Xuanyu Zhou

Selected Works
2021-2025

https://xuanyuzhou.org/

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Education

Zhejiang University — Hangzhou, Zhejiang
Bachelor of Engineering in Urban and Rural Planning — 2021-2026 (Exp.)
GPA: 3.93/4.0

University of California, Berkeley — Berkeley, CA
Exchange at College of Environmental Design — 2025

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Sky For Whom?

Unmasking the Pedestrian Perspective in Urban Canyons in San Francisco

My role
Individual Work

Time
2025.2 - 2025.10
Work done during an exchange at UC Berkeley

Instructor
Yuye Zhou, Ph.D. student
Prof. Lu Liang

Key Words
Sky View Factor, Pedestrian Network, Urban Morphology, Urban Spatial Analysis, San Francisco

Tech Stack
GIS, Python, Monocular Depth Estimation, Semantic Segmentation, Point Clouds Generation

Note
Interactive Demo Available at https://xuanyuzhou.org/portfolio/SVF/

Distribution of Google Street View Imagery

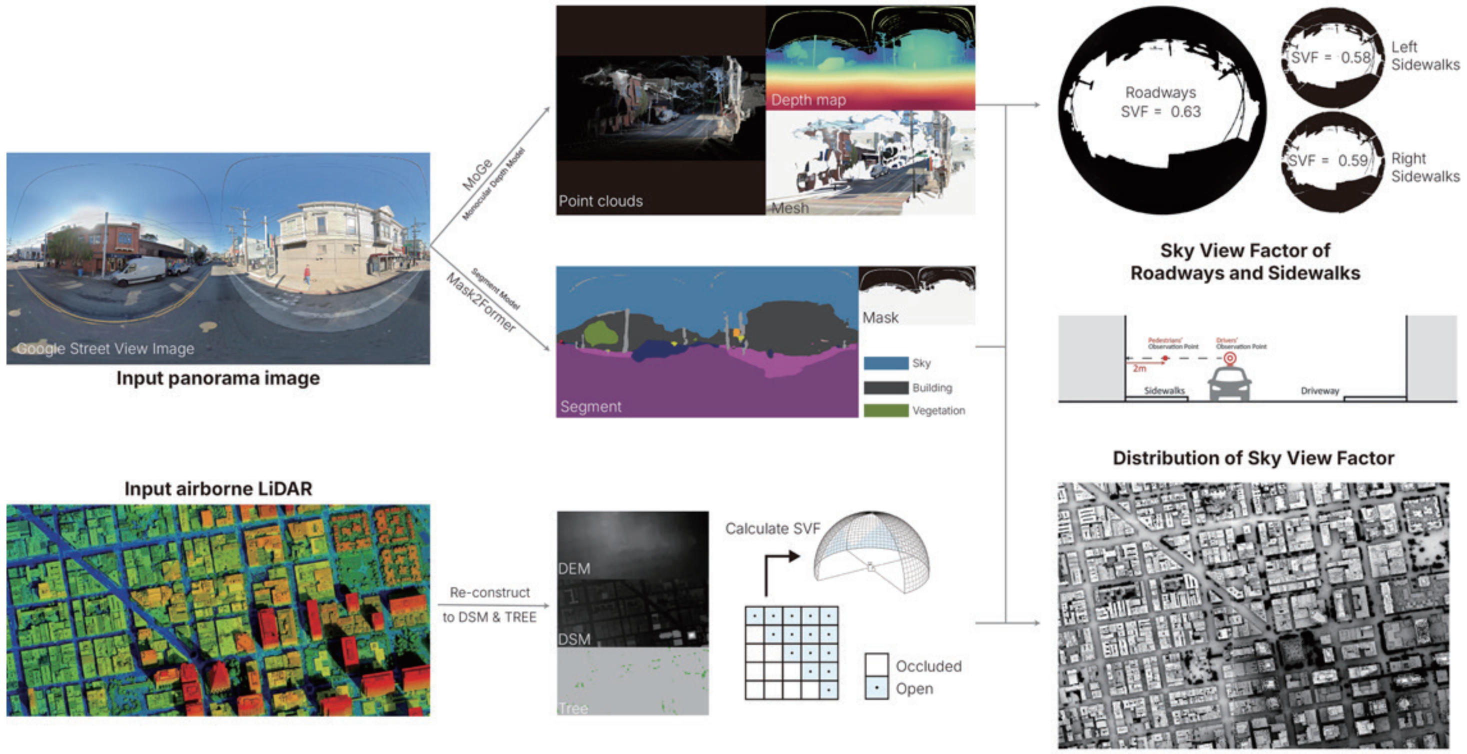
Research Background

The global thermal environment is deteriorating at an alarming rate, with the impact being most acute in densely populated urban areas due to the Urban Heat Island (UHI) effect. As extreme heat events become more frequent, accurately assessing microclimate indicators, specifically the **Sky View Factor, is critical for understanding and mitigating heat stress to ensure public health and thermal comfort.**

However, existing large-scale SVF estimation methods predominantly rely on street-view imagery captured by vehicles, **which reflects the geometry of roadway centers rather than where people actually walk**. Our research demonstrates a significant statistical discrepancy between roadway and sidewalk SVF values, proving that current vehicle-based estimations fail to accurately represent the true thermal exposure experienced by pedestrians.

To bridge this gap, we propose a novel method capable of deriving **pedestrian-level SVF directly from single street-view images**. By geometrically inferring the view from the sidewalk based on the original roadway perspective, our approach achieves high accuracy in estimating human-centric sky visibility, offering a precise and scalable solution for climate-responsive urban planning.

Work flow



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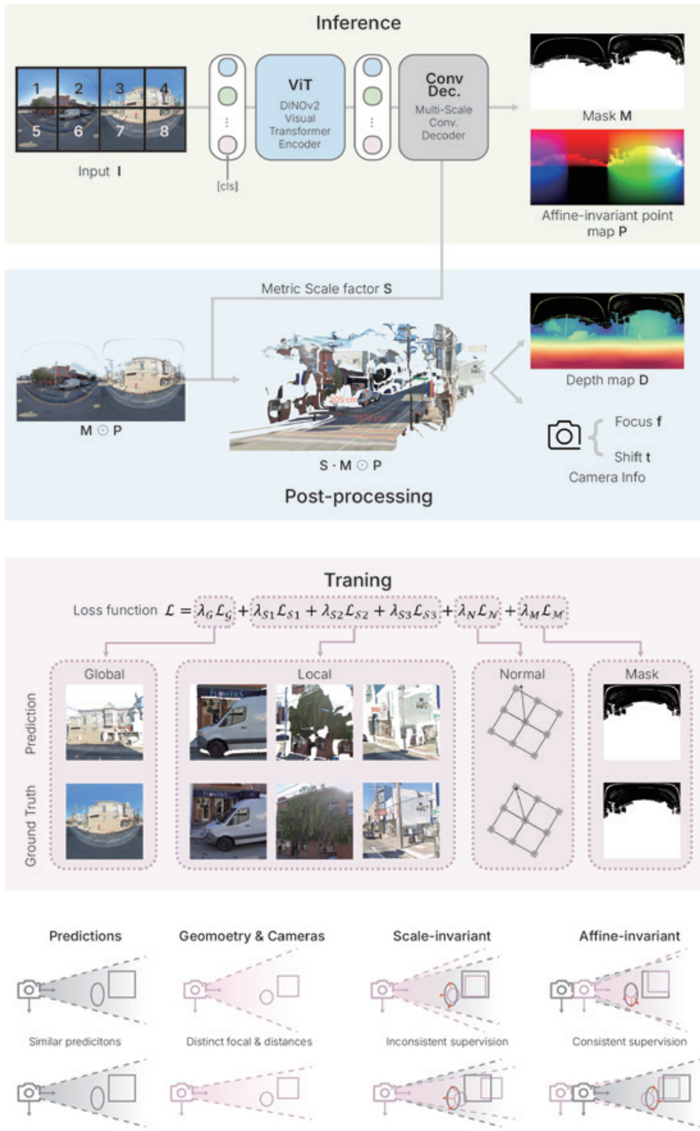
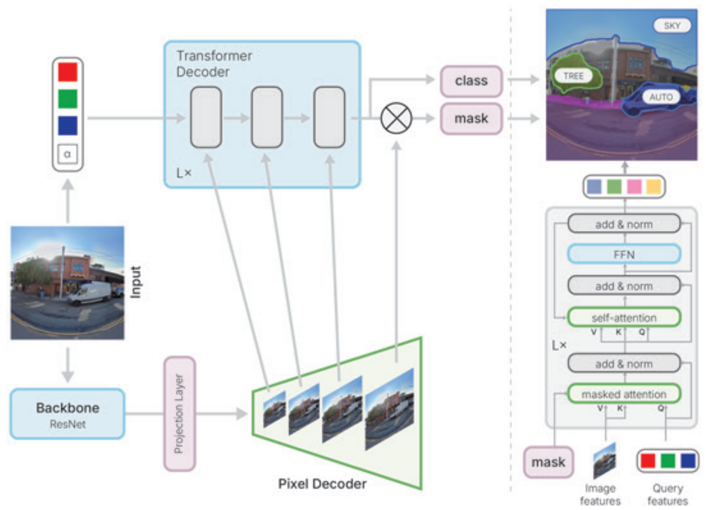
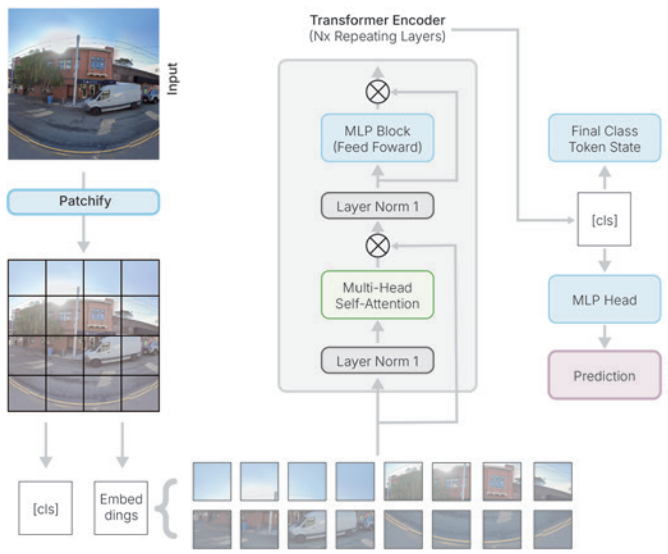


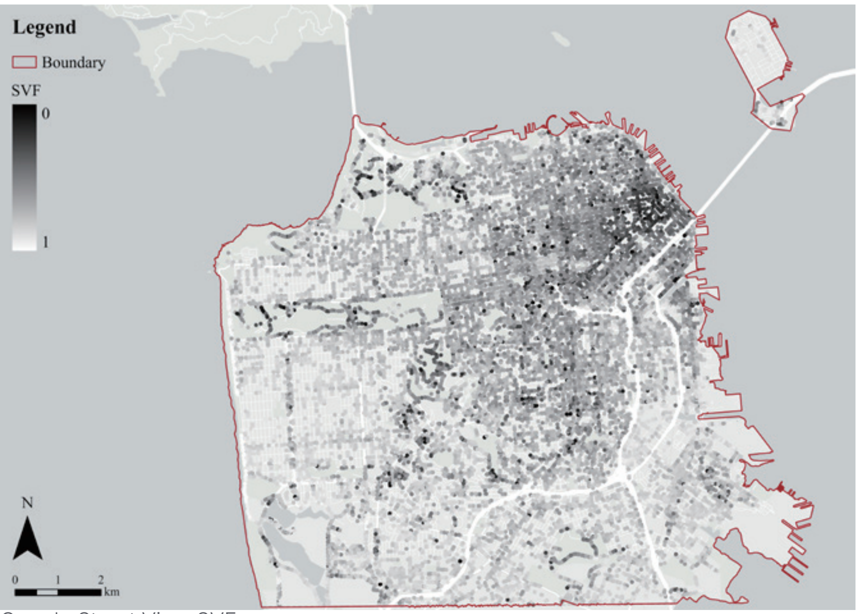
Mask2Former



ViT



Global Performance and Pairwise Agreement

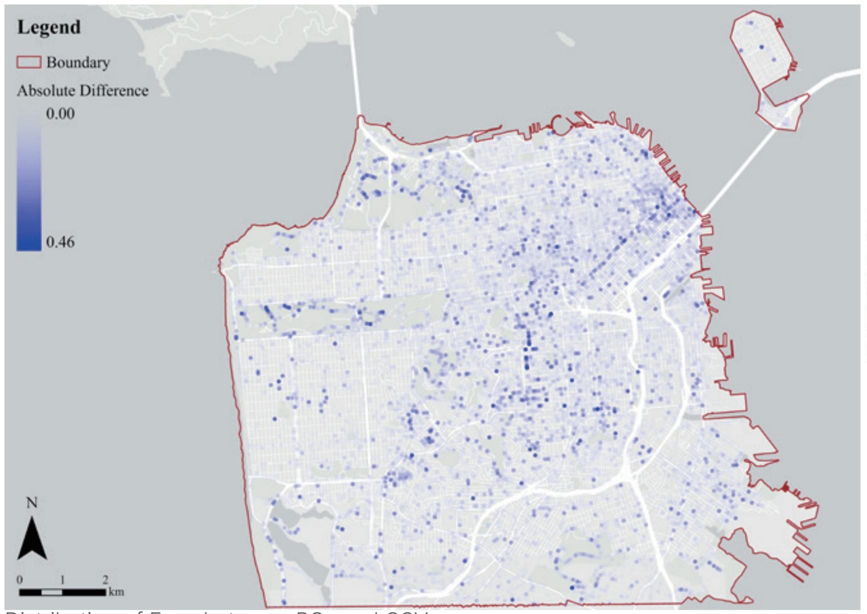


Google Street View SVF

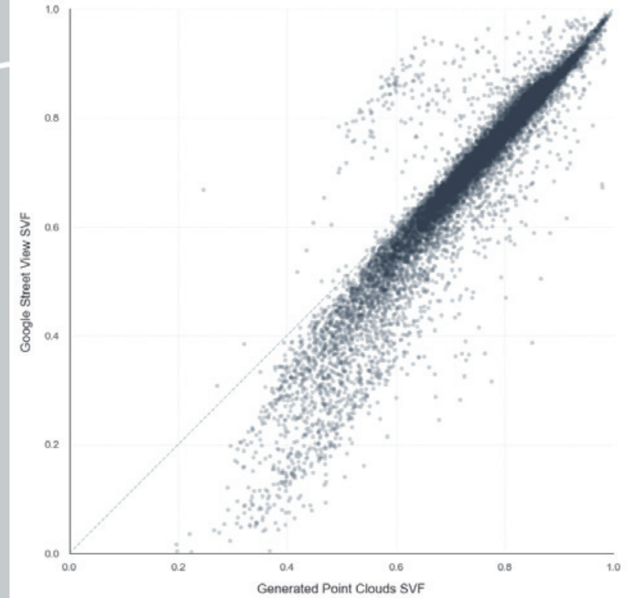
Generated Point Clouds - Google Street View

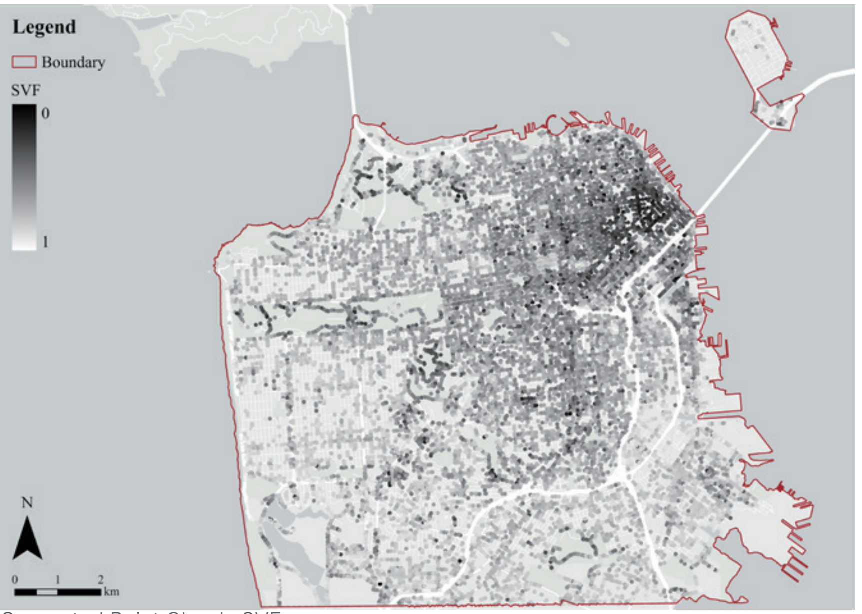
The distribution of absolute differences between the Generated Point Clouds and GSV exhibits a remarkable degree of spatial homogeneity, with most of SF showing negligible differences.

While the maximum absolute difference reaches 0.46, high-magnitude errors appear only as sporadic, isolated points rather than forming contiguous clusters. Notably, there is no significant accumulation of errors in specific urban zones.



