AI-Augmented Urban Livability Research

Yi Wang, Ph.D.

People, Health & Place Unit

Bursky School of Public Health

September 17, 2025

The People, Health & Place Unit (PHP)

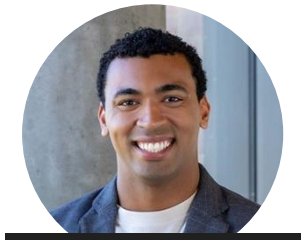
We conduct research to understand how place-based factors contribute to health disparities, with the goal to inform evidence-based strategies centered on promoting inclusive and healthy places.

Rodrigo Reis (Unit Founder)

Yi Wang

Alexandre Augusto de Paula da Silva

Milena Franco Silva



Drew Crenshaw

Ana Luiza Favarão Leão

Maryse N. Rios-Hernandez

Catharina Cavasin Salvador

Use AI to study urban livability

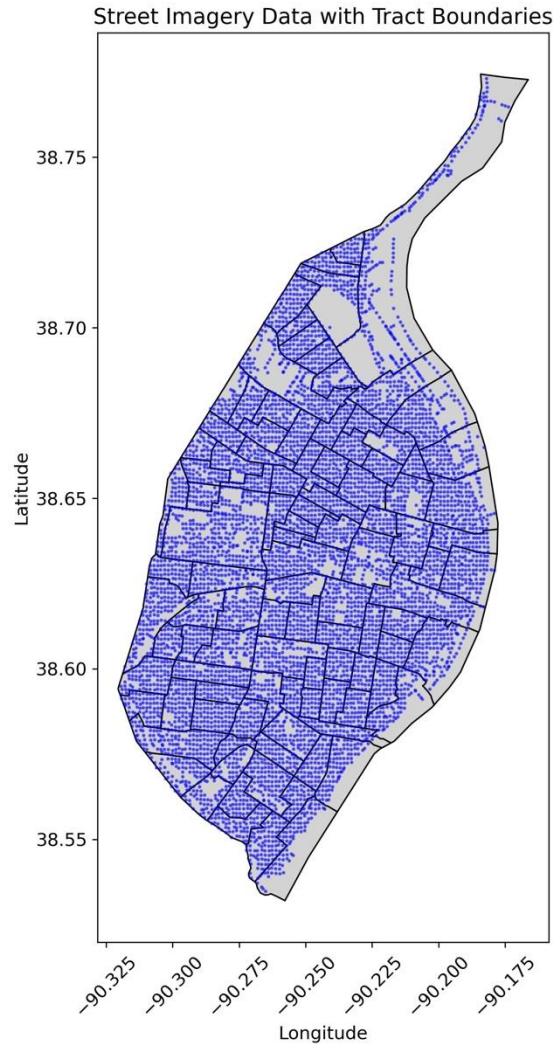
Streetscape audits

- Traditionally, public health researchers conduct on-site audit to study neighborhood walkability.
  - E.g. Presence of sidewalks, tripping hazards, streetlights, and tree canopy (MAPS-Mini).
- Computer vision models enable us to classify built environment features directly from street view imageries.

AI-assisted audits in St. Louis

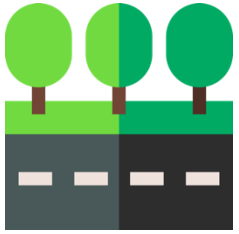
7,848 street segments

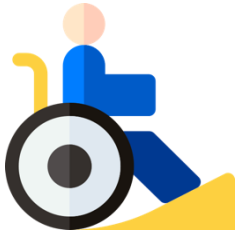
- We generated a 100m grid along the street network and used it to pull imageries from the Google Street View API.
- We then applied a vision language model (VLM) to classify built-environment features.



Leão, A. L. F., Wang, Y., Banda, B., Balogun, M., Xing, E., Gudapati, S., Rios-Hernandez, M., Jacobs, N., & Reis, R. (forthcoming). Exploring Spatial Inequities and Livability: A mixed-methods study using artificial intelligence and community insights. Journal of Urban Health.

