objectives

- To develop a GIS-based analytical framework for Florida agencies to decide the optimal locations of mobility hubs



Four criteria in deciding mobility hubs



We take **Gainesville, FL** as case study region but will apply the methodology framework to other regions in the future analysis (e.g Jacksonville, West Palm beach).

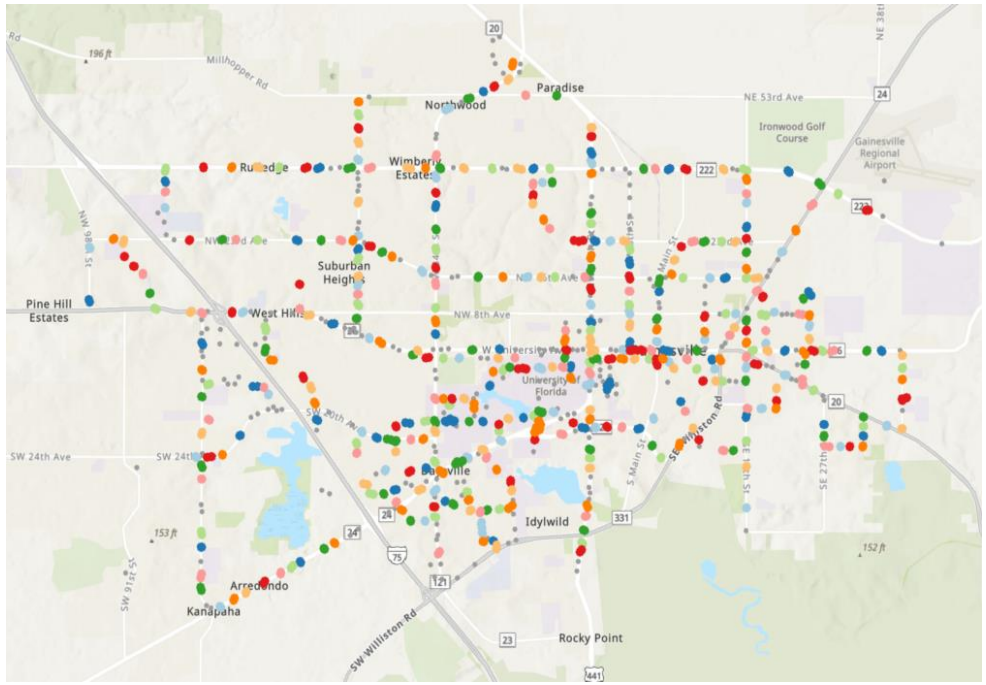
Dataset

Criteria	A. Transit ridership and supply	B. FM/LM Connectivity	C. Infrastructure	D. Sociodemographic Characteristics
Datasets	1. Bus Ridership 2. Bus Stops 3. Bus Service Frequency 4. Bus routes	1. Micromobility (scooter, microtransit, bikeshare) FM/LM trips	1. Sidewalk 2. Bicycle lane	1. Employment 2. Population 3. Race 4. Education 5. Vehicle ownership 6. Income
Data sources	City, transit agency, Florida Signal Four Analytics	City, Department of transportation	City, Google Maps	American Community Survey (ACS) , LEHD

Methodology

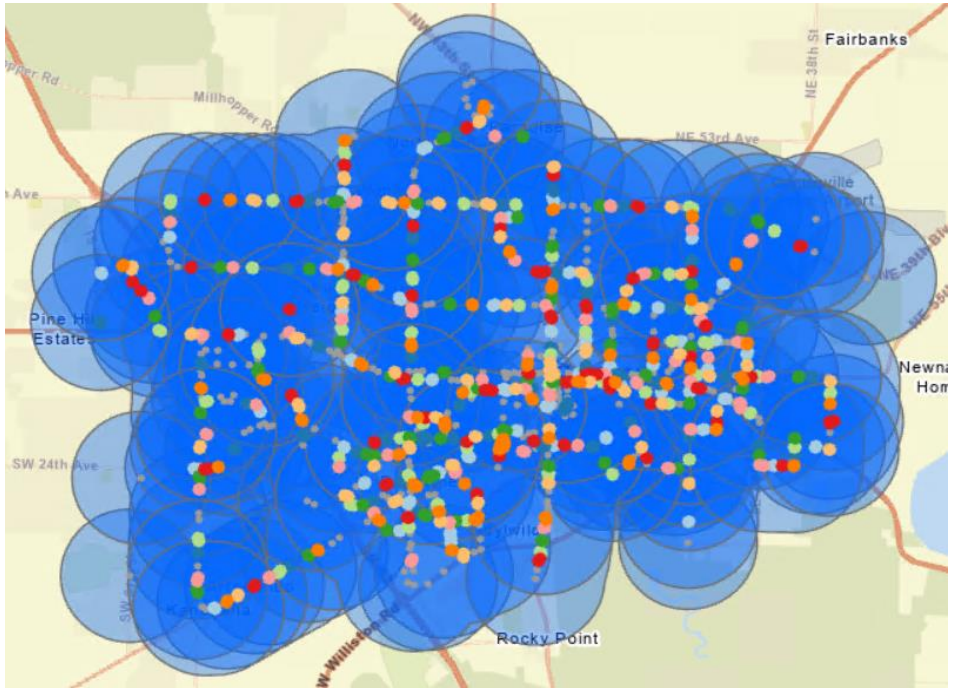
Step 1: define the spatial unit for locating mobility hubs