Distribution of Error between PCs and GSV



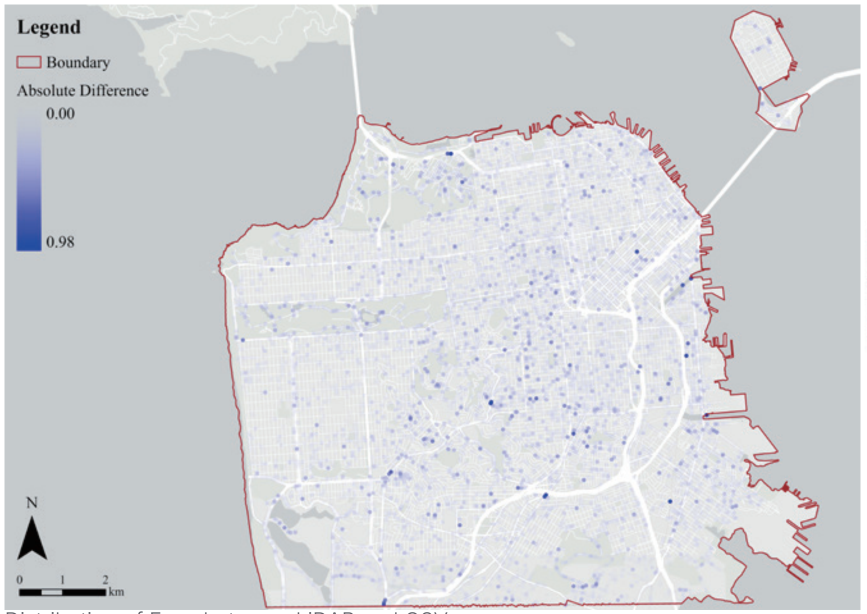


Generated Point Clouds SVF

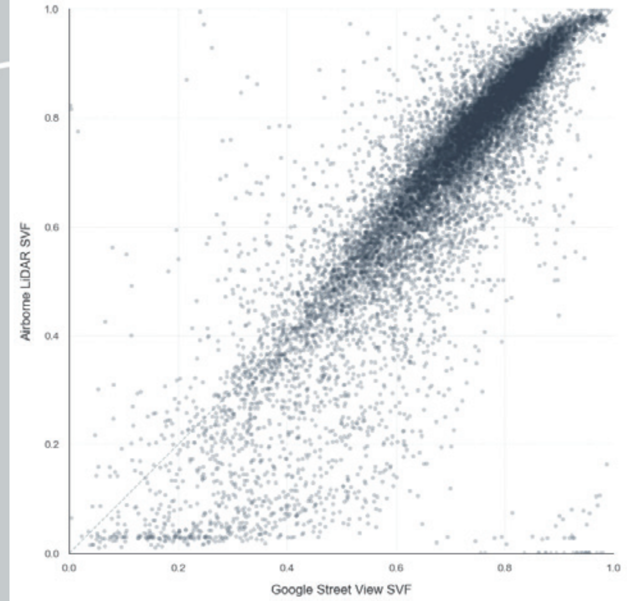
Airborne LiDAR - Google Street View

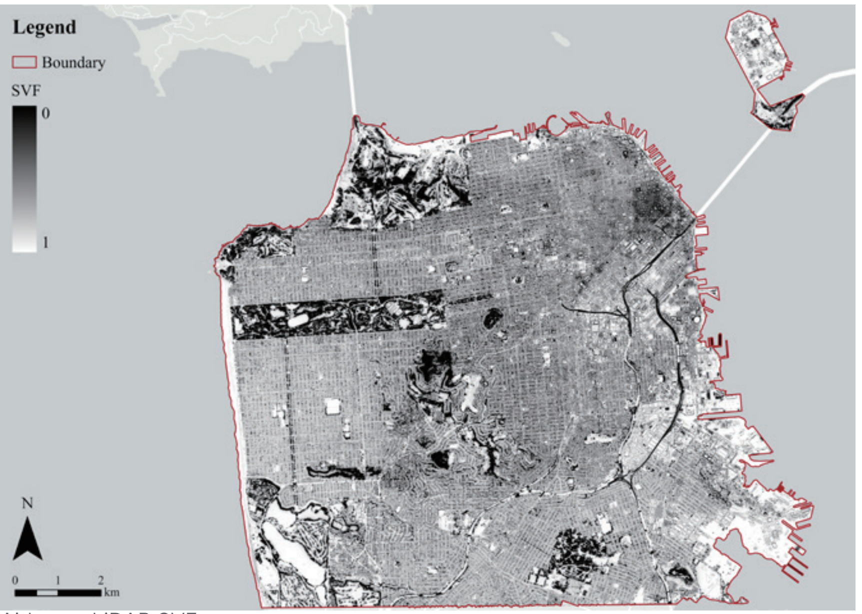
The spatial distribution of absolute differences between Airborne LiDAR and GSV-derived SVF is dominated by low-value areas, corroborating the strong statistical correlation reported earlier.

However, noticeable discrepancies are not randomly distributed as they are predominantly concentrated in the northeastern quadrant of San Francisco, which corresponds to the city's high-density urban core, like Financial District and Downtown.



Distribution of Error between LiDAR and GSV



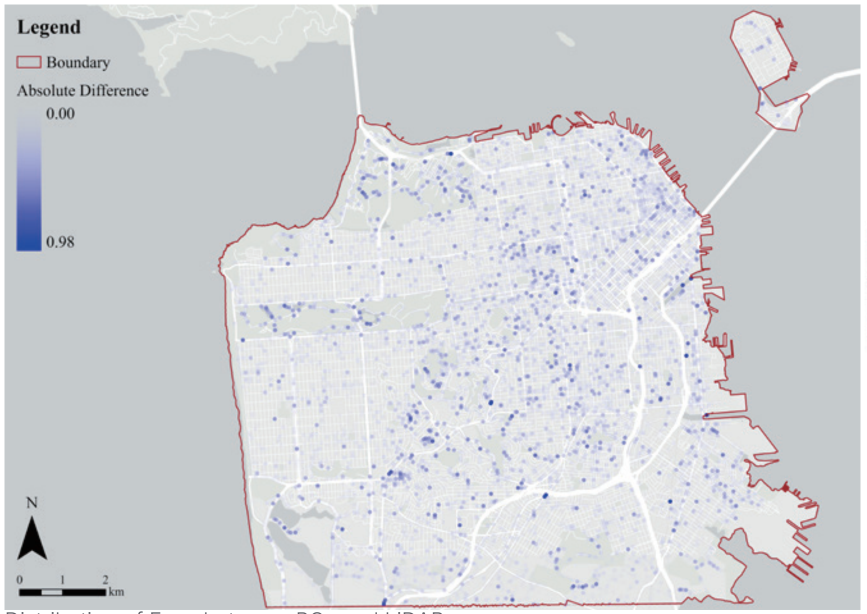


Airborne LiDAR SVF

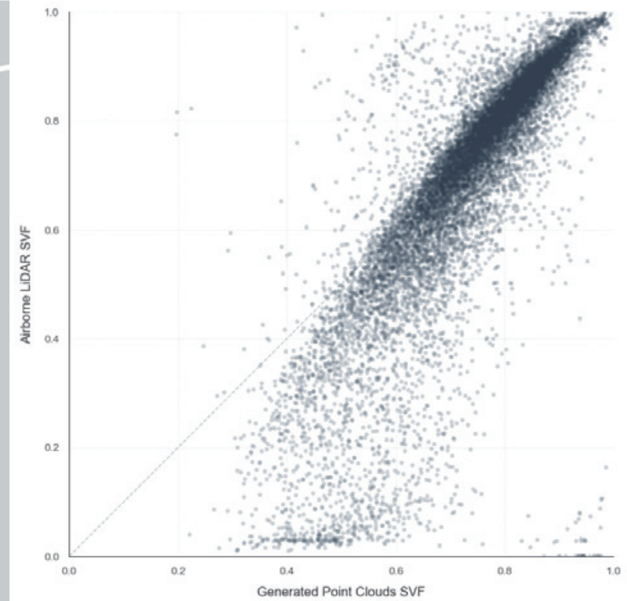
Generated Point Clouds - Airborne LiDAR

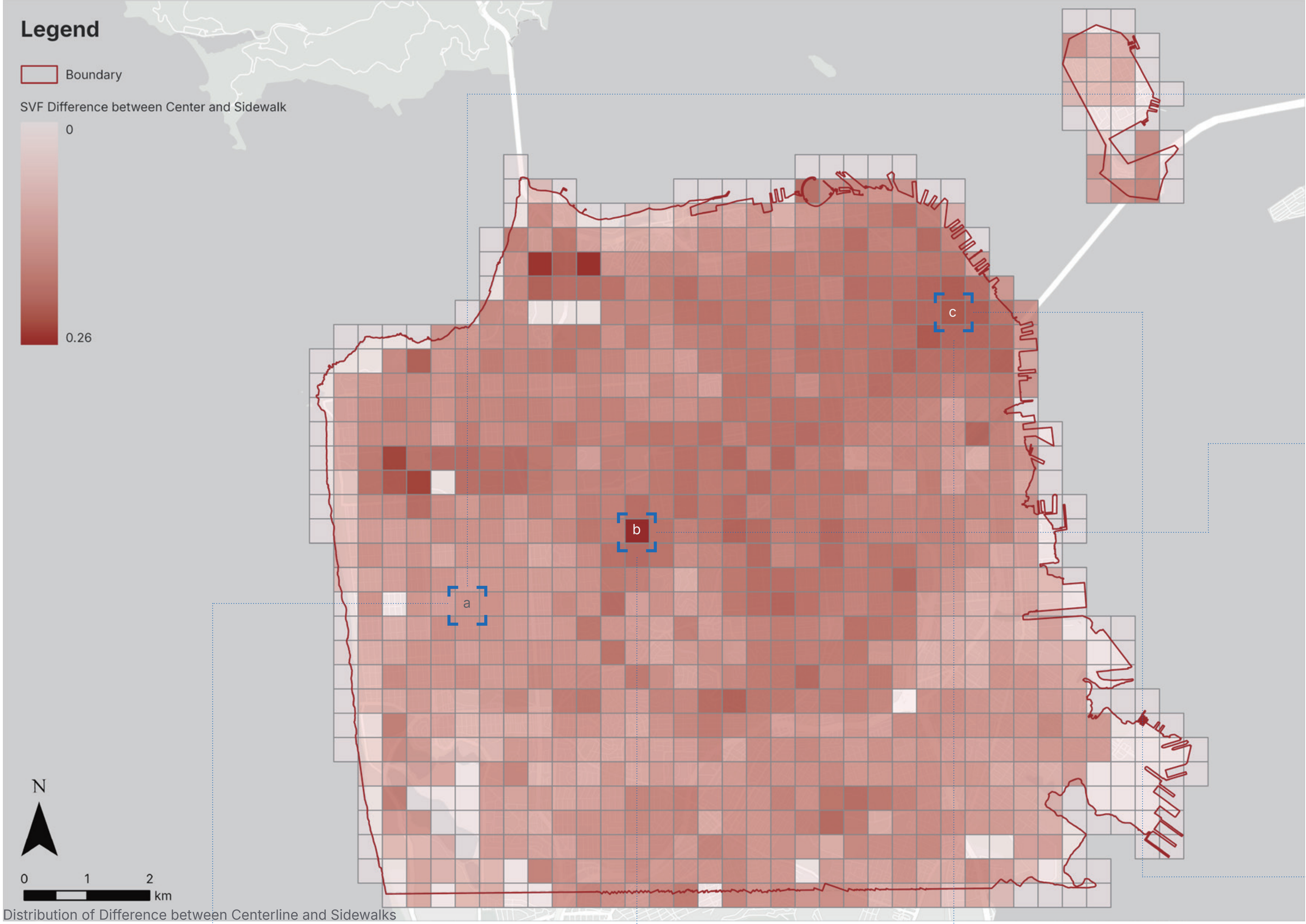
The comparison between Airborne LiDAR and Generated Point Clouds reveals the most pronounced spatial discrepancies among all pairwise combinations.

Unlike the localized or sporadic errors observed in previous comparisons, this map displays a widespread distribution of high-magnitude differences (reaching a maximum of 0.98) across the entire city, affecting both the high-density urban core and low-density residential zones.



Distribution of Error between PCs and LiDAR





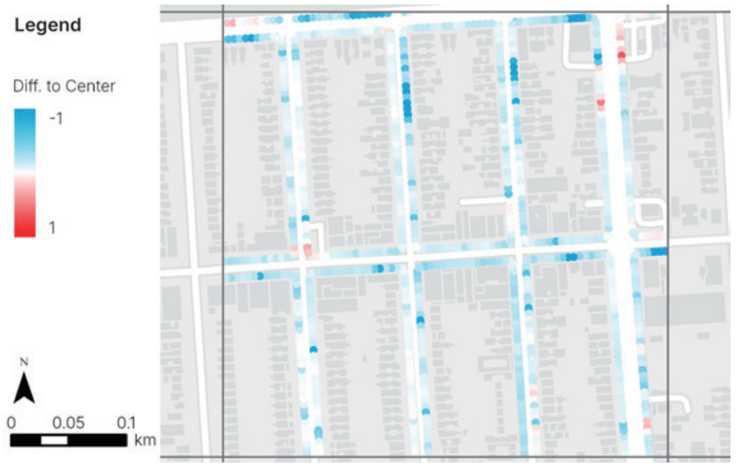
Distribution of Difference between Centerline and Sidewalks


Typical Street View at **a**

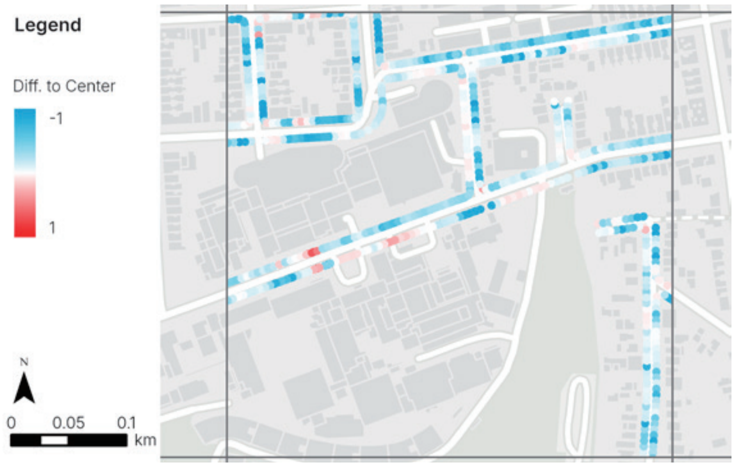

Typical Street View at **b**


Typical Street View at **c**

a



b



c

Pedestrians' View of Sky View Factor

The spatial distribution of SVF error correlates strongly with **urban morphology**.

Low-density residential areas exhibit the highest consistency with minimal deviation. Conversely, error margins widen in high-rise districts due to the urban canyon effect. Notably, the most significant discrepancies are found in areas with dense **vegetation**, where complex canopy geometries challenge the model's precision.

From Patchwork to Network

A Comprehensive Framework for Demand Analysis and Fleet Optimization of Urban Air Mobility

My role
Individual Work

Time
2025.6 - 2025.10
Work done at MIT-UF-NEU Summer Research Camp

Instructor
Dr. Xuan Jiang
Prof. Jinhua Zhao
Prof. Shenhao Wang
Prof. Haris Koutsopoulos

Key Words
Urban Air Mobility, UAM Fleet Operation, Regional-Scale Traffic Simulation, Heterogeneous Fleet, Transportation Network Equilibrium

Tech Stack
GIS, Python, CUDA, SF-CHAMP, Parallel Computing, Traffic Simulation, LPSim

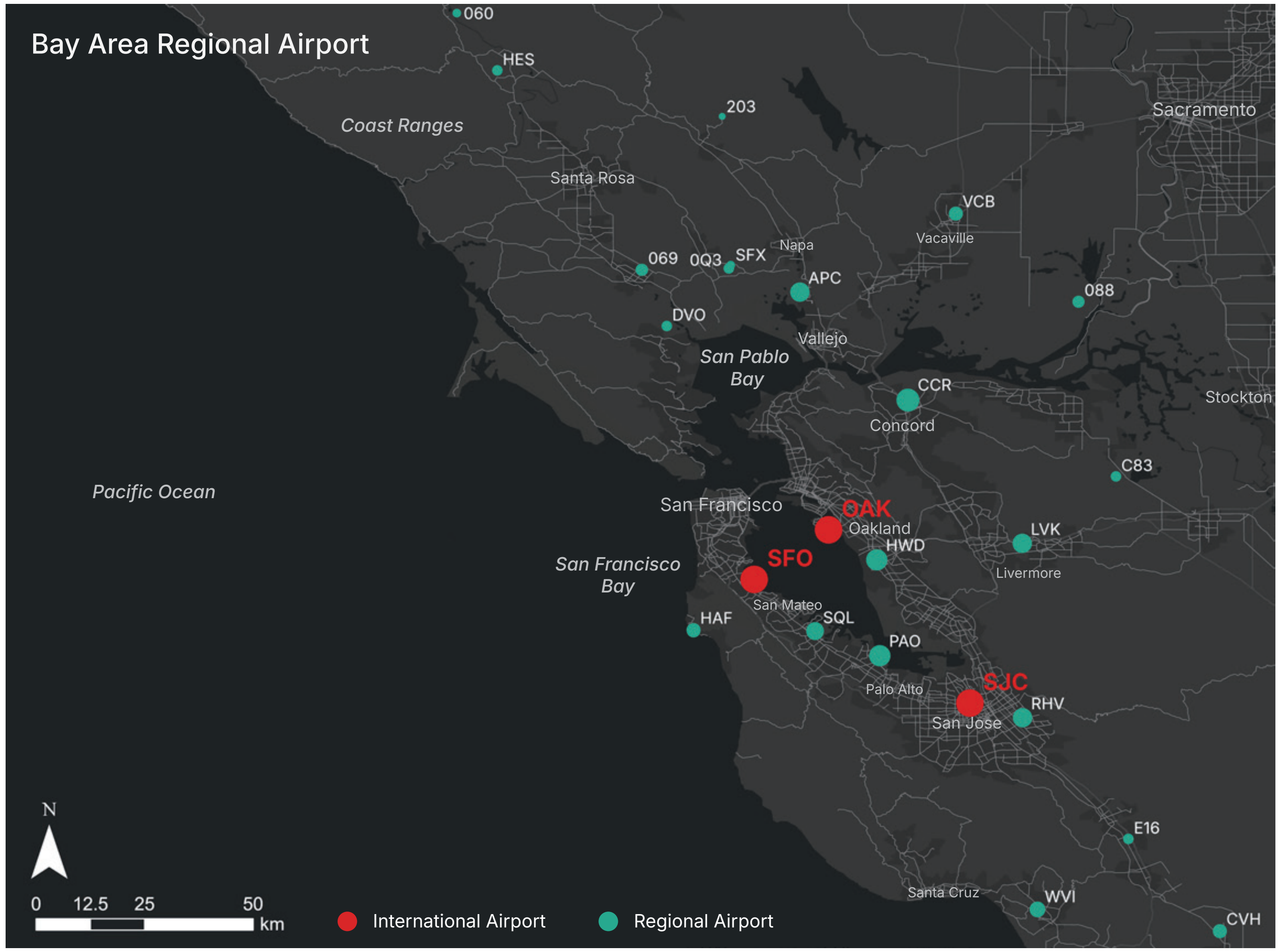
Note
Work Accepted by TRB 2026 Annual Meeting
Poster Available at https://xuanyuzhou.org/urban-air-mobility/
Preprint Available at https://arxiv.org/abs/2510.04186

Background

While re-purposing underutilized regional airports is identified as a strategic entry point for UAM, there is no established framework for systematically evaluating, selecting, and integrating this **existing infrastructure to maximize network capacity and operational viability**.

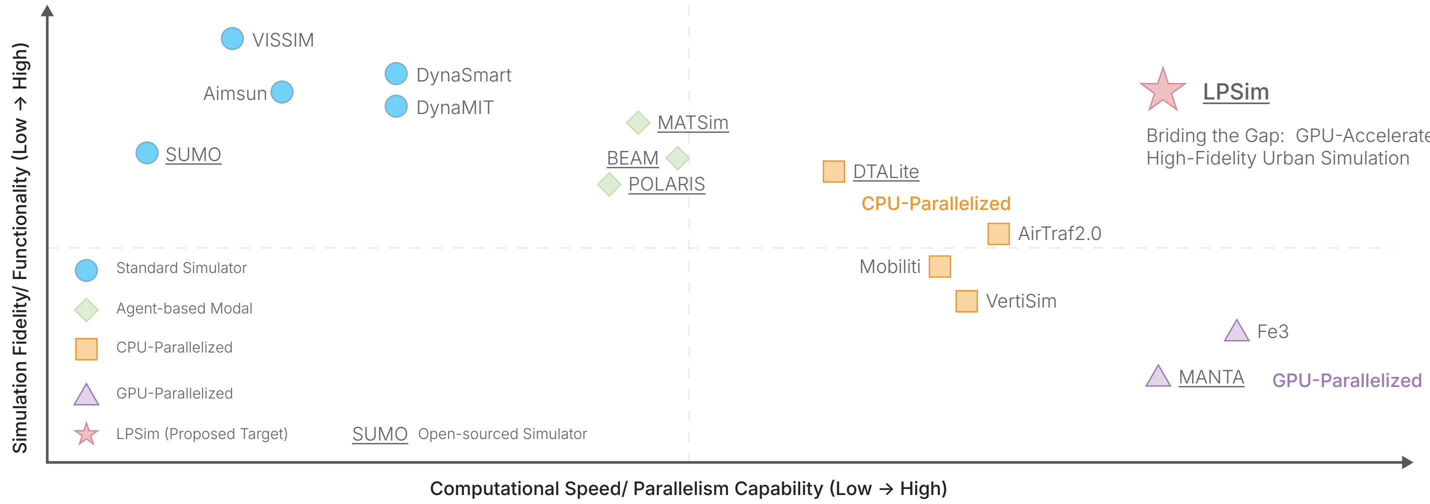
Current approaches lack efficient and scalable solutions for the core planning problem of optimally composing a heterogeneous fleet (mix of eVTOLs/ eSTOLs) to **dynamically match spatio-temporal demand variations**. This is critical for minimizing capital costs (seat wastage) while ensuring service coverage.