AI-classified built-environment features





Variable	Category	Frequency	Percentage (%)
Streetlights	Ample	6,665	84.9%
	Some	815	10.4%
	No	368	4.7%
Building Maintenance	2 (Well maintained)	5,961	76.0%
	0 (Poorly maintained)	1,868	23.8%
	1 (Moderately maintained)	19	0.2%
Pavement Presence	Yes (Pavement present)	7,080	90.2%
	No (No pavement)	768	9.8%
Pavement Continuity	Yes (Continuous pavement)	6,077	77.4%
	No (Discontinuous pavement)	1,771	22.6%
Major Tripping Hazards	1 (Hazard present)	5,460	69.6%
	0 (No hazard)	2,388	30.4%
Pedestrian Crossing	No	7,289	92.9%
	Yes	559	7.1%
Curb Ramps	Yes	761	9.7%
	No	7,087	90.3%
Tree Canopy Overhead	High	4,043	51.5%
	Medium	2,116	27.0%
	Low	951	12.1%
	Invalid / indeterminate	738	9.4%

Leão, A. L. F., Wang, Y., Banda, B., Balogun, M., Xing, E., Gudapati, S., Rios-Hernandez, M., Jacobs, N., & Reis, R. (forthcoming). Exploring Spatial Inequities and Livability: A mixed-methods study using artificial intelligence and community insights. Journal of Urban Health.

Agreement between the VLM and human raters varies

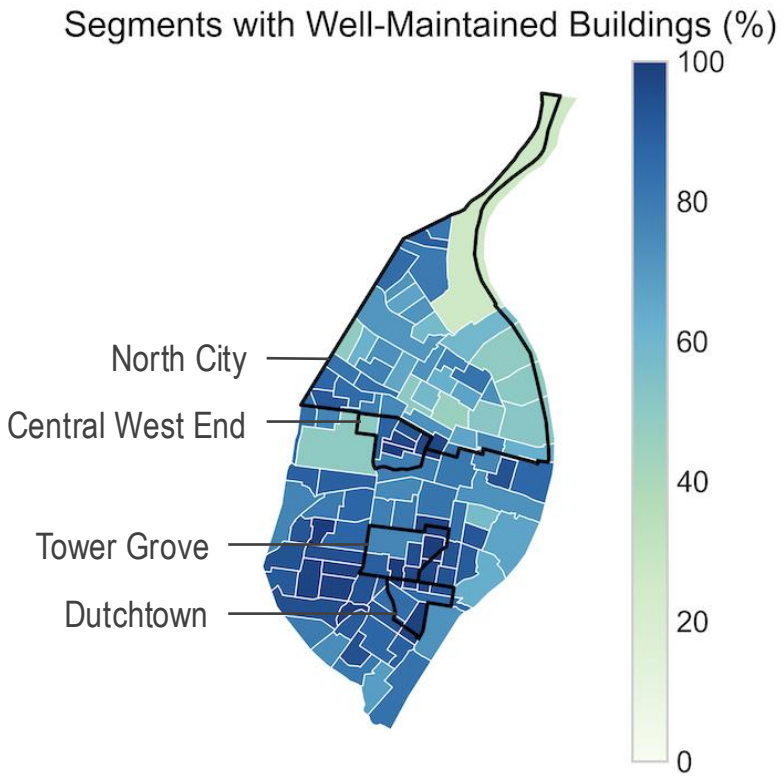
Features with low agreement were excluded from analysis

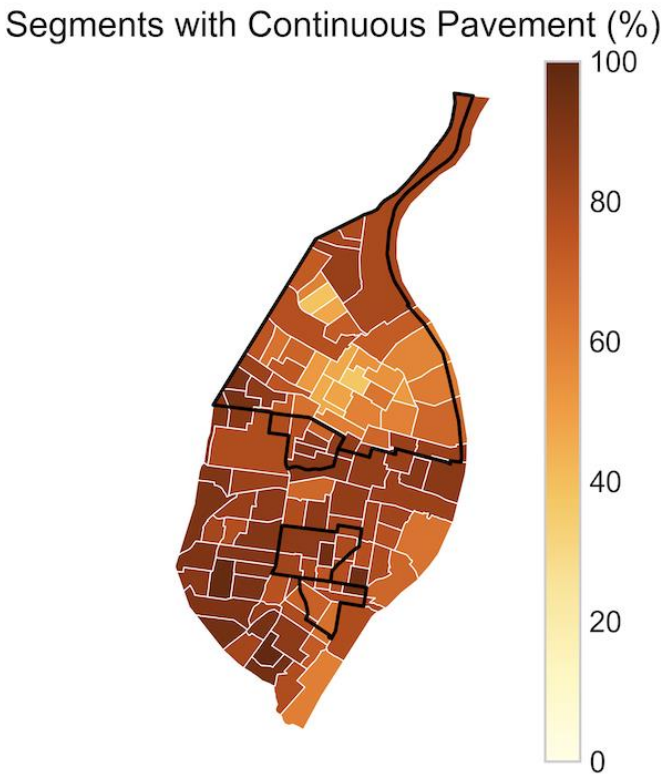
Feature	n	Human present (%)	VLM present (%)	Agreement (%)	AC1
Pedestrian crossing present [a]	164	6.1	6.7	95.7	0.95
Public transit stop present	164	4.3	3.0	93.9	0.93
Public park present	164	6.1	12.8	90.9	0.89
Streetlights present	164	78.7	95.7	80.5	0.75
Buildings well maintained	130	86.9	83.8	78.5	0.71
Sidewalk/pavement present	164	65.2	92.1	69.5	0.54
Buffer present*	164	39.6	100.0	39.6	−0.04
Bike path present [b]*	164	5.5	100.0	5.5	−0.88