- Group adjacent transit stops



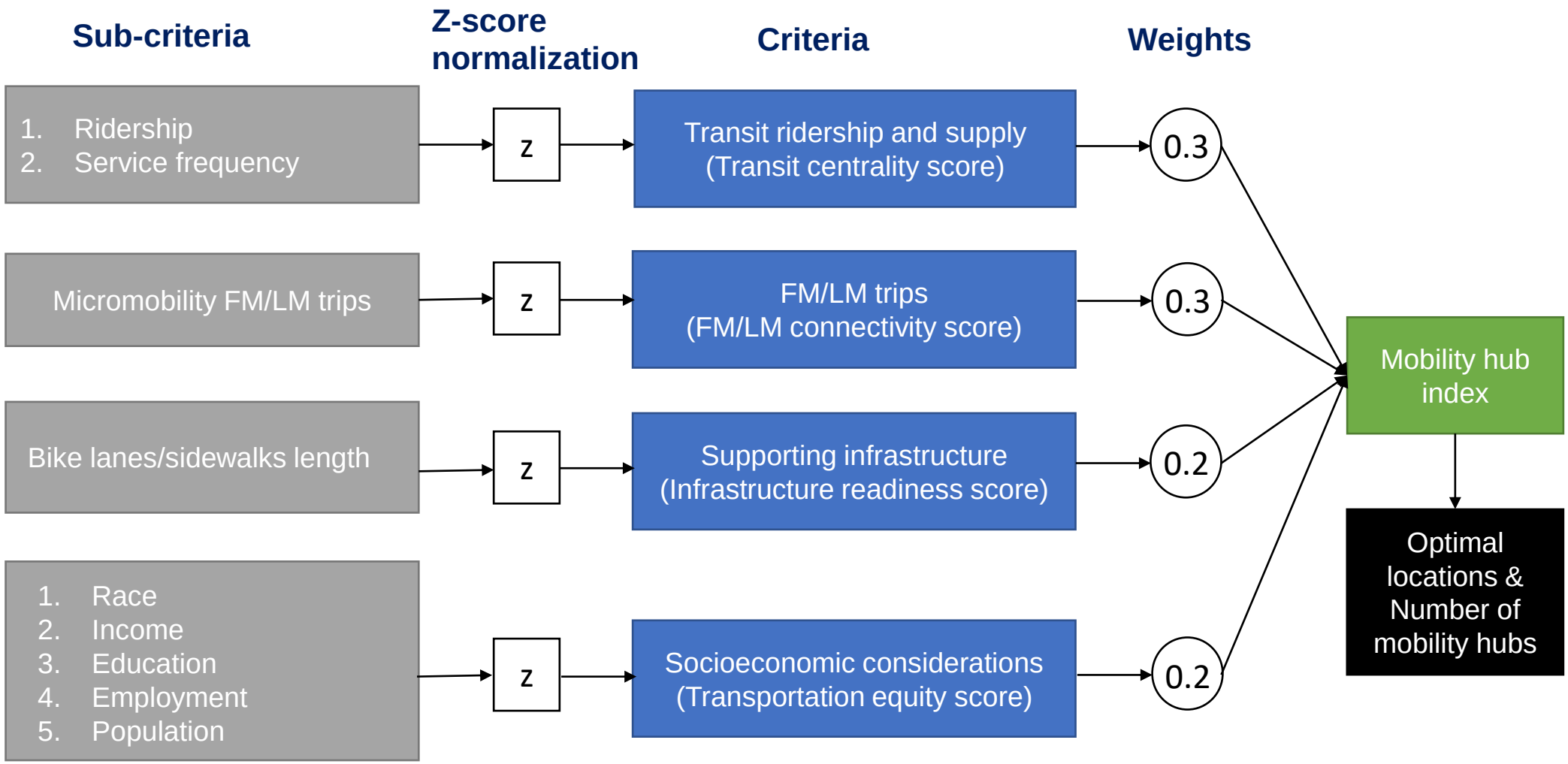
DBSCAN clustering algorithm: generate **628** grouped clusters among **1081** stops