Conventional transportation analysis tools are ill-suited for UAM planning because they cannot handle regional-scale simulations, **model the dynamic feedback between new air traffic and existing ground systems**, and suffer from prohibitive computational times, creating a bottleneck for iterative design.



Methodology

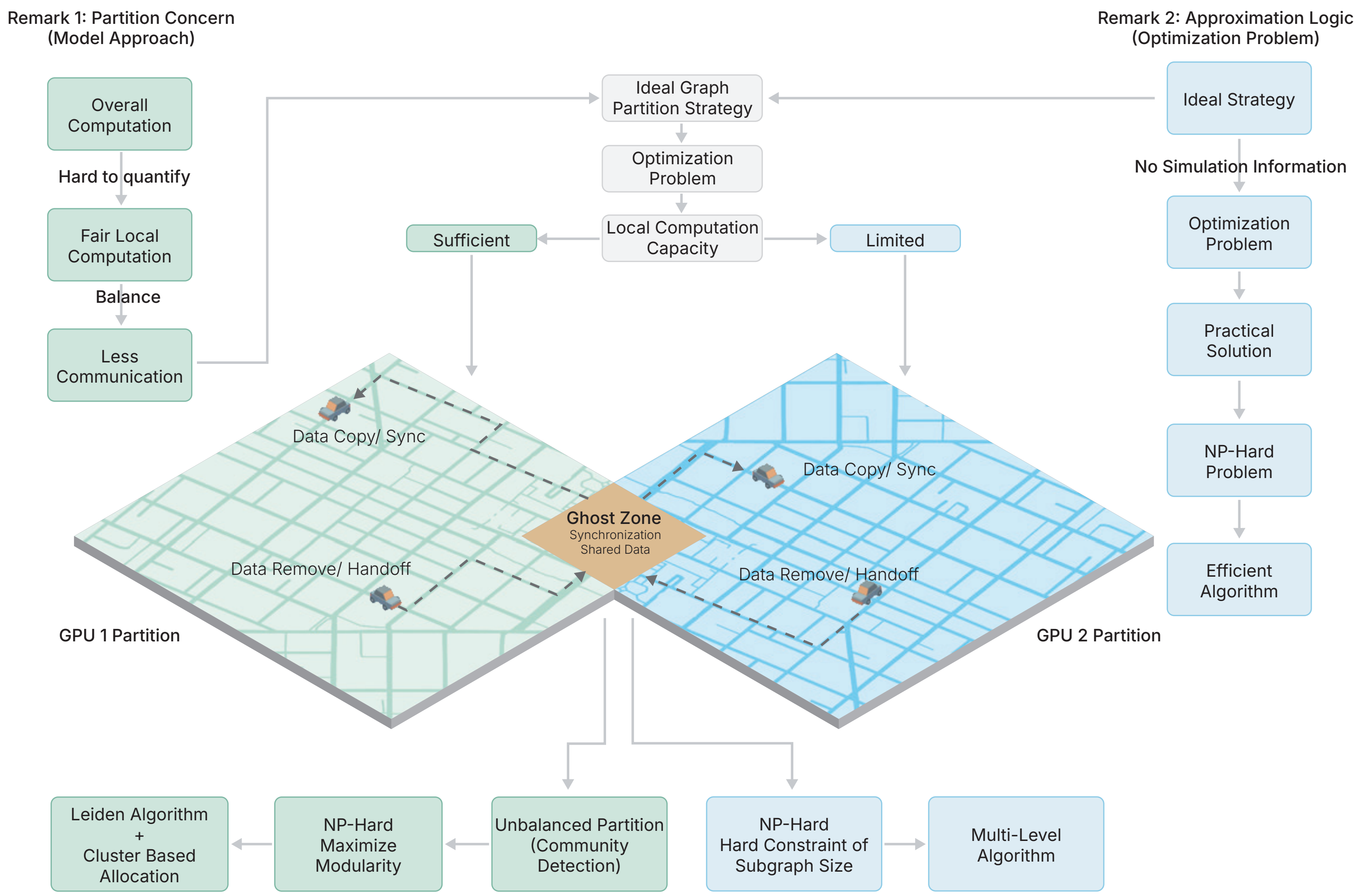
Why LPSim?



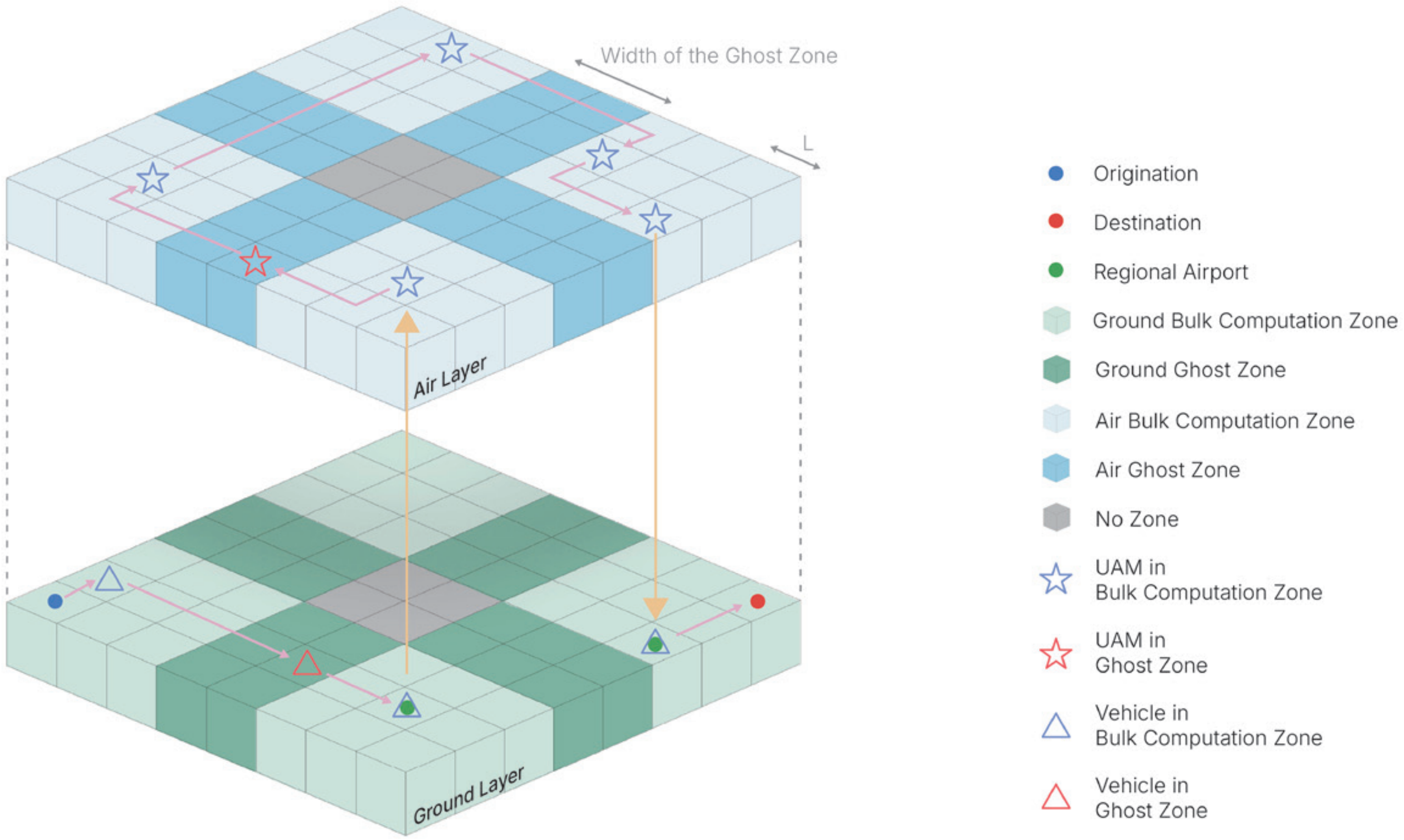
Existing transportation simulation models have explored solutions such as leveraging supercomputers for large datasets (Mobiliti), utilizing CPU/GPU parallelism (MANTA), and adopting CPU-based mesoscopic parallel simulations (BEAM, POLARIS).

However, these approaches still have limitations: they often focus on either functionality or parallelism, and the potential of fully parallelizable GPU-based simulation remains unexplored, especially using multiple GPUs to simultaneously enhance computational power and memory for larger, faster scenarios. In contrast, our LPSim addresses this gap by **effectively integrating both advanced functionality and scalable multi-GPU parallelism**.

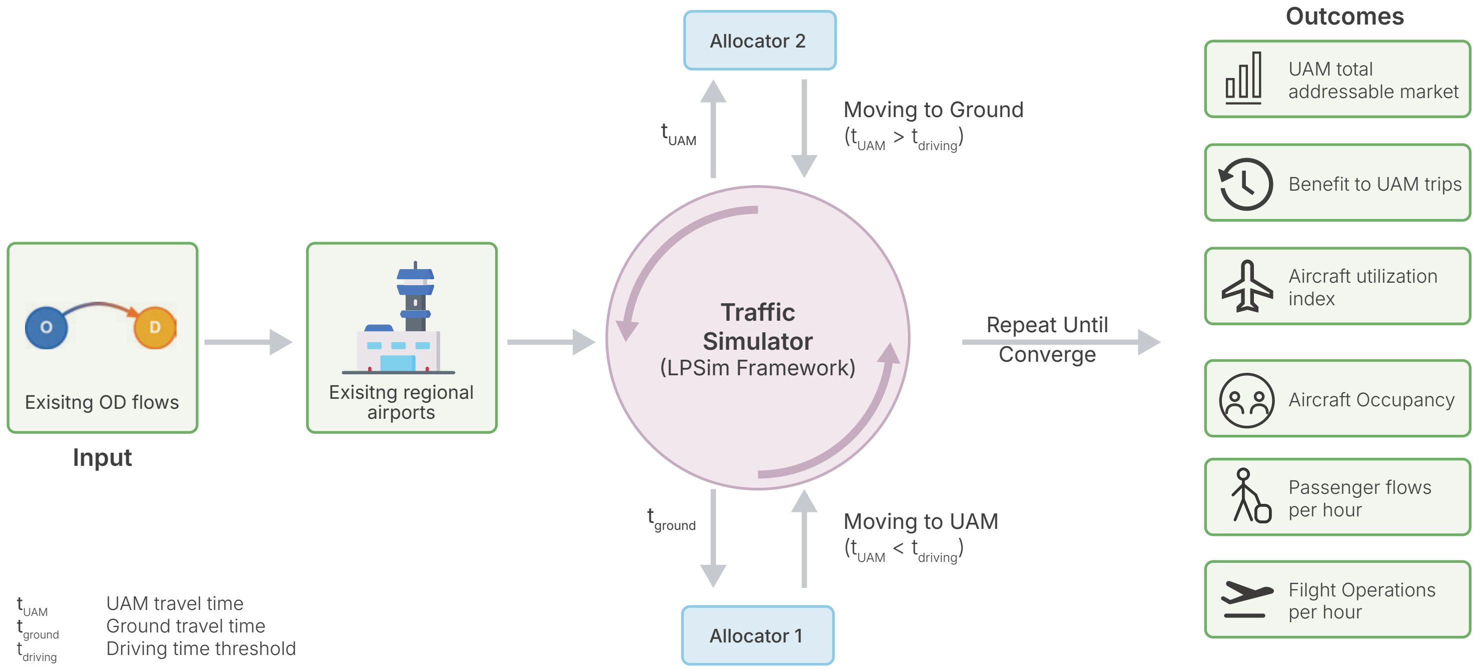
Graph Partitioning Strategy



Two-layer Structure

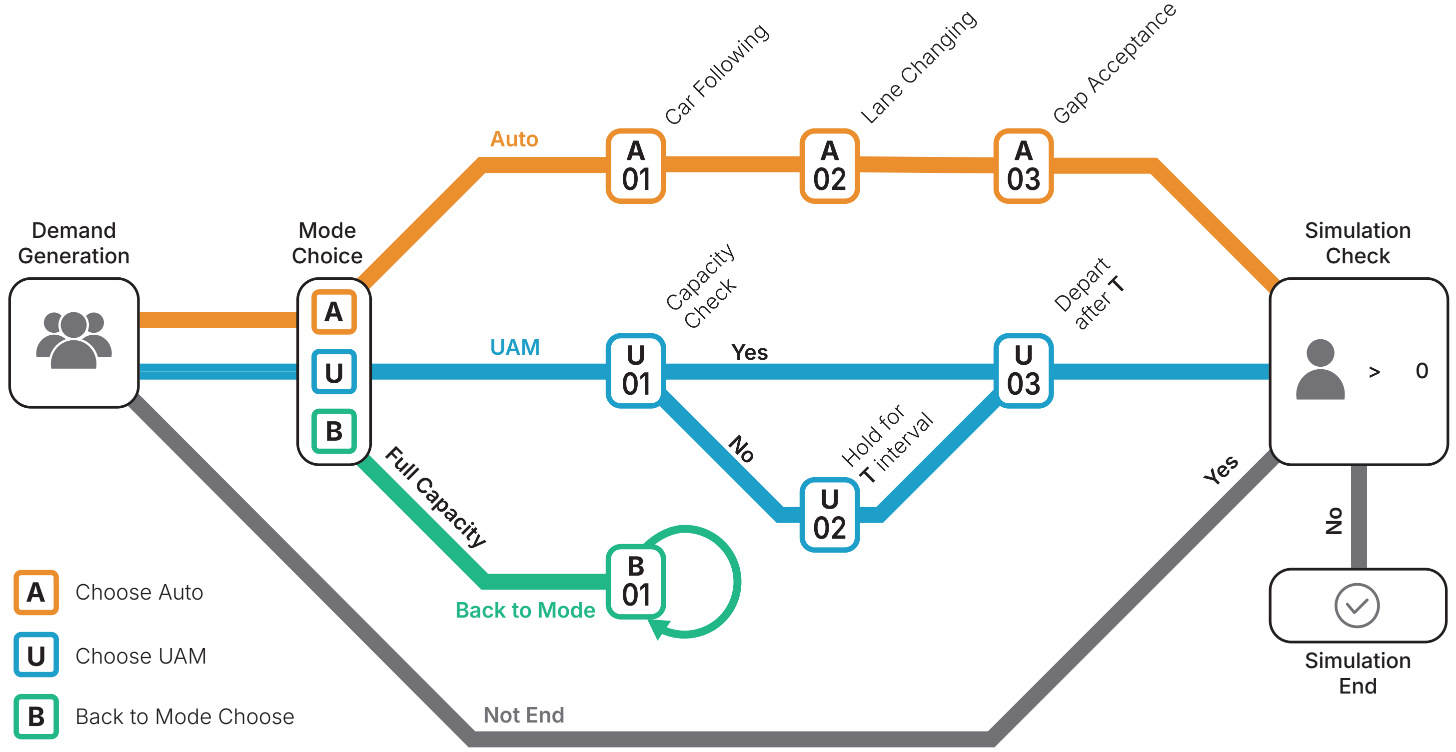


Equailibrium



This promotional mechanism is typically active for a limited number of early iterations, controlled by the parameter $t_{driving}$, after which travelers switch based on other emergent properties of the system. **This iterative process of demotion and promotion continues until the system stabilizes.** Convergence is reached when the net change in the set of UAM users between two consecutive iterations becomes negligible. Specifically, the loop terminates when the proportion of trips that switched modes relative to the total number of OD trips falls below a predefined tolerance threshold ε. Upon convergence, the algorithm outputs the final equilibrium allocations of t_{uam} and t_{ground}. This result should represent the total addressable market for UAM under realistic, congested conditions, along with the calculated net travel time benefits or losses for travelers in each mode.