Leão, A. L. F., Wang, Y., Banda, B., Balogun, M., Xing, E., Gudapati, S., Rios-Hernandez, M., Jacobs, N., & Reis, R. (forthcoming). Exploring Spatial Inequities and Livability: A mixed-methods study using artificial intelligence and community insights. Journal of Urban Health.

Worse infrastructure in North City neighborhoods

A result of long-term disinvestment





Residents interview

- North City and Dutchtown "forgotten" versus Central West End and Tower Grove as places where "everything works together."

- AI-supported streetscape audit can give policymakers a scalable tool to identify underserved neighborhoods and allocate more resources toward these historically disinvested areas.

Limitations of AI-assisted streetscape audit

1. The VLM has a general tendency to over-report features as present.

- E.g., bike path, sidewalk
- Most VLMs are trained largely on internet images that were captioned or described with a bias toward naming things that *are* there rather than describing absences, nudging them toward "yes" by default.

2. Street View imageries update more often in areas with higher traffic and commercial activities.

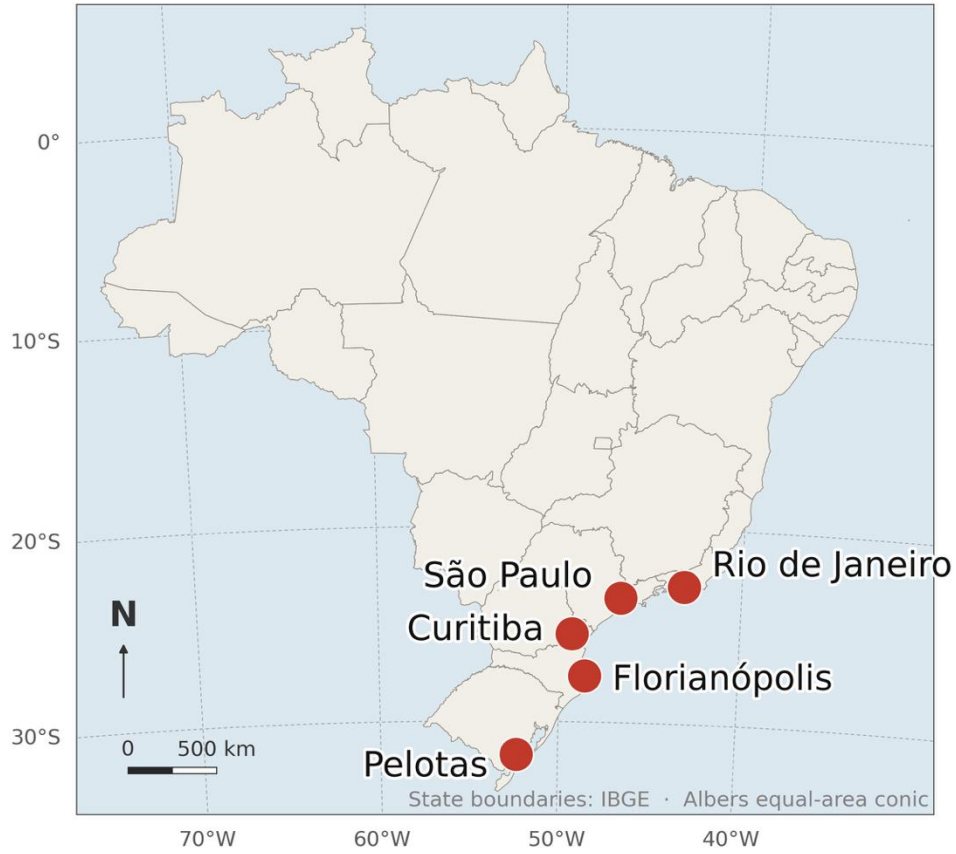
- Historically disinvested, lower-density areas might be photographed less frequently.
- Could either overstate or understate the current disparity

Scaling up

AI-assisted microscale livability audits in 5 Brazilian cities

+ Focus groups with stakeholders

- public administrators, urban planners, architects
- on perceived barriers & opportunities for integrating AI-generated livability indicators into local policymaking



WashU

Thank you!