- Create 1 mi buffers around transit-stop clusters



Spatial unit to identify mobility hubs

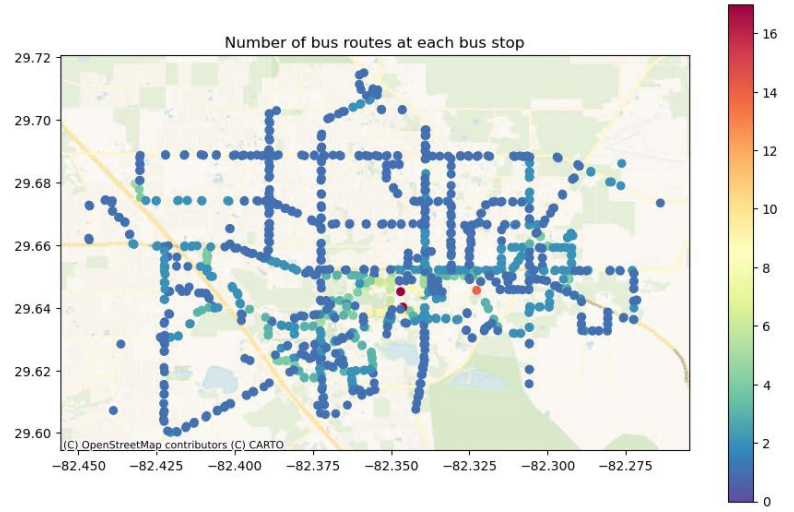
Methodology

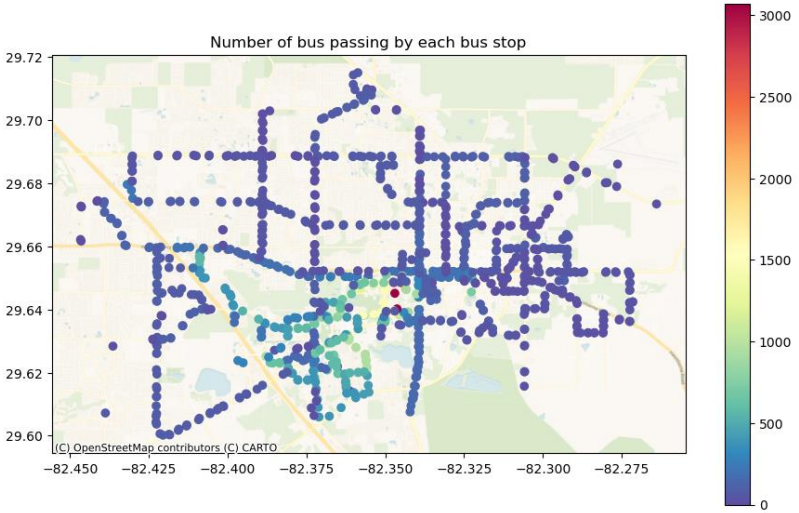


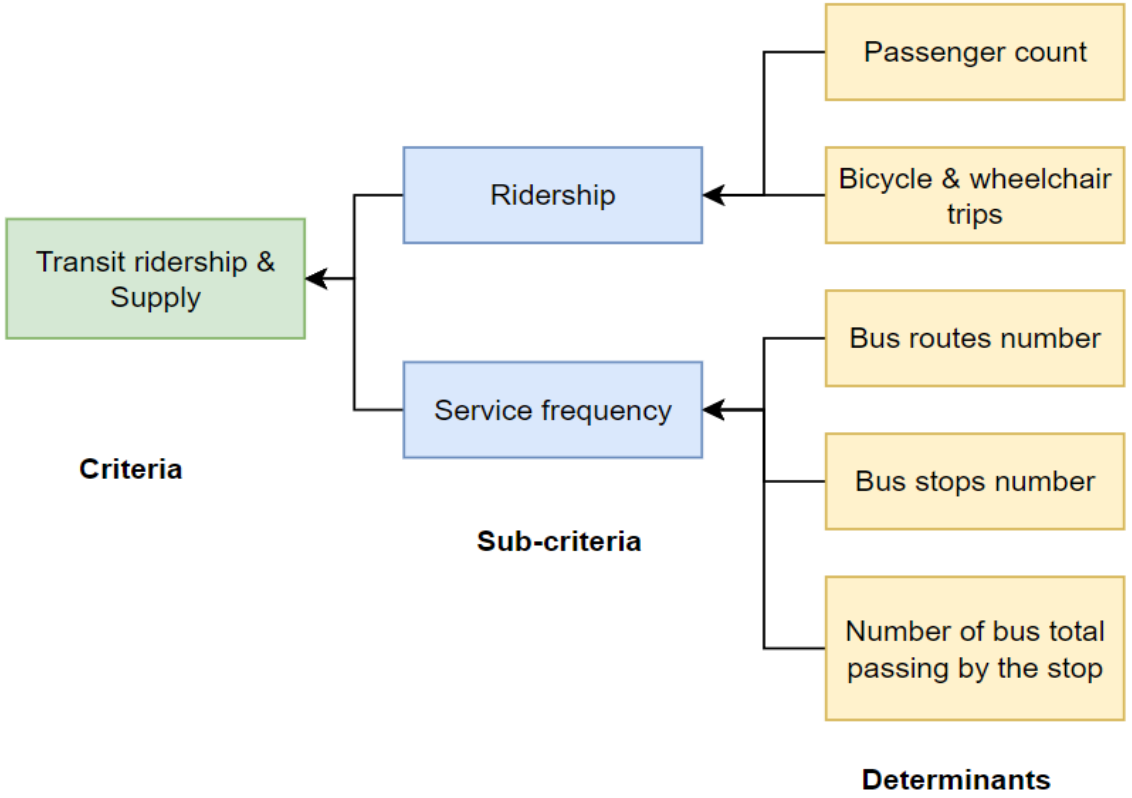
Step 2: Compute the four scores for each spatial unit