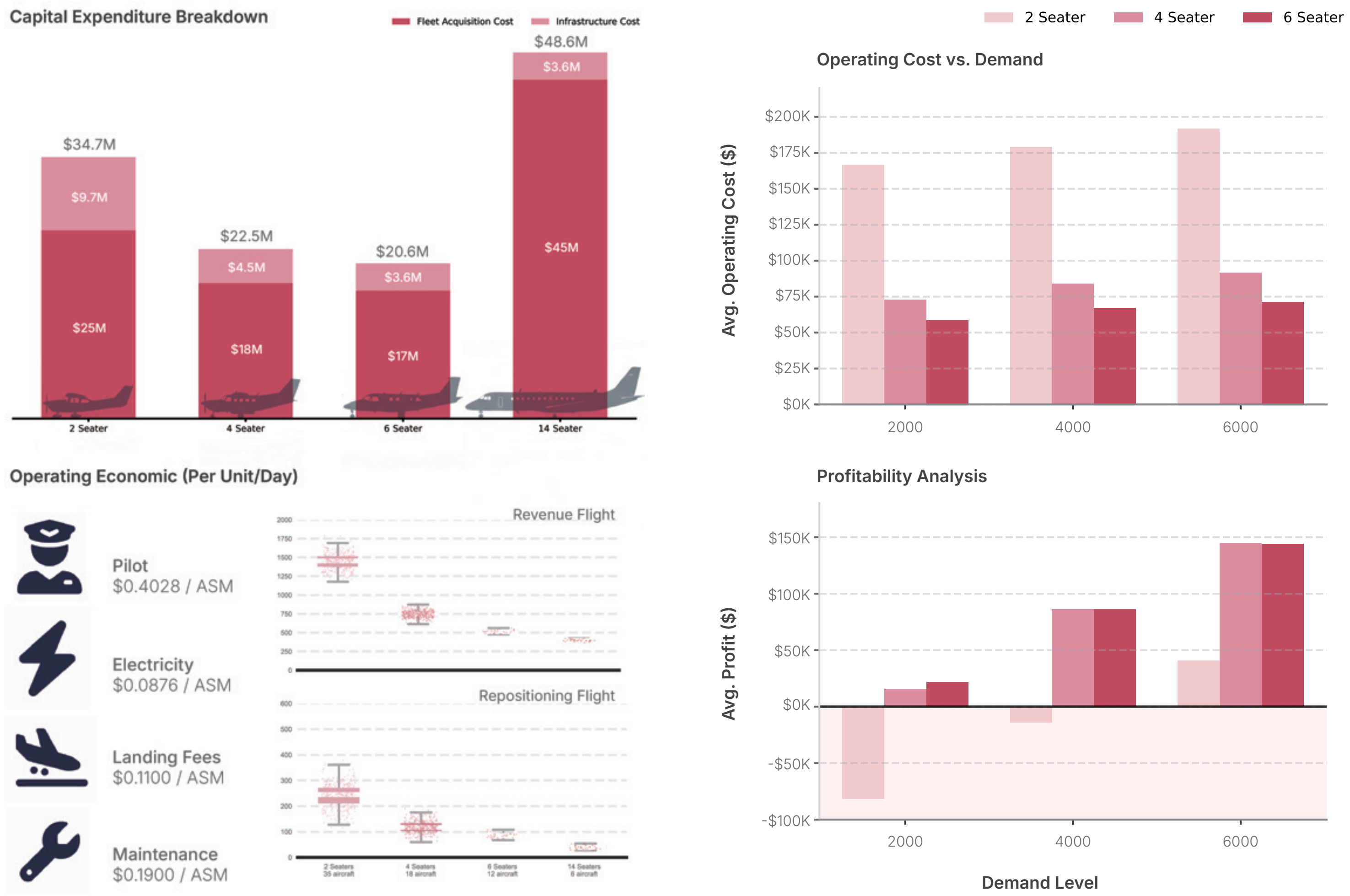
UAM and Ground Trip Simulation



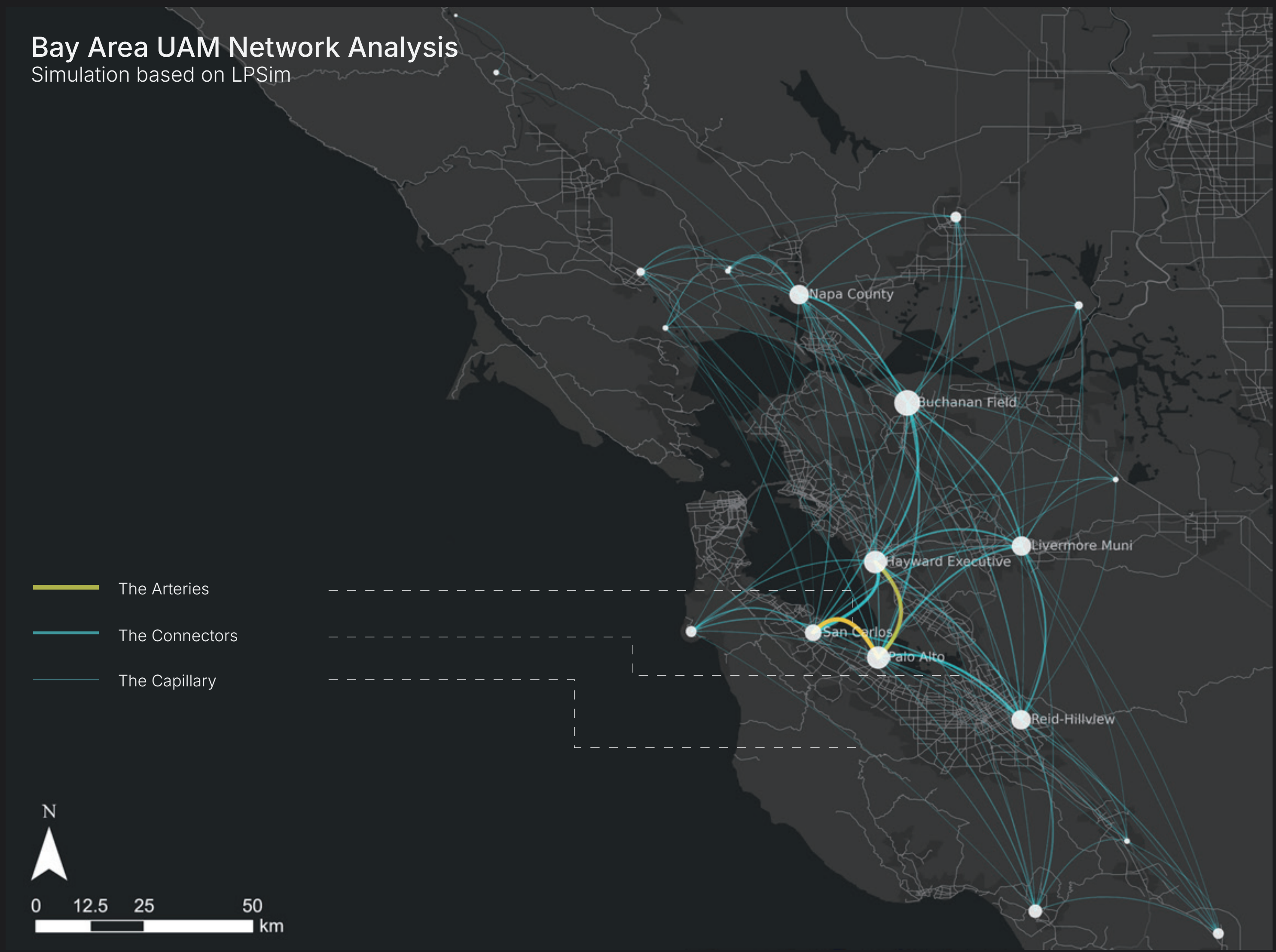
Our simulation begins with the generation of demand and routing stages, **assigning a mode (Auto or UAM) to each segment of the trip**. Ground transportation follows traditional traffic simulation paradigms, including car-following, lane-changing, and gap-acceptance models.

For UAM trips, our system dynamically manages operations by continuously monitoring vertiport capacity and enforcing departure intervals to satisfy necessary operational separation requirements. The complete multimodal network, illustrating the distinct layers for UAM and ground traffic.

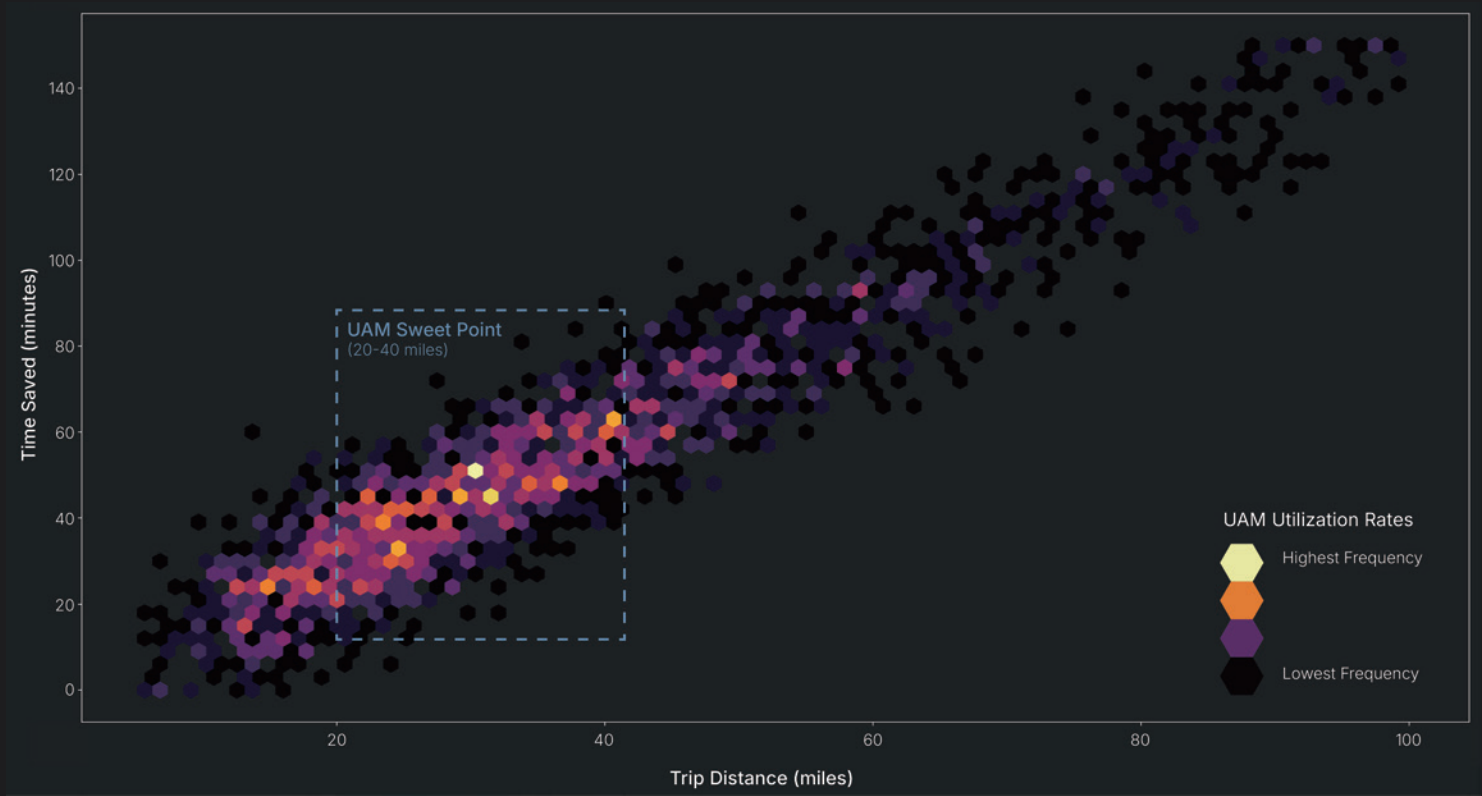
Financial Analysis



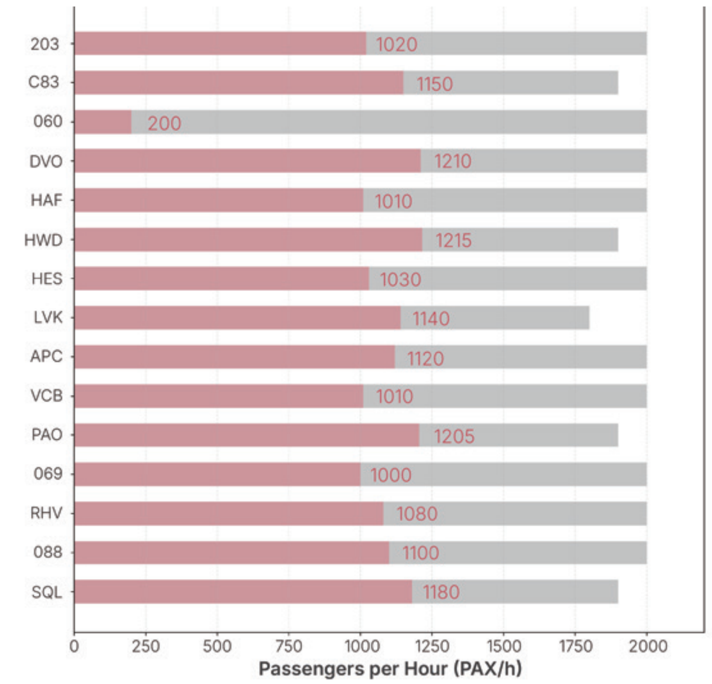
Result



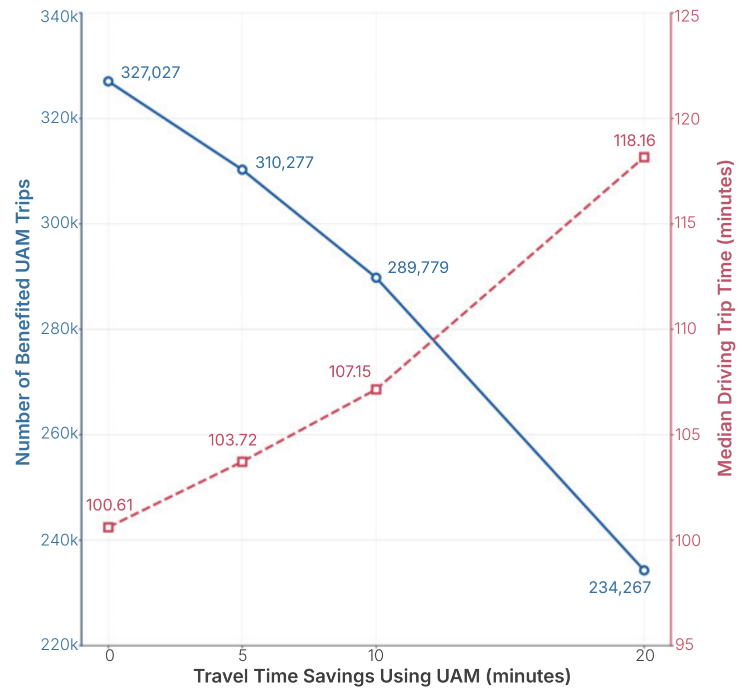
Distribution of Time Savings and Travel Distances



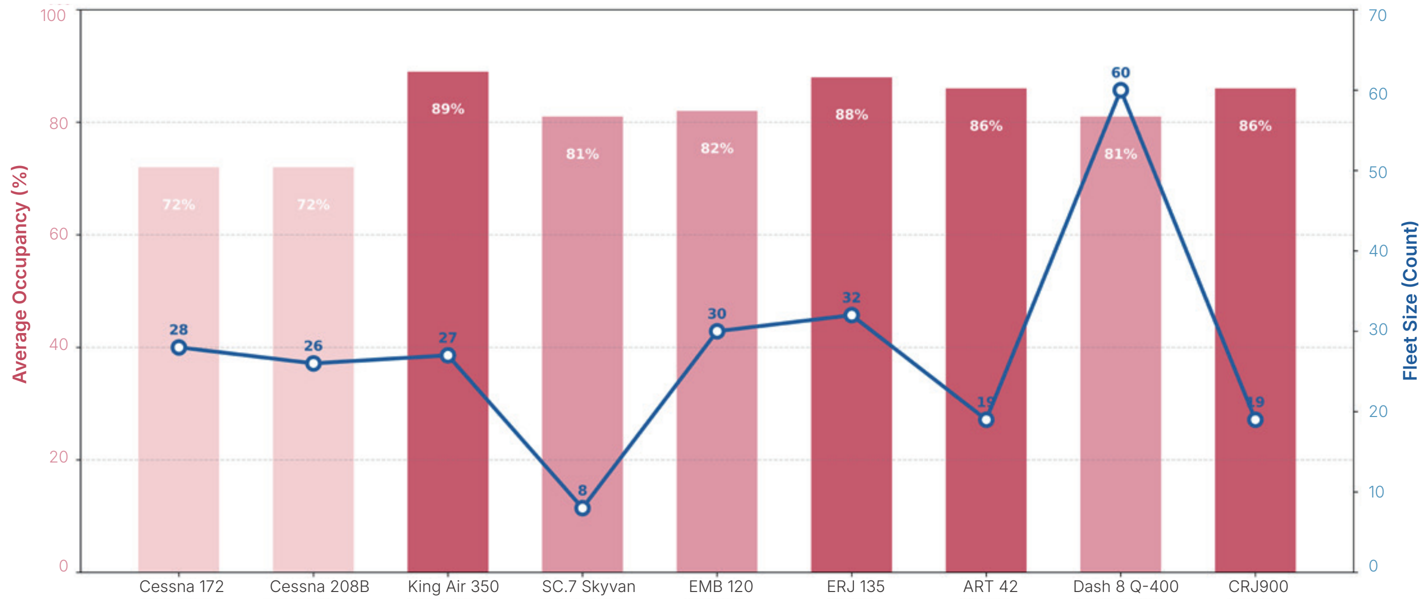
Airport Potential



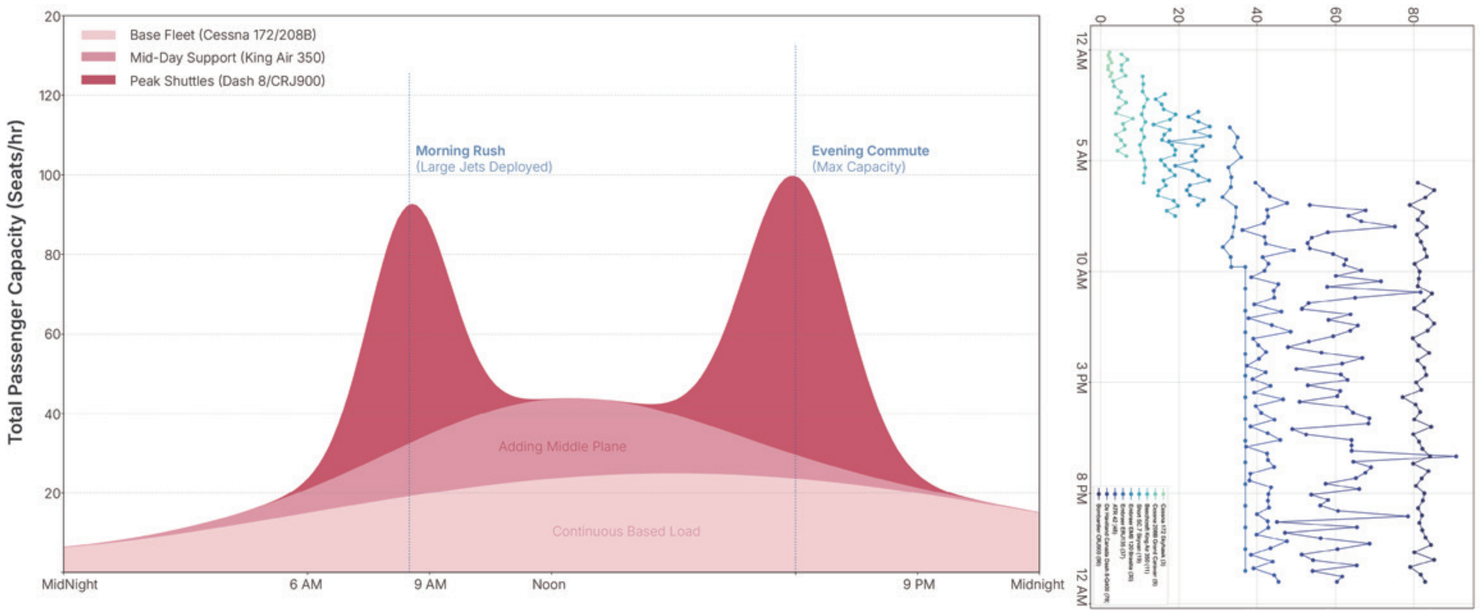
Number of Benefit Trips



Fleet Efficiency Spectrum



Departure Strategies



Smart Stops, Smooth Swaps

Field Research on Current Utilization, Policy Impact, and Strategies of Park-and-Ride Systems in Hangzhou