Step 3: Compute mobility hub index by weighing each of four score

Criteria #1. Transit Ridership and Supply



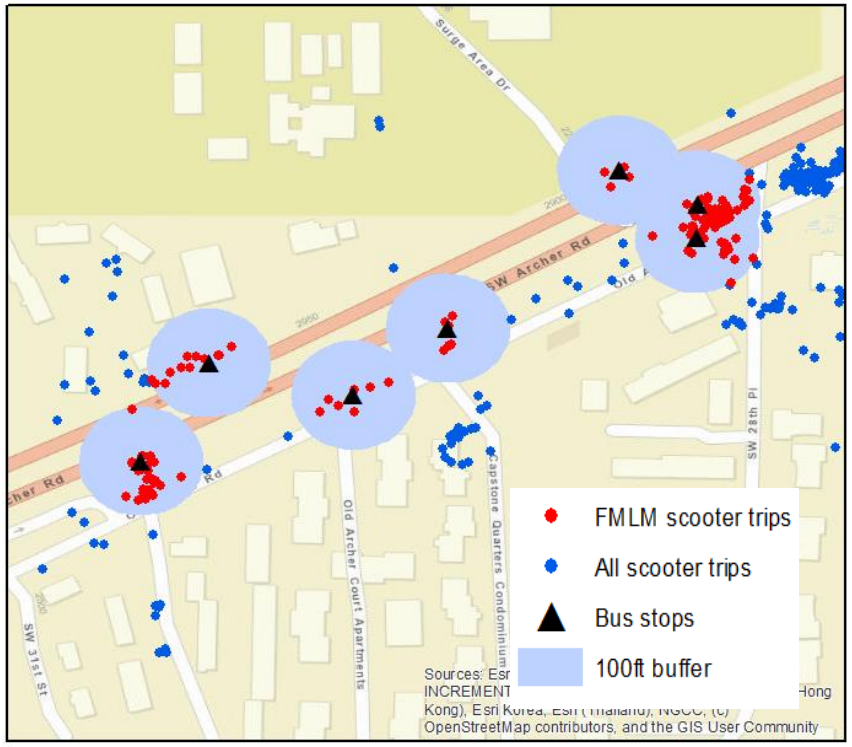




The stop-level determinants should be aggregated to the spatial unit. (code)

Criteria #2. First/last mile Connectivity

FM/LM connectivity score is measured by the **micromobility trip origin/destination counts (scooter, microtransit, bikeshare)** within 100ft buffer zone at the grouped bus stops.



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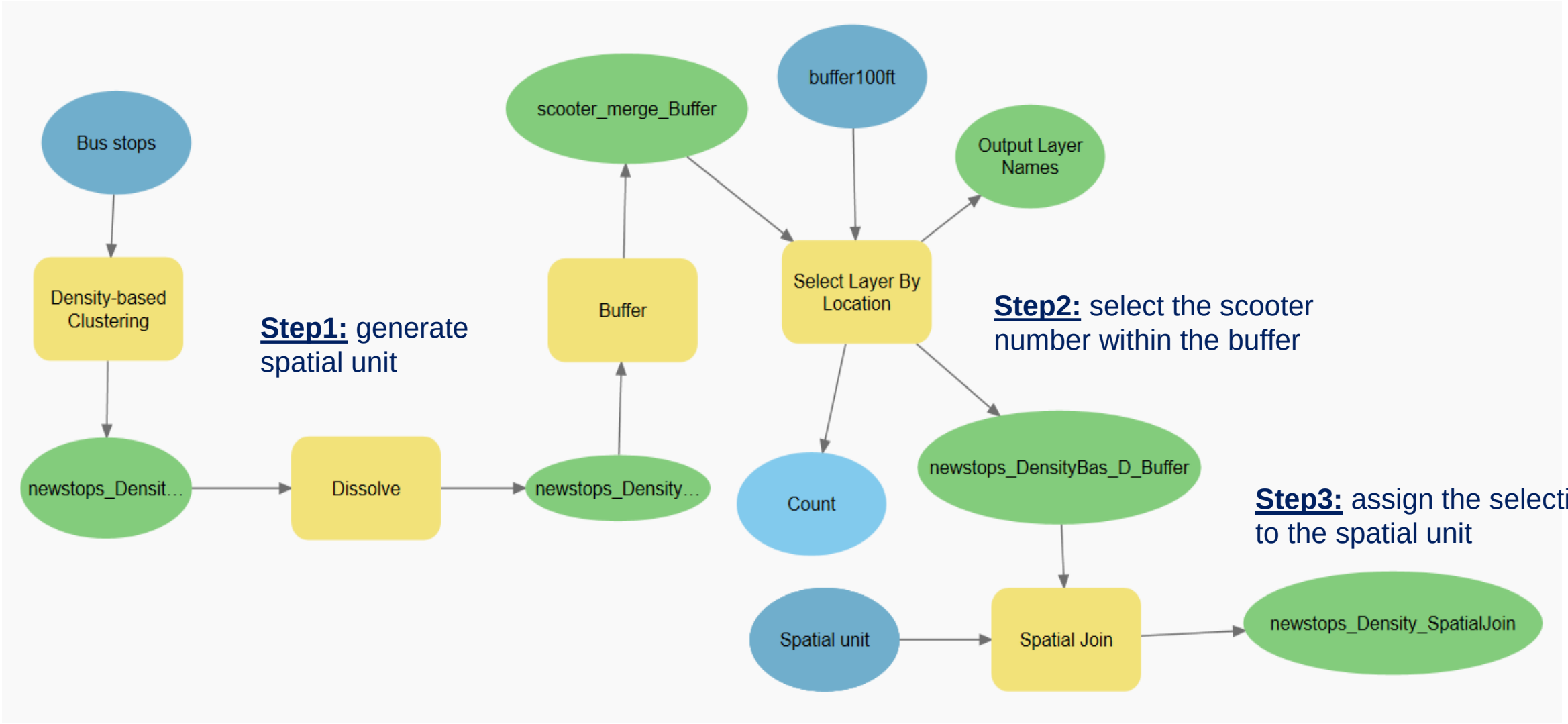
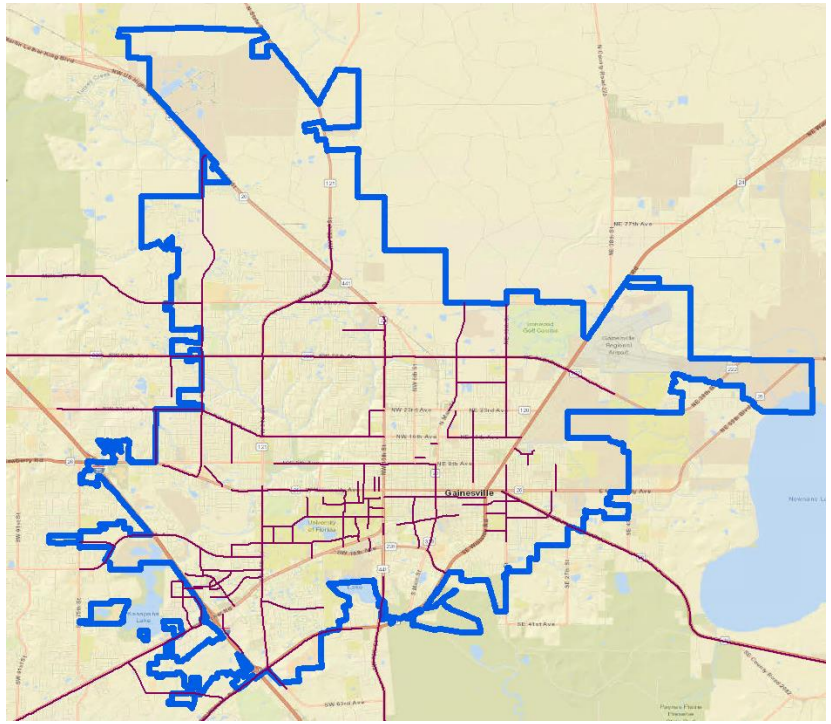
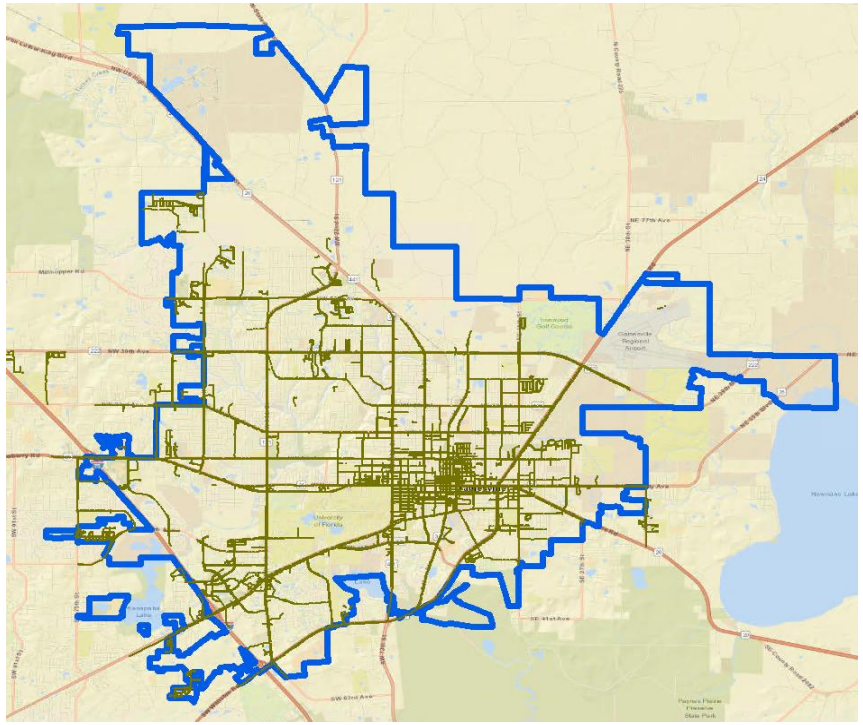


Criteria #3. Infrastructure

- Infrastructure readiness score is measured by the **sidewalk and bicycle length** within the spatial unit.