My role
50% Conceptualization
50% Methodology
50% Visualization

Time
2024.6 - 2024.8

Gourp Members
Qianyi Yu

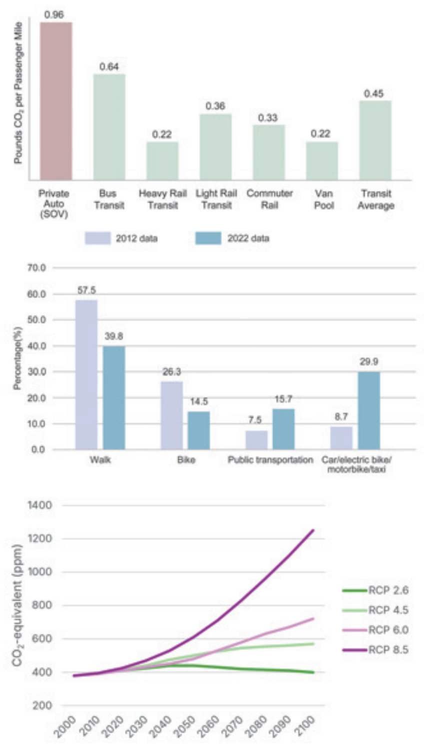
Instructor
Prof. Chuankun Rao

Key Words
Park and Ride, Sustainability, Urban Congestion, Transportation Policy, User Behavior

Tech Stack
GIS, Python, Machine Learning, Statistical Analysis, Random Forest, SHAP

Note
Full Report Available at https://xuanyuzhou.org/course-wupen-icity

Background

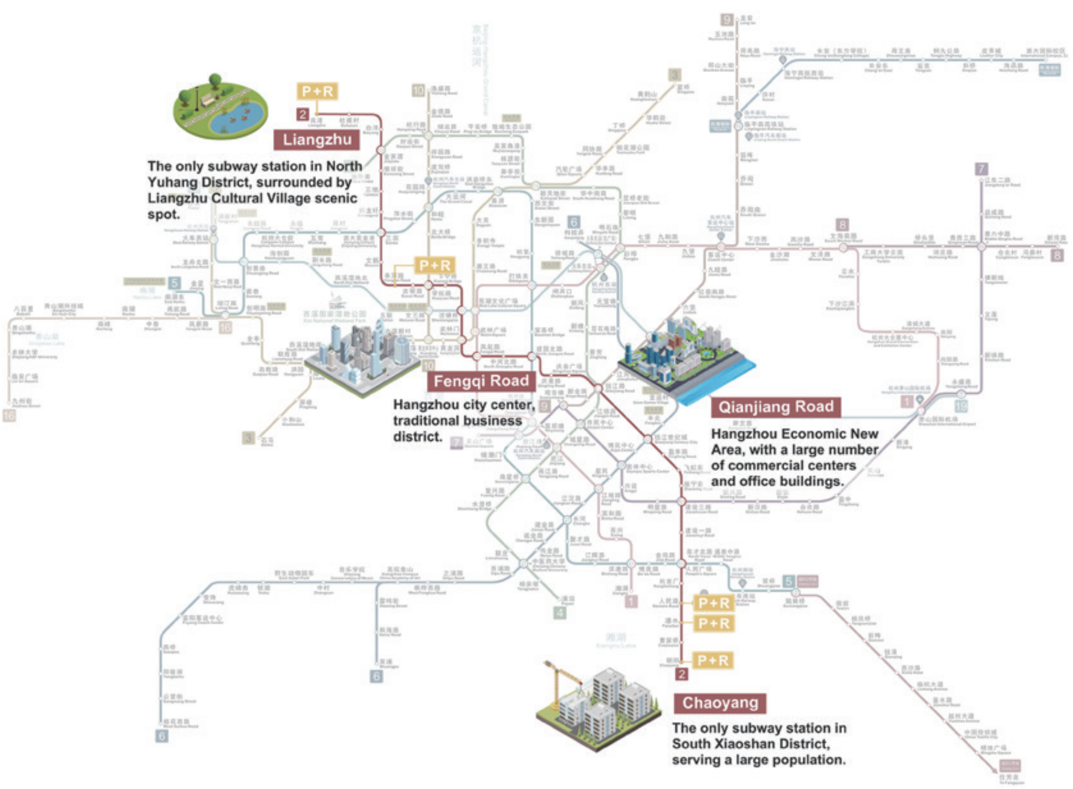


Urban car use exacerbates carbon emissions; thus, rail transit emerges as a feasible mitigation strategy, prompting a robust advocacy for park and ride (P+R) facilities.

Sustainable development is seen as key to addressing global issues, with the transportation sector both vital for socio-economic infrastructure and a major emitter, contributing 10% to China's total carbon emissions by the end of 2023.

Urban rail transit, exemplified by Hangzhou's efforts in smart transportation, plays a crucial role in reducing carbon emissions and improving urban sustainability through its efficiency and low emissions.

Research Area



Why?

Hangzhou Metro Line 2, an integral part of the city's transit system and one of its busiest with a daily ridership of around 600,000. It spans multiple urban zones, providing an ideal setting for a comprehensive analysis of P+R systems.

Which?

Five stations have been selected for inclusion in the dataset for this study.

Key stations with P+R lots include Fengtan Road Station, Renmin Road Station, Panshui Station, and Chaoyang Station. Despite not officially having a P+R facility, Liangzhu Station demonstrates P+R characteristics like pricing and user demographics, is also included in this analysis.

Research Questions

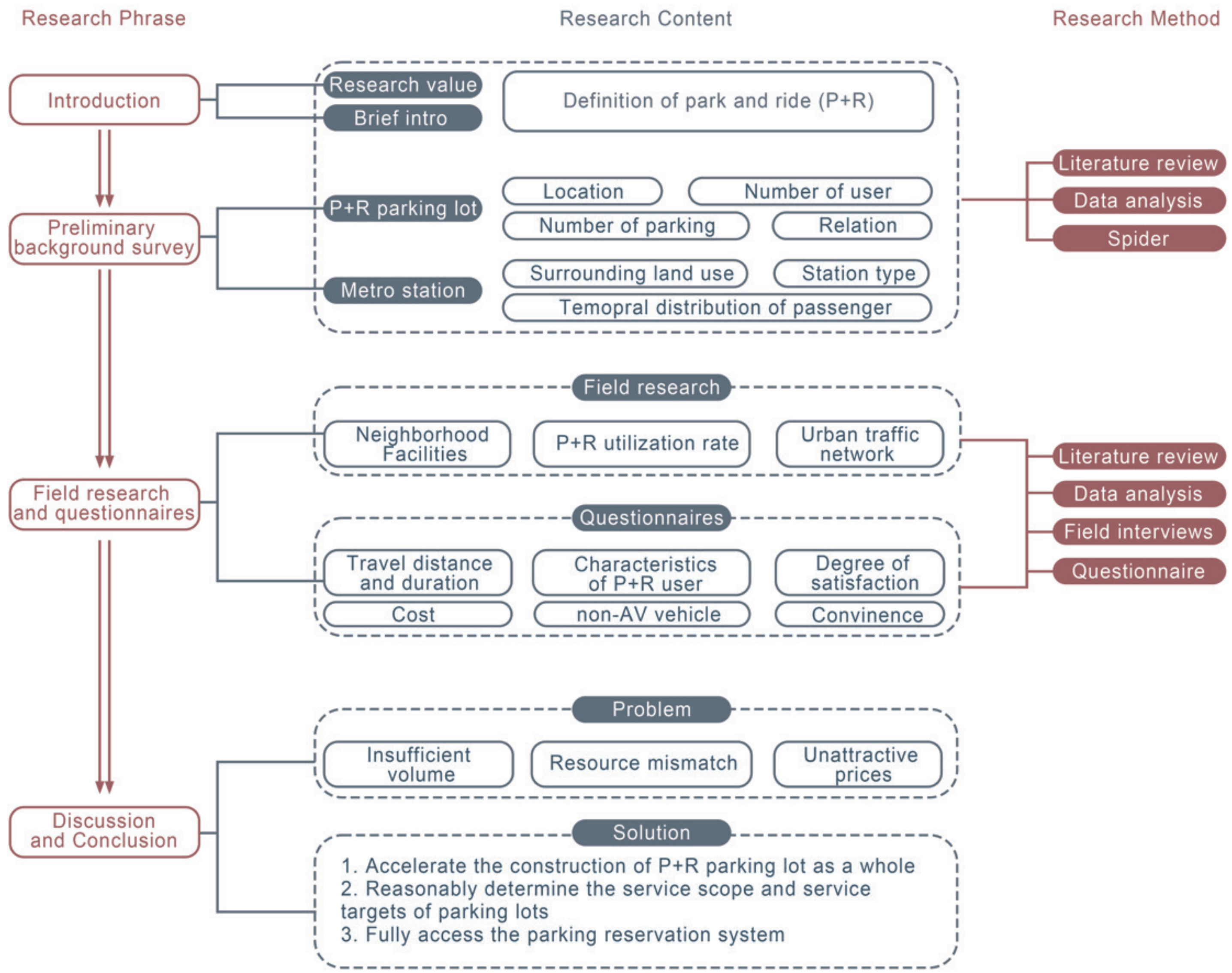
What are the effects of the implementation of the Hangzhou Park and Ride (P+R) system?

How to quantify residents' willingness to use P+R system and explore what impact their willingness?

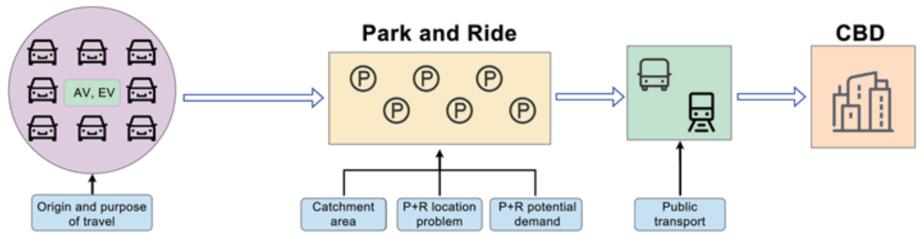
How can the existing P+R system be optimized in terms of spatial distribution, scale selection, and policy formulation?

Research Flow

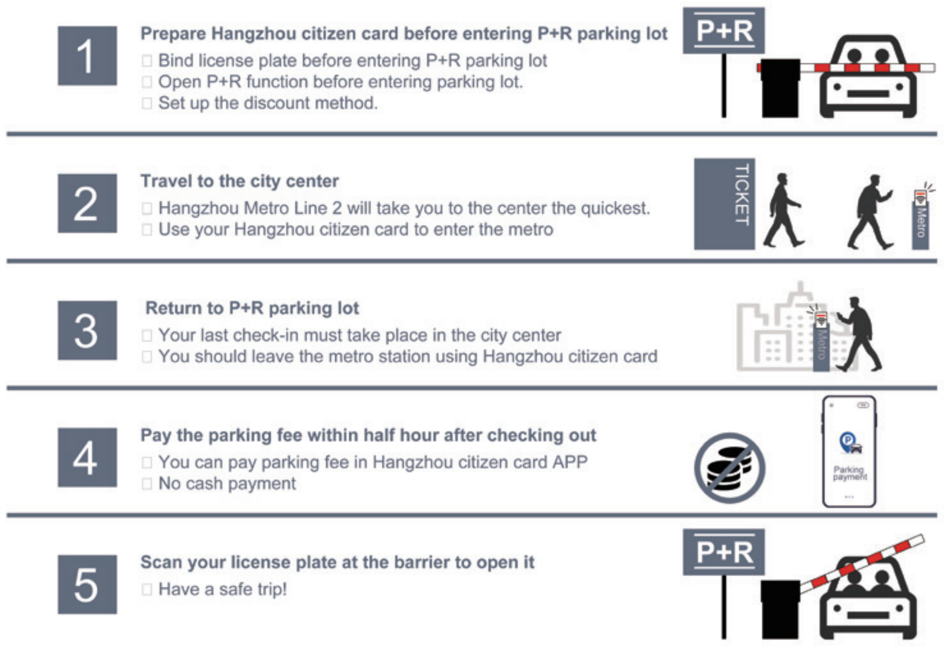
Accordingly, we developed a systematic analytical framework to comprehensively examine the Park-and-Ride usage patterns along Hangzhou Metro Line 2. The proposed methodological framework is illustrated below.



P+R Implementation in Hangzhou



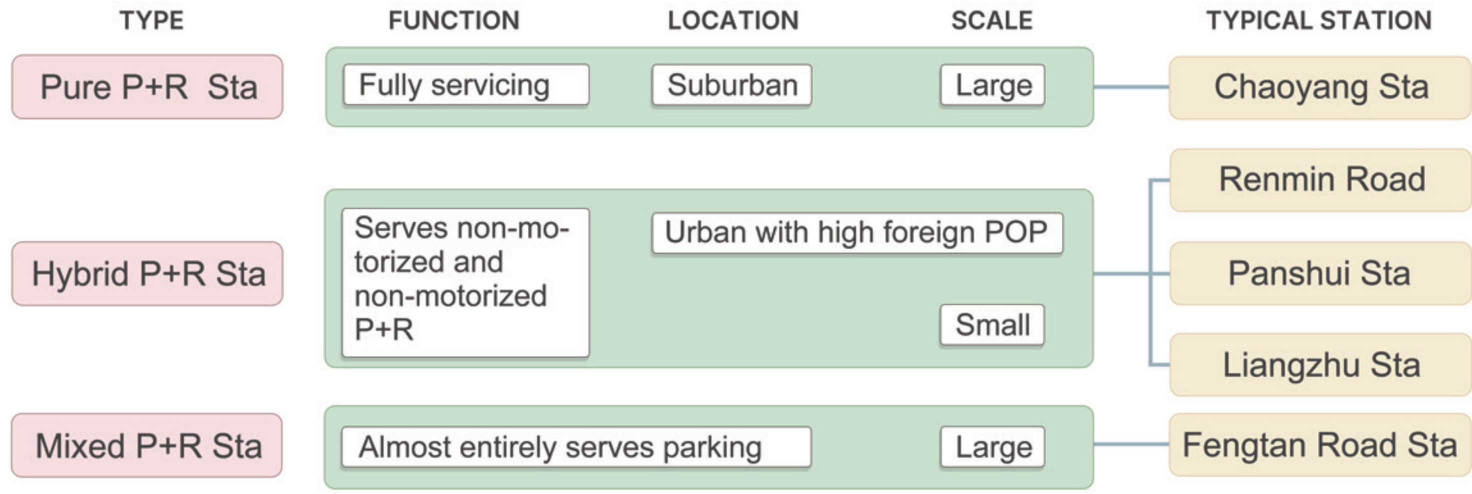
P+R involves establishing transit facilities on the periphery of urban areas near rail stations, offering low-cost parking for vehicles. Supported by favorable public transit fare policies, this strategy aims to encourage commuters to switch to public transport for entering central urban areas.



In 2015, Hangzhou implemented half-price P+R discounts at subway stations, starting with pilot projects at Xianghu, Jiubao, and Linping stations on Metro Line 1. This policy quickly filled parking lots to capacity during work hours, leading to the expansion of P+R facilities.

P+R Facility Guide

Station Types

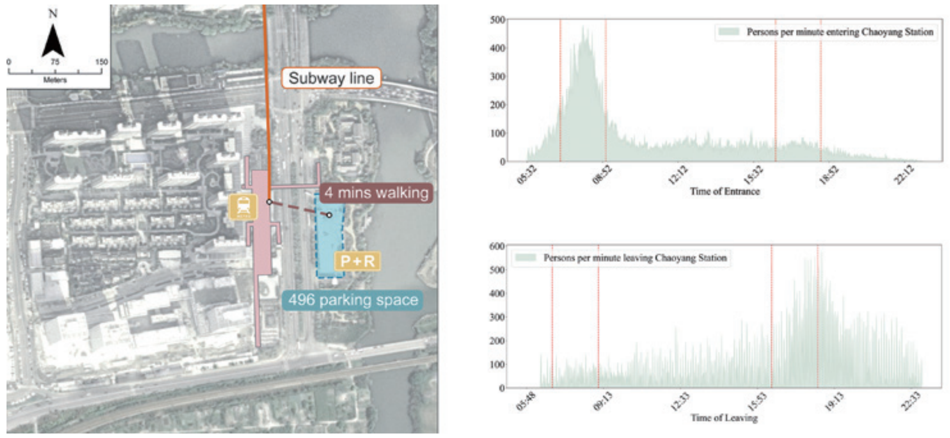


Station name	Organization form	Scale	Station Type	Number of P+R cars	Ratio of passenger using P+R
Fengtan Road Sta	Inside station	885	Intermediate Sta	88.5	1.12%
Renmin Road Sta	Outside station	44	Intermediate Sta	22	0.27%
Panshui Sta	Outside station	80	Intermediate Sta	40	0.68%
Liangzhu Sta	Outside station	228	Terminal Sta	114	1.38%
Chaoyang Sta	Outside station	496	Terminal Sta	496	6.46%

Summary of Stations

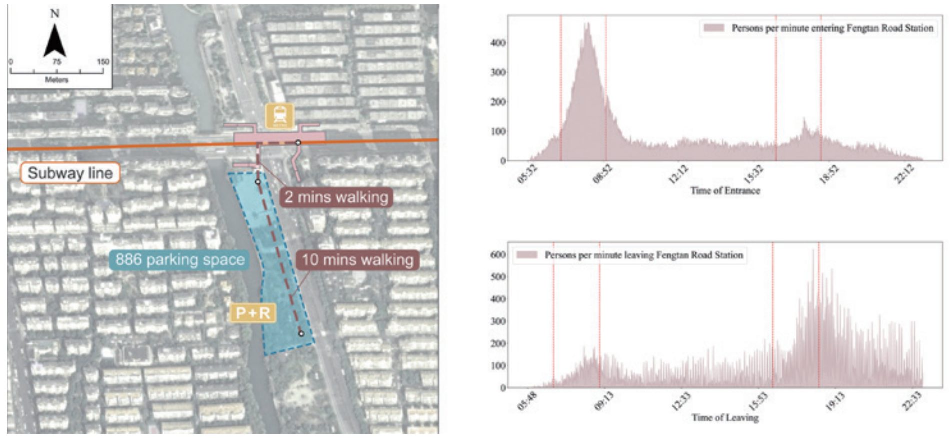
Through a field survey of five P+R parking lots on Hangzhou Metro Line 2, we obtained the size of the parking spaces at each station, the number of vehicles using P+R for parking, and calculated the utilization rate of P+R.

Type A: Pure P+R Sites



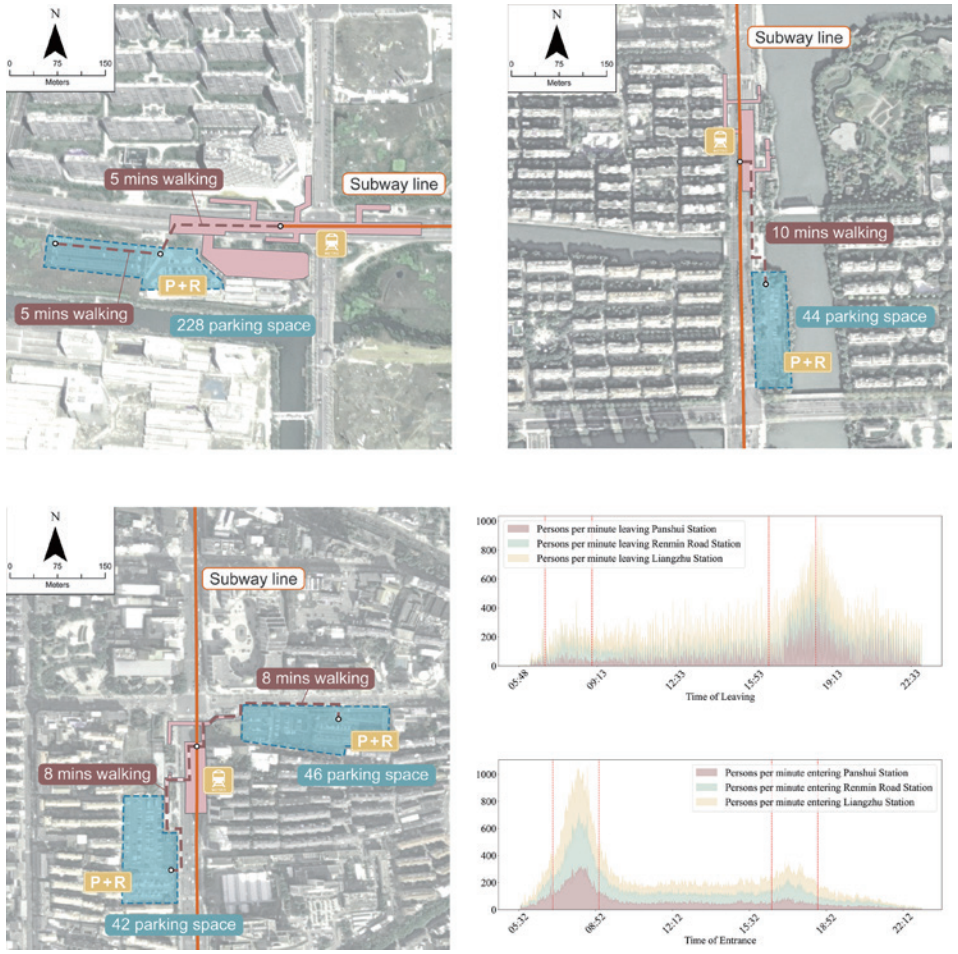
During typical weekdays, the parking saturation point is reached around 8:15 AM, occasionally necessitating the use of emergency lanes for additional parking. This saturation persists until approximately 4:30 PM, thereafter gradually diminishing as the evening exodus unfolds. By 7:00 PM, most vehicles have vacated the premises.

Type B: Mixed P+R Sites



The Lianhuagang River Underground Parking Garage, positioned near Exit C of the Fengtan Road Station on Line 2, offers a substantial capacity of 885 parking spaces and is directly connected to the station via an underground passage. It's the first and largest development in Hangzhou to utilize the subterranean space beneath greenery for public parking.

Type C: Hybird P+R Sites



At the remote Liangzhu Station, 228 parking spaces lie underused at only 70% capacity, making it the least frequented parking spot among Line 2, despite its ample provision. The station, unstaffed and predominantly serving local professionals, contrasts with the always-full non-motorized vehicle areas, revealing a local preference for more accessible and economical transit options.

Survey

Hangzhou P+R parking utilization and use experience evaluation.

1

Questionnaire theme

2

Questionnaire were issued in the connecting channel between P+R parking lot and Chaoyang station.

Issuing place

Targets

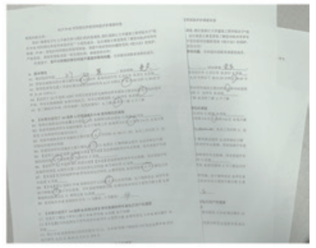
3

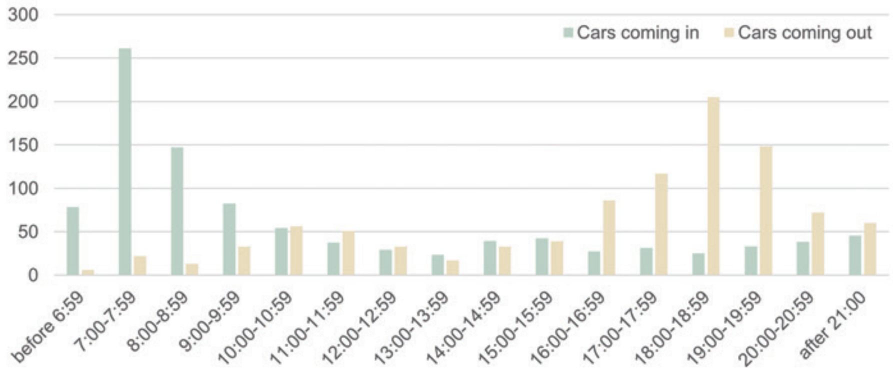
The expected targets are users of Chaoyang Station P+R parking lot.

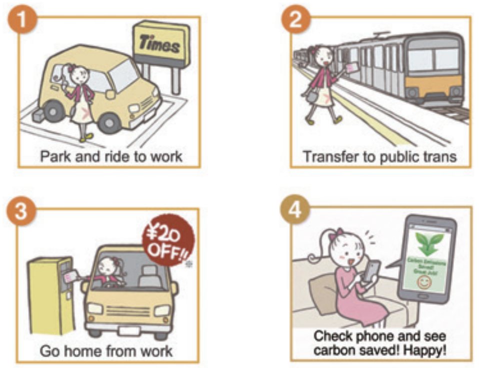
Questionnaire structure

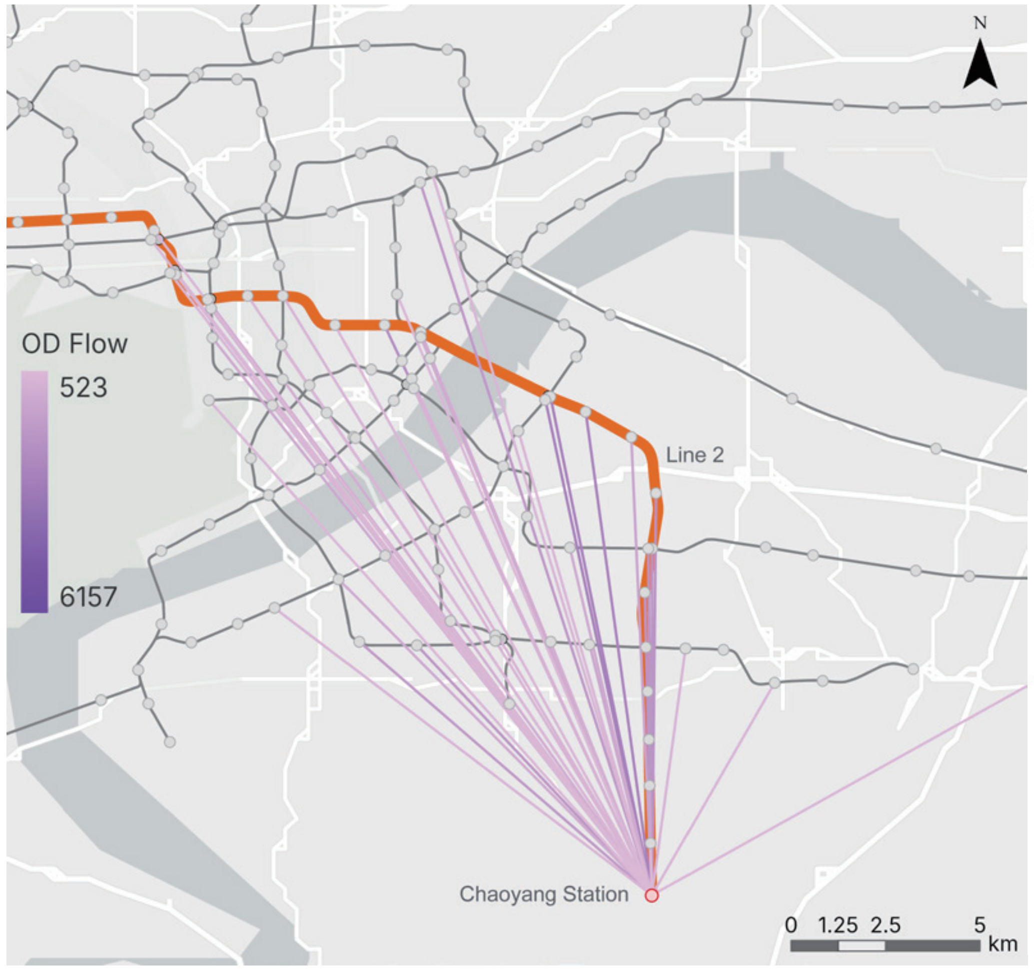
4

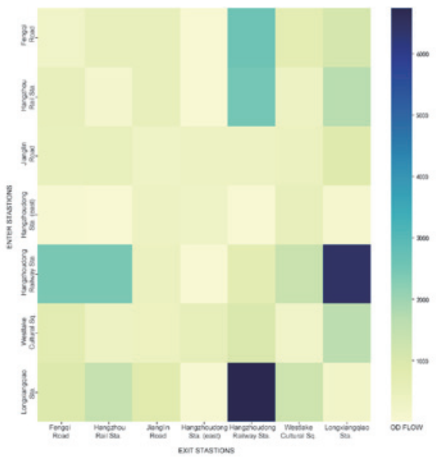
The respondents' basic information, usage of the P+R parking lot and the experience of using.



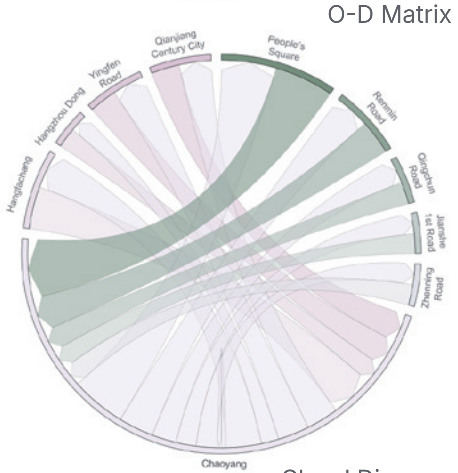






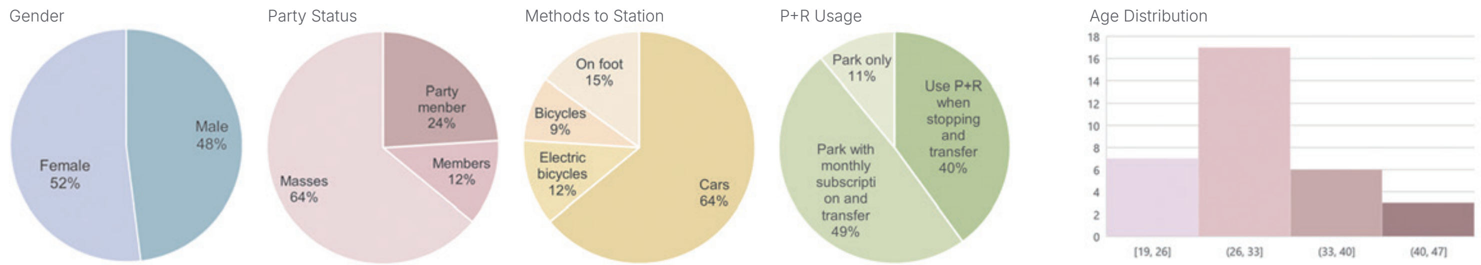


O-D Matrix



Chord Diagram

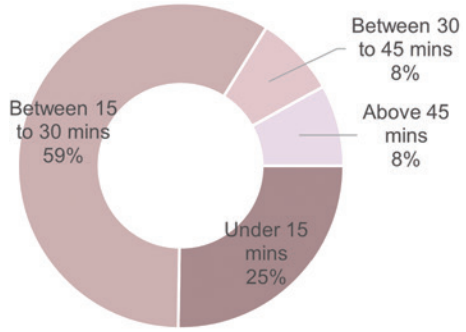
Characteristics of Respondents



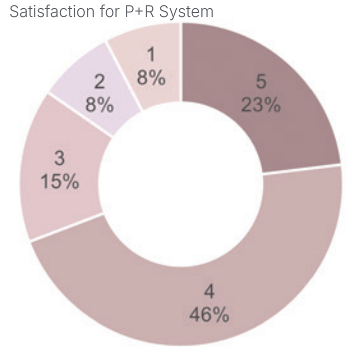
The gender distribution among the respondents was 52:48, closely mirroring the gender ratio (109) of the population in Hangzhou, suggesting that the sampling was reasonably representative. The predominant age group among participants was 26-33 years, accounting for over 50% of the respondents, with an average age of 31 years. In terms of political affiliation, 24% of the respondents were members of the CCP, while 64% were identified as masses. When asked about their mode of transportation to the subway station, 64% of respondents reported driving, whereas 21% utilized non-motorized vehicles.

P+R Users

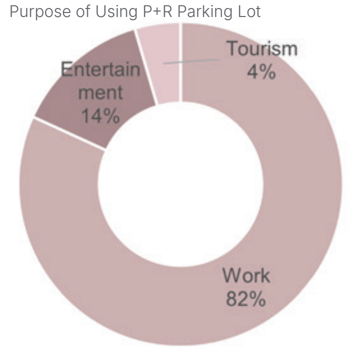
Time from Home to Station



Satisfaction for P+R System



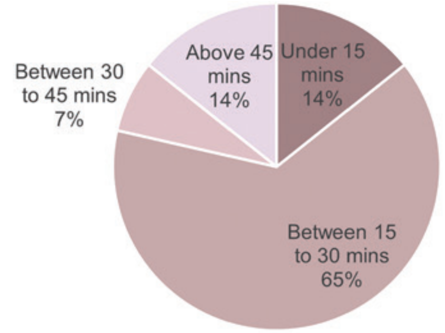
Purpose of Using P+R Parking Lot



Considering that the average weekday commute time is approximately 34.7 minutes, this suggests that when driving accounts for more than half of the commute time, commuters prefer driving directly to their destinations over using the P+R facility.

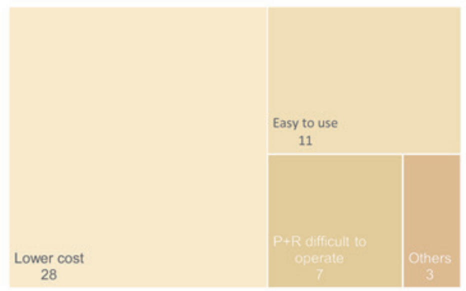
Monthly Parking Uses

Time from Home to Station



Marginal price for monthly subscribers to choose P+R

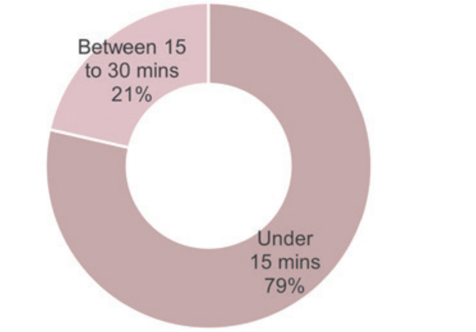
Reason of Using P+R Parking Lot



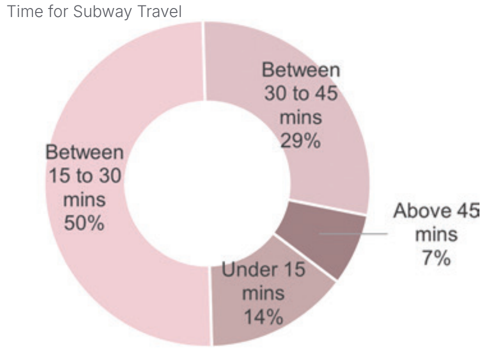
A substantial 86% of users prefer monthly parking over P+R primarily due to its lower cost. More than 70% of respondents would switch to P+R if the daily cap price were reduced to 8 yuan, suggesting price sensitivity in parking choices. Additionally, 28% of users cite the operational difficulties associated with P+R as a significant reason for their preference for monthly parking.

Non-motor Users

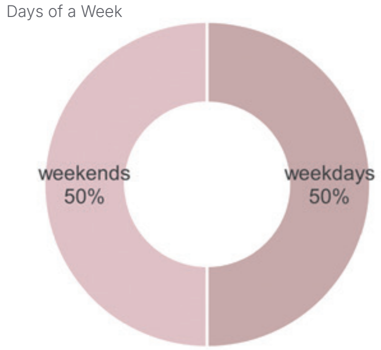
Time from Home to Station



Time for Subway Travel

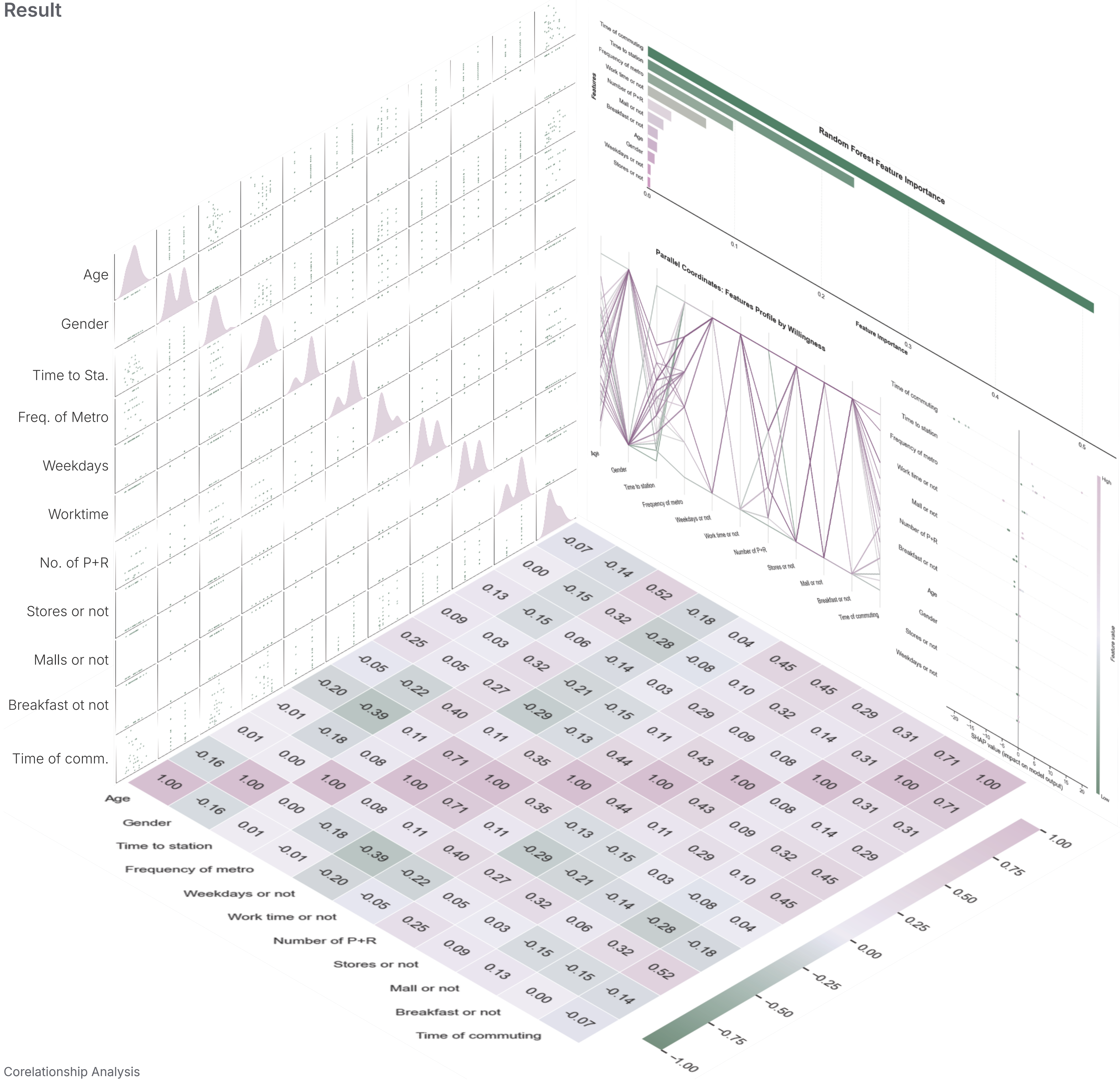


Days of a Week



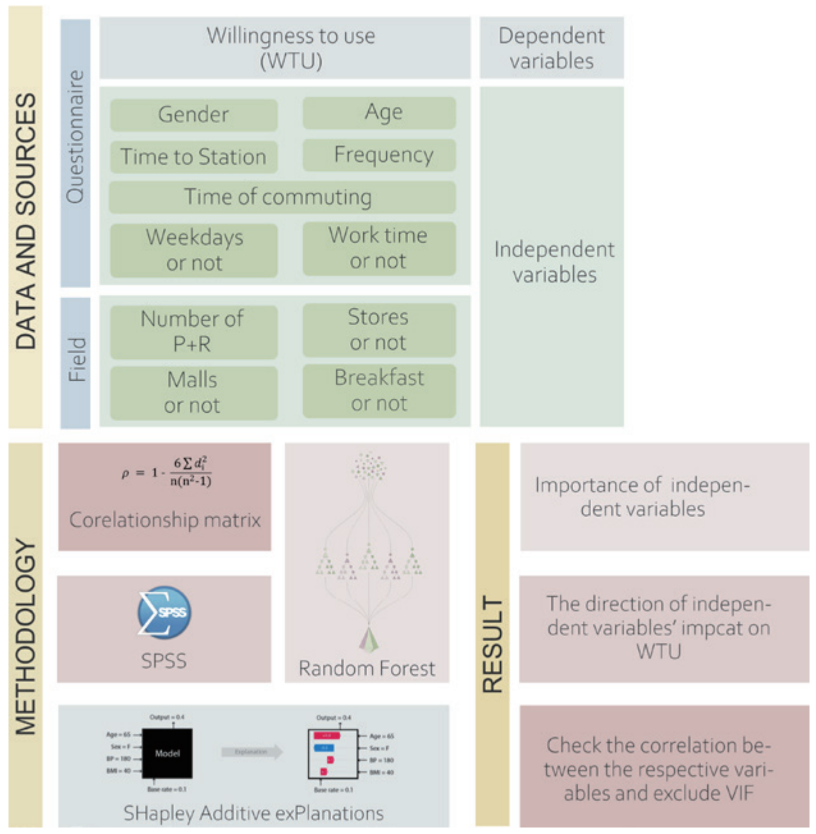
A significant 79% of non-motorized vehicle users report that their travel time to the subway station is less than 15 minutes. This statistic strongly indicates that most of these commuters reside close to subway stations, highlighting non-motorized vehicles for commuting.

Result

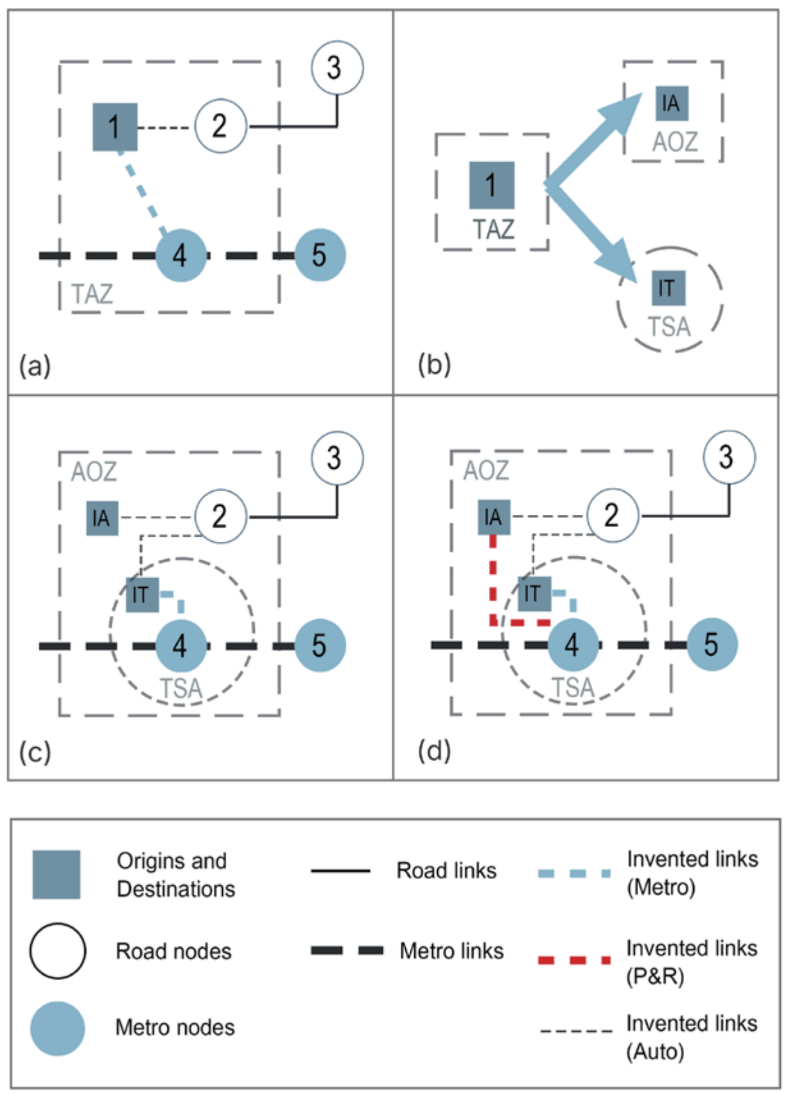


Corelationship Analysis

Analytic Framework



Improvement Strategies



Greening the Gap

Tracking Urban Green Space Dynamics in Pittsburgh Using Remote Sensing and Big Data

My role
Individual Work

Time
2024.2 - 2025.8

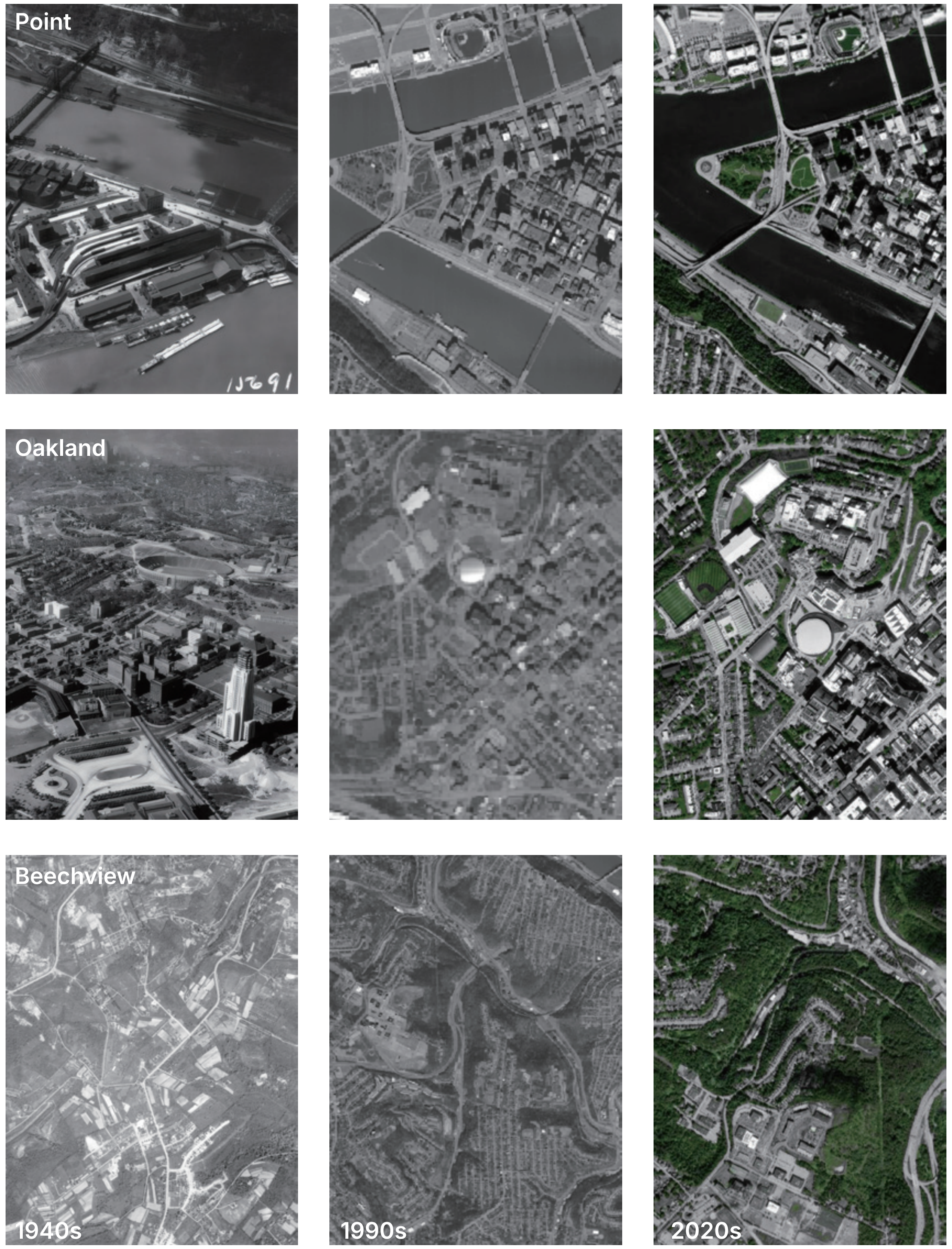
Instructor
Dr. Mingze Chen

Key Words
City Shrinkage, Green Infrastructure, Deep Learning, Urban Renewal, Satellite Imagery

Tech Stack
GIS, Python, Census Data, Machine Learning, Spatialtemporal Factor Analysis

Note
Work Accepted by ACSP 2024
Presentation Available at https://xuanyuzhou.org/urban-green-space/

Background



Global Trends

Shrinkage is a widespread global phenomenon that negatively impacts urban sustainability and social equity by deteriorating the physical and social infrastructure of declining cities.

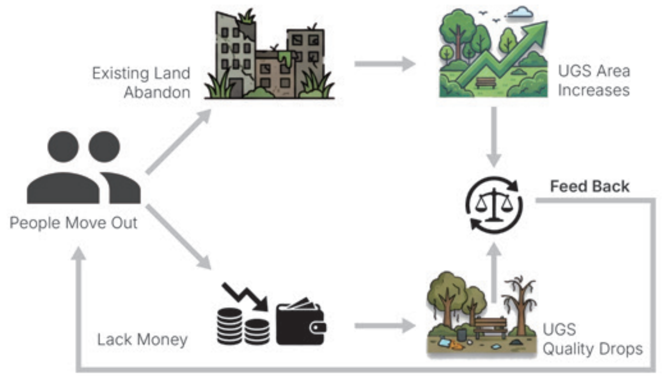
Inequity of Green Space

The unequal distribution and poor maintenance of green spaces in shrinking cities lead to lower-quality vegetation, which directly threatens resident health and exacerbates environmental injustice.

Community Vitality

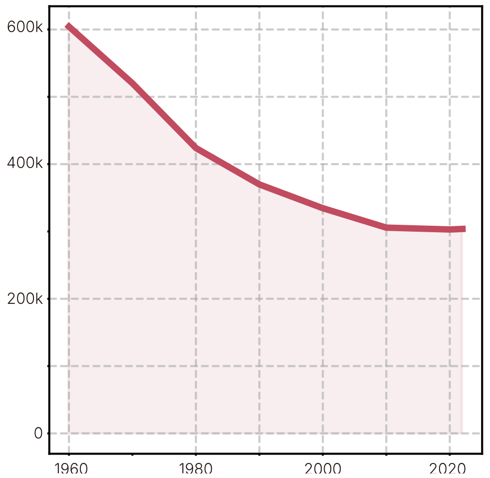
Evaluating UGS based on actual usage intensity and community engagement is essential for understanding how green spaces truly support urban social vitality, rather than just physical accessibility.

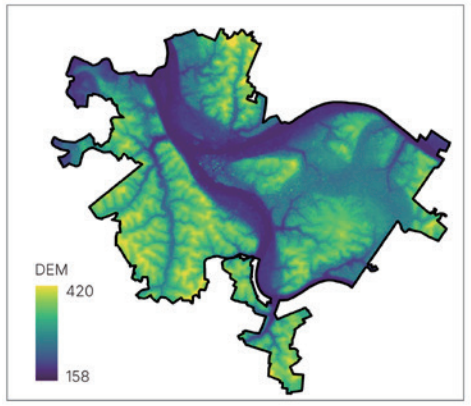
Why Green Matters in Shrinking Cities?

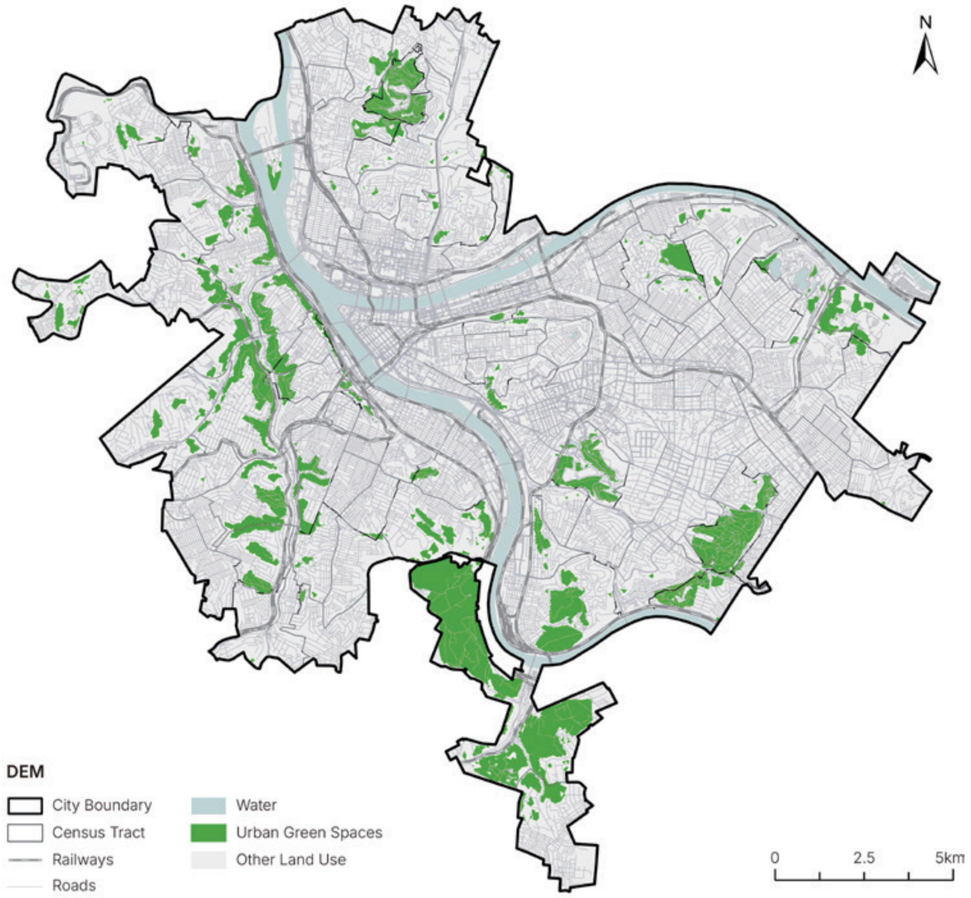


Shrinking in U.S.

Basic Description

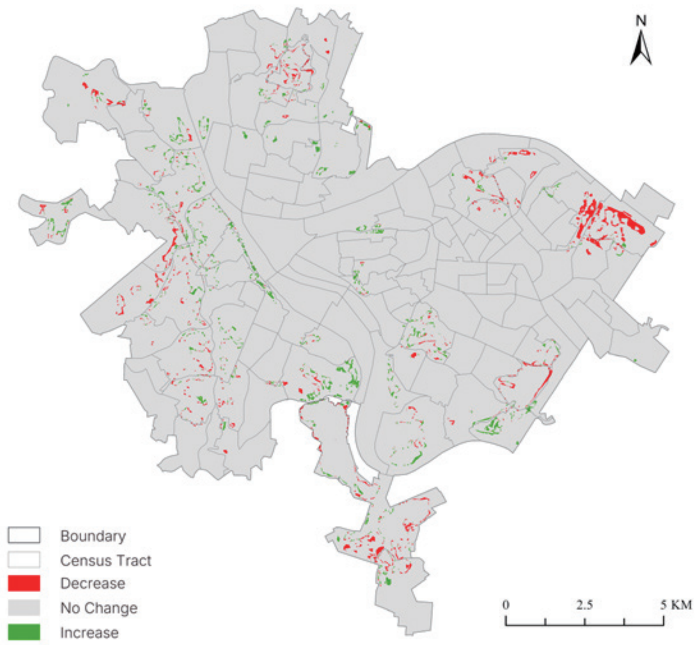


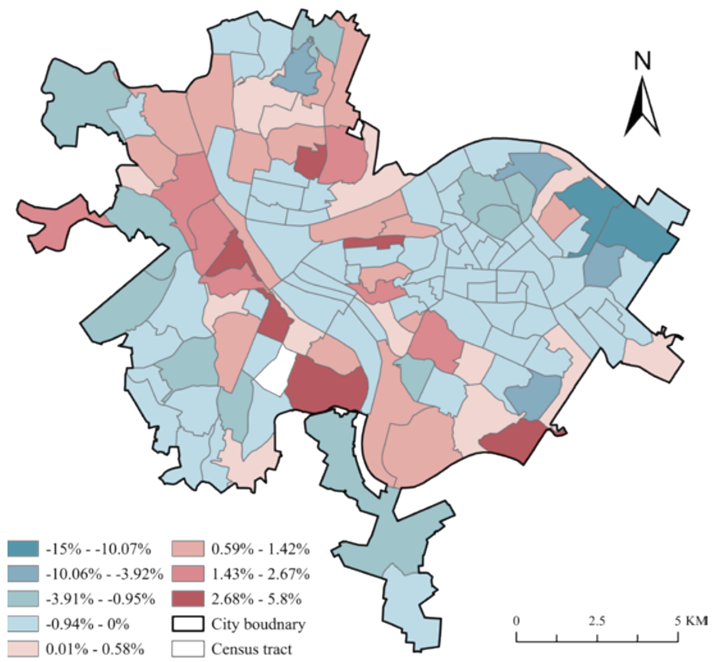




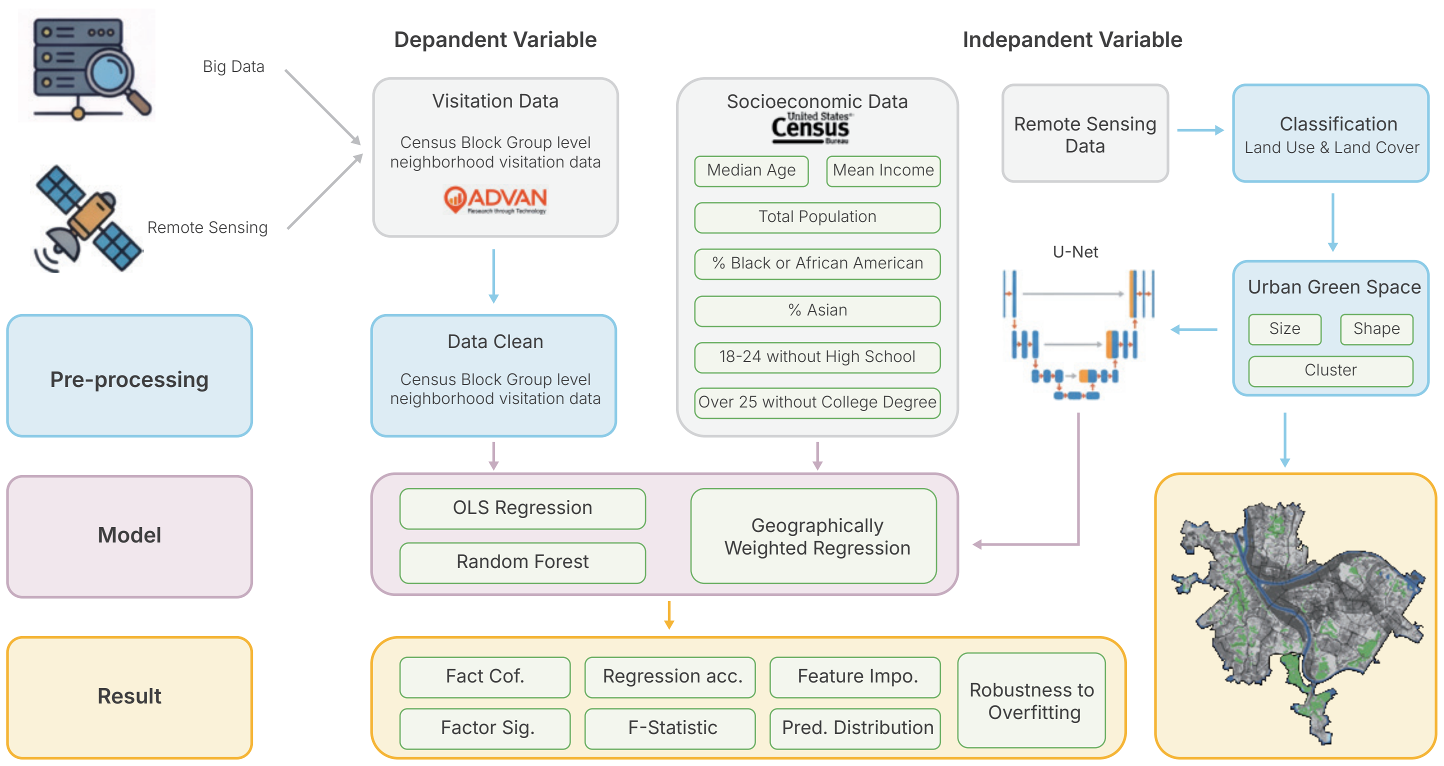
Pittsburgh serves as a quintessential archetype of a post-industrial "Rust Belt" city, making it a critical site for studying the spatial and social consequences of urban shrinkage. Having experienced a consistent population decline of 9.20% between 2000 and 2022, the city presents a unique paradox: **while its the physical infrastructure reflects the remnants of a denser past, its UGS has undergone a complex transformation**. Pittsburgh's rugged topography and fragmented development patterns create a diverse landscape where high-quality central parks coexist with neglected, unmanaged green patches in declining neighborhoods. This stark contrast provides an ideal setting to investigate the interplay between demographic shifts, social equity, and community vitality, offering scalable insights into how shrinking cities globally can re-prioritize resource efficiency and sustainable planning.

Green Changes and Change Rates in Pittsburgh

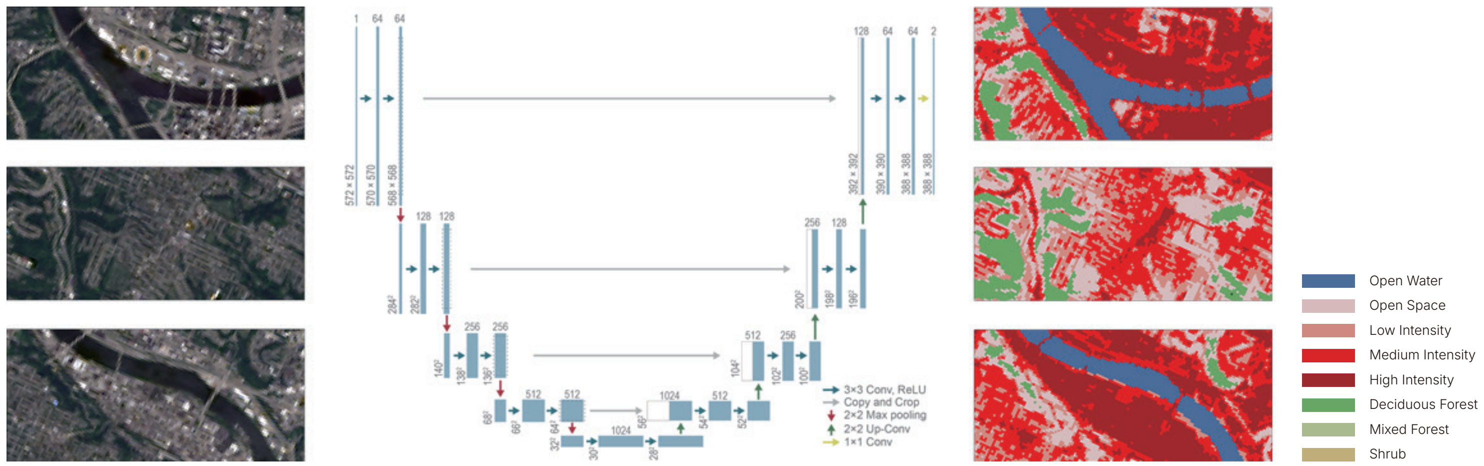




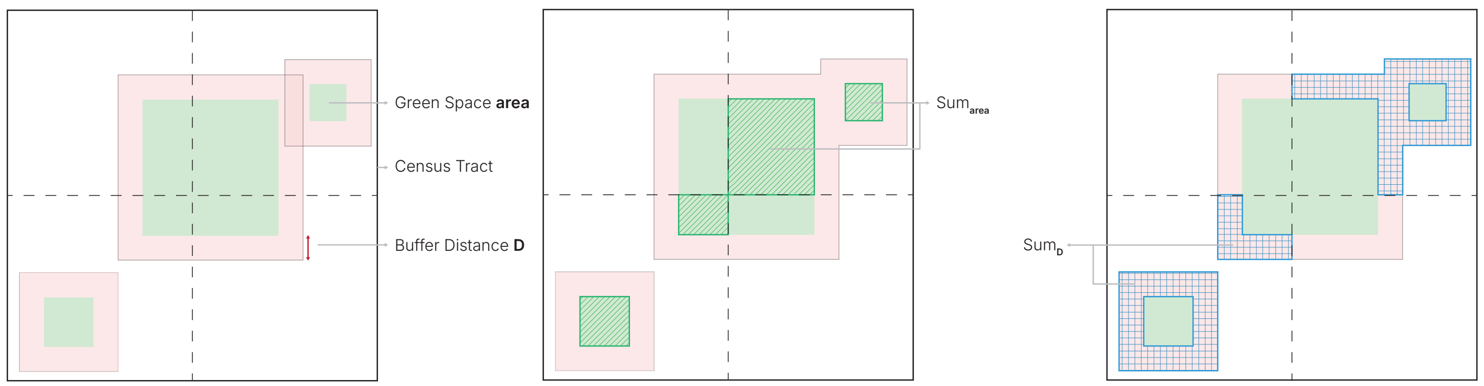
Methodology



U-NET Architecture

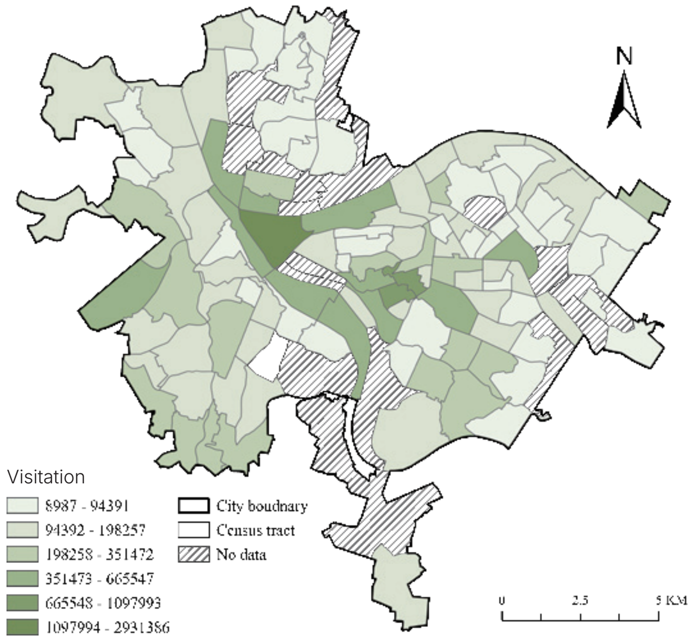


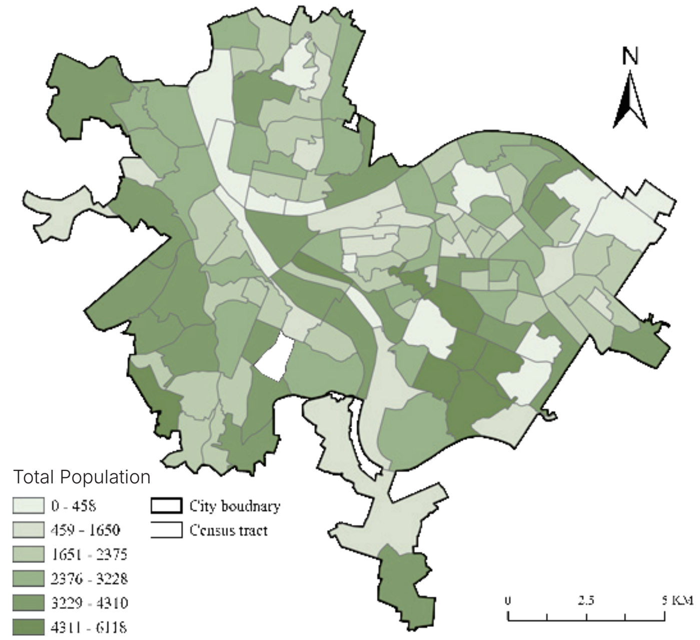
Green Buffer Calculation

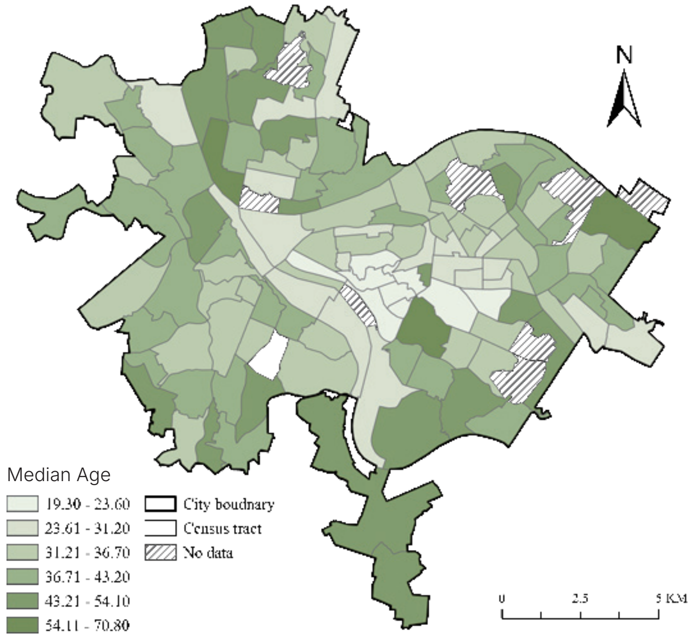


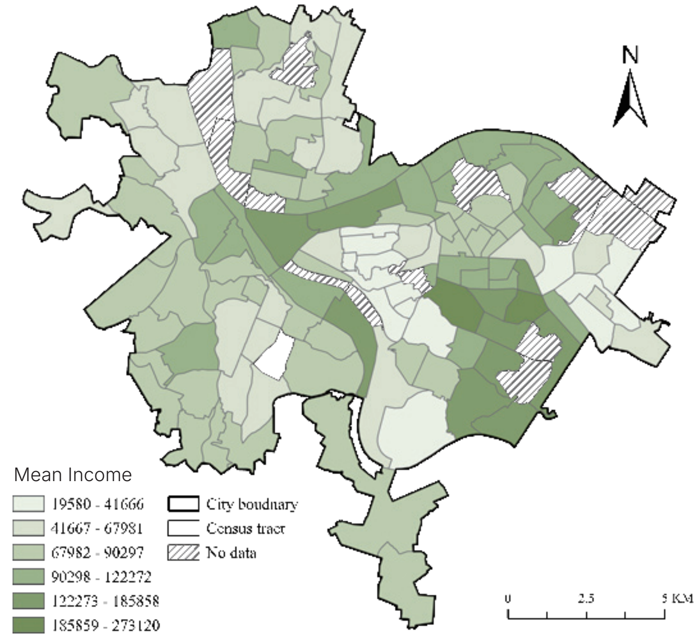
Creating Buffer | Merge & Calculate Green | Zonal Statistics

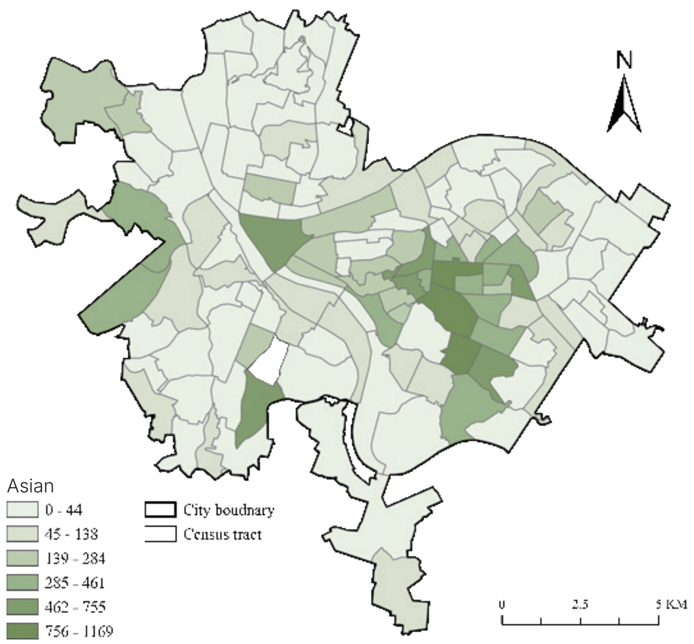
Data

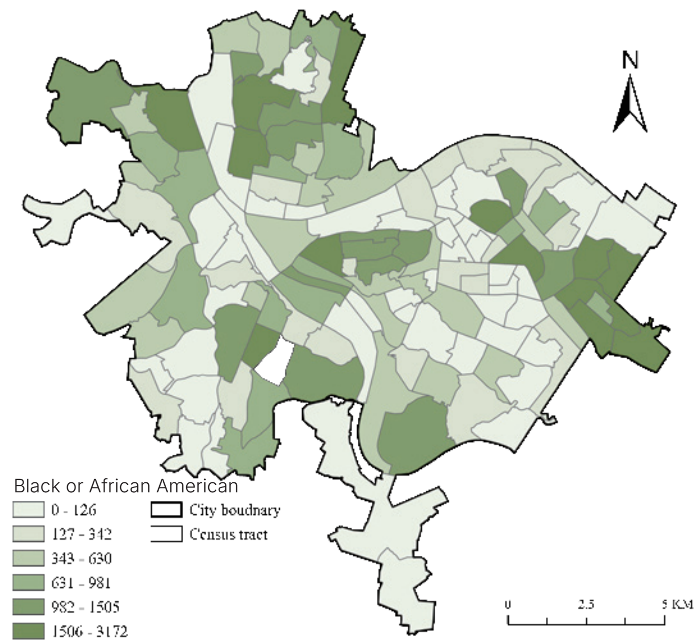




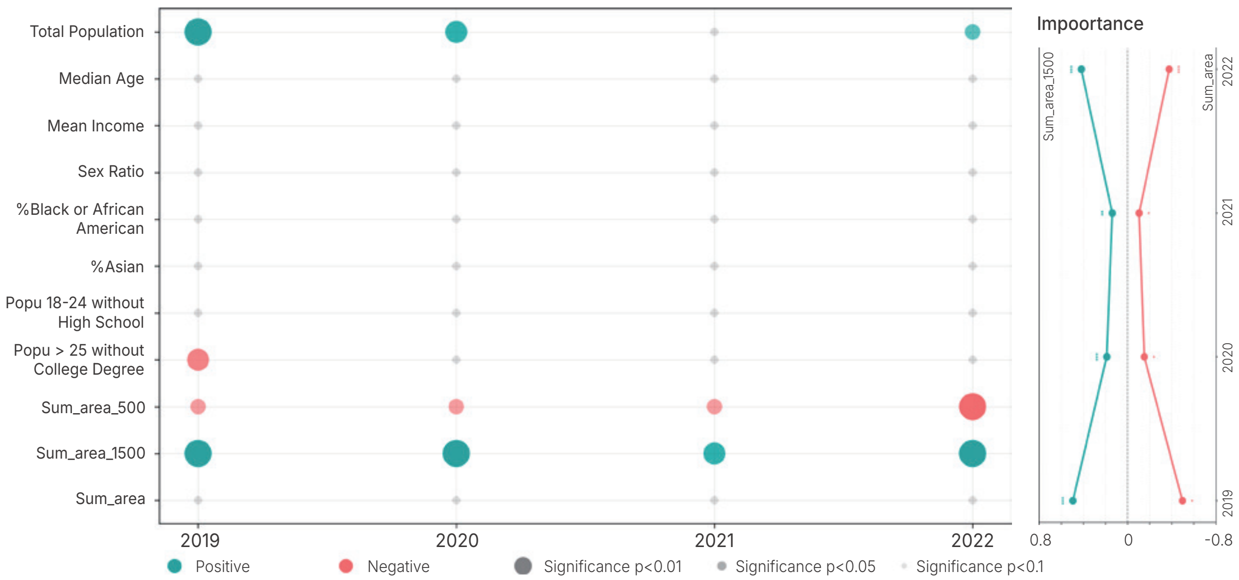








Result