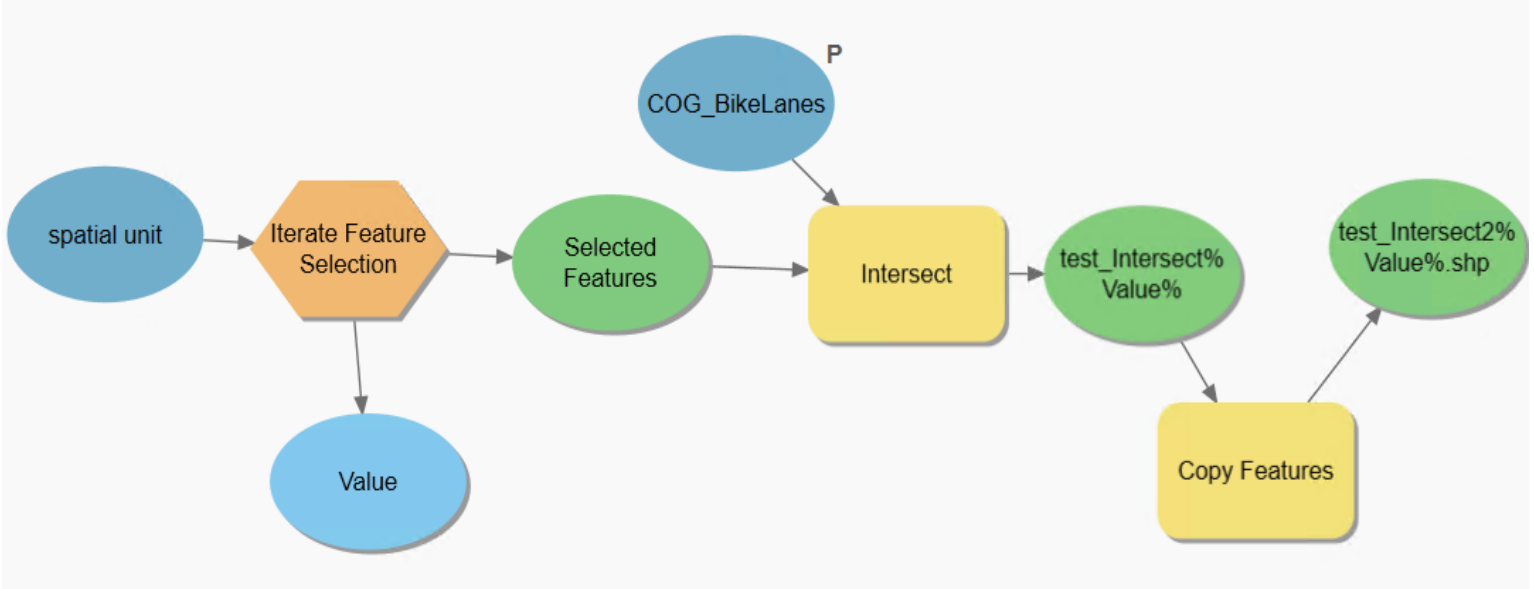


Bike lanes

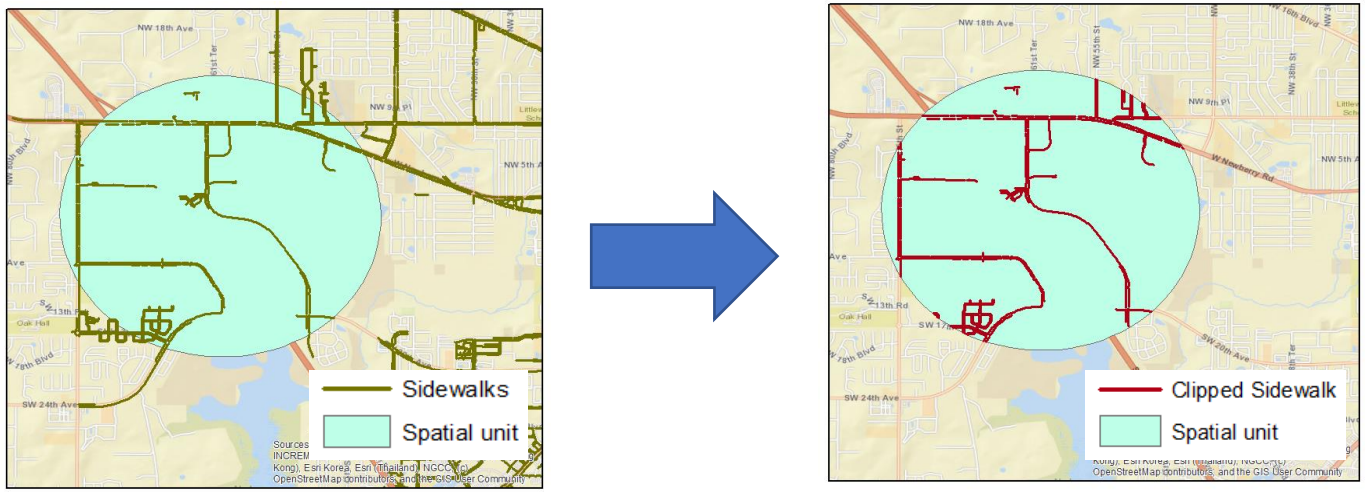


Sidewalk

Criteria #3. Infrastructure



Module builder: clip the road segment by the spatial unit

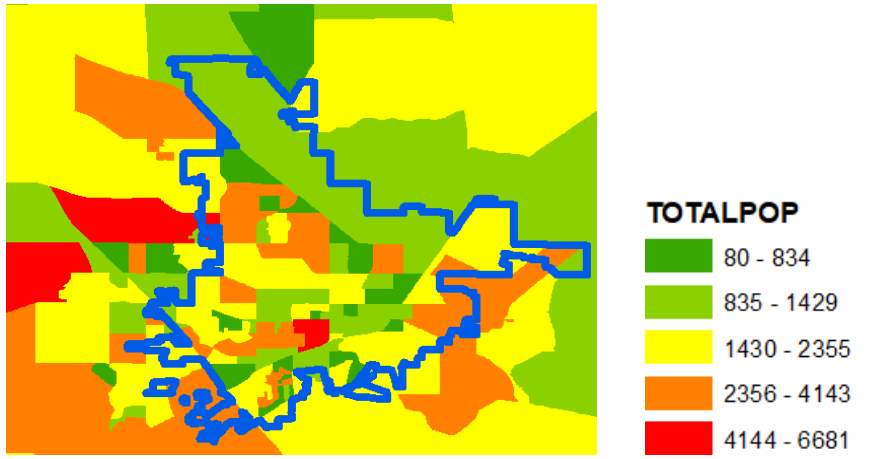


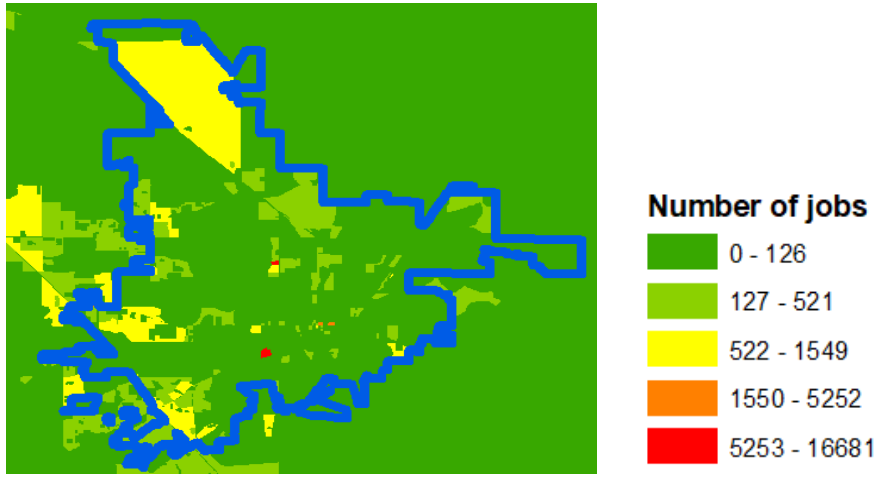
Example

Criteria #4. Socioeconomic Factors

Considered factors:

- Total population
- Total high-income population (%)
- Hispanic white population (%)
- Household with zero vehicles (%)
- Children & elderly (%)
- Numbers of jobs
- Number of high-wage jobs (%)





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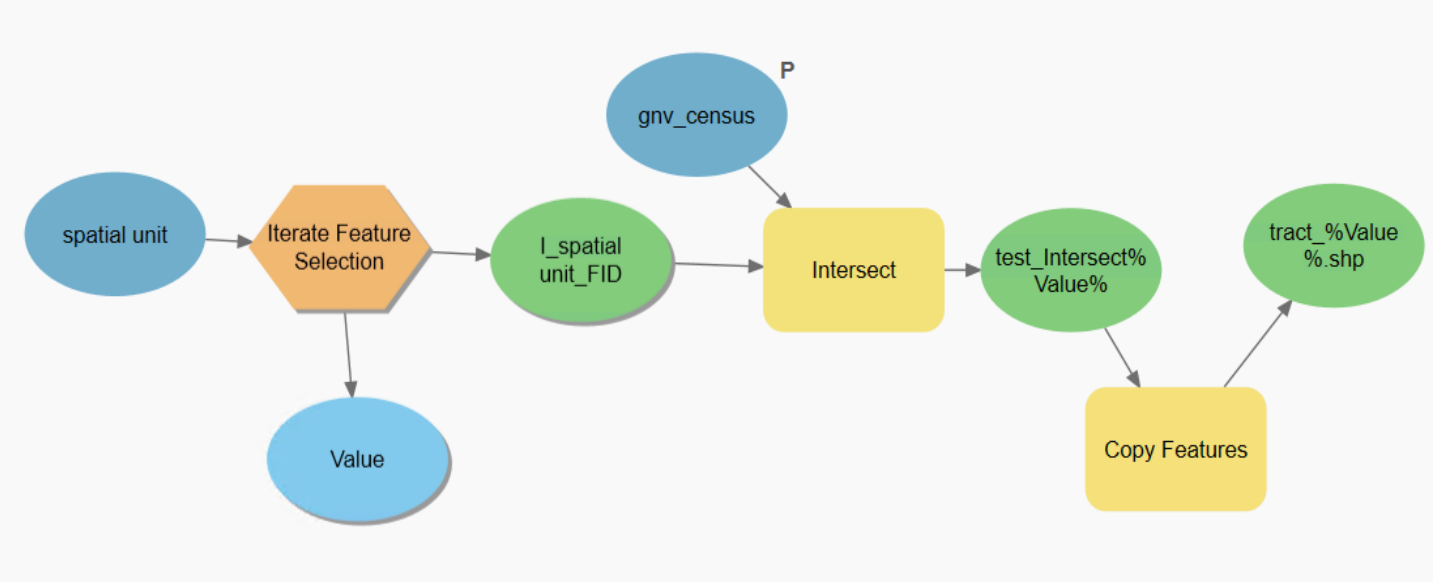
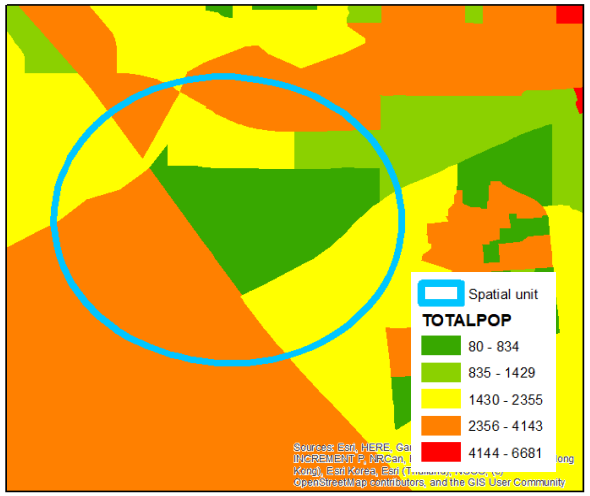
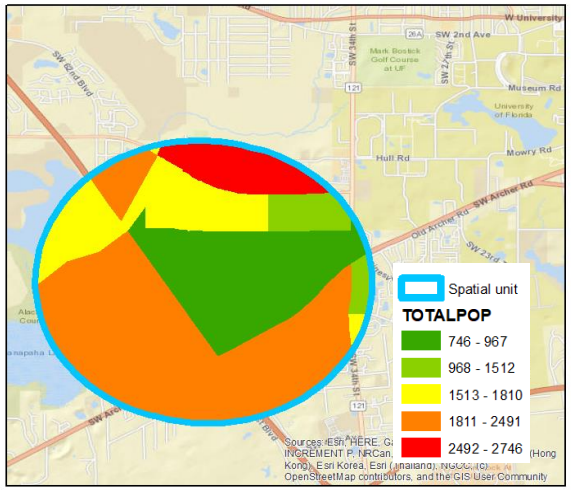


Module builder: intersect the census block group with each spatial unit to assign the sociodemographic information to the spatial unit





Example

Future work

1. Continue calculating the spatial indicators for the infrastructure and socioeconomic factors (finished by this week):
    - Bicycle & sidewalk length within the spatial unit
    - Average population & number of jobs within the spatial unit

2. Assign weights to different indicators through the discussion with stakeholders

3. Integrate all the weighted spatial indicators of different criteria. Calculate the mobility hub index to site mobility hubs.

Initial thoughts of weighting scheme

Weights	Criteria	Sub-criteria	Measurement	Weights
0.3	Transit ridership and supply (Transit centrality score)	Ridership	Passenger count	0.4
			Bicycle and wheelchair trips	0.1
		Service frequency	Number of unique bus routes	0.1
			Bus stop number	0.1
			Number of bus total passing by the stop	0.3
0.3	FM/LM Connectivity (FM/LM connectivity score)	Bikeshare FMLM trips	Number of trips within bus stop buffer	0.33
		Microtransit FMLM trips		0.33
		Scooter FMLM trips		0.33
0.2	Supporting infrastructure (Infrastructure readiness score)	Bike lane	Bike lane length	0.5
		Sidewalk	Sidewalk lane length	0.5
0.2	Socio-demorgraphic (Transportation equity score)	Total population	Average value of intersected block groups	0.4
		Numbers of jobs		0.2
		Number of high-wage jobs		0.1
		Household with zero vehicles (%)	Weighted population %	0.1
		Children & elderly (%)		0.1
		Hispanic white population (%)		0.1

Thanks!

Q&A

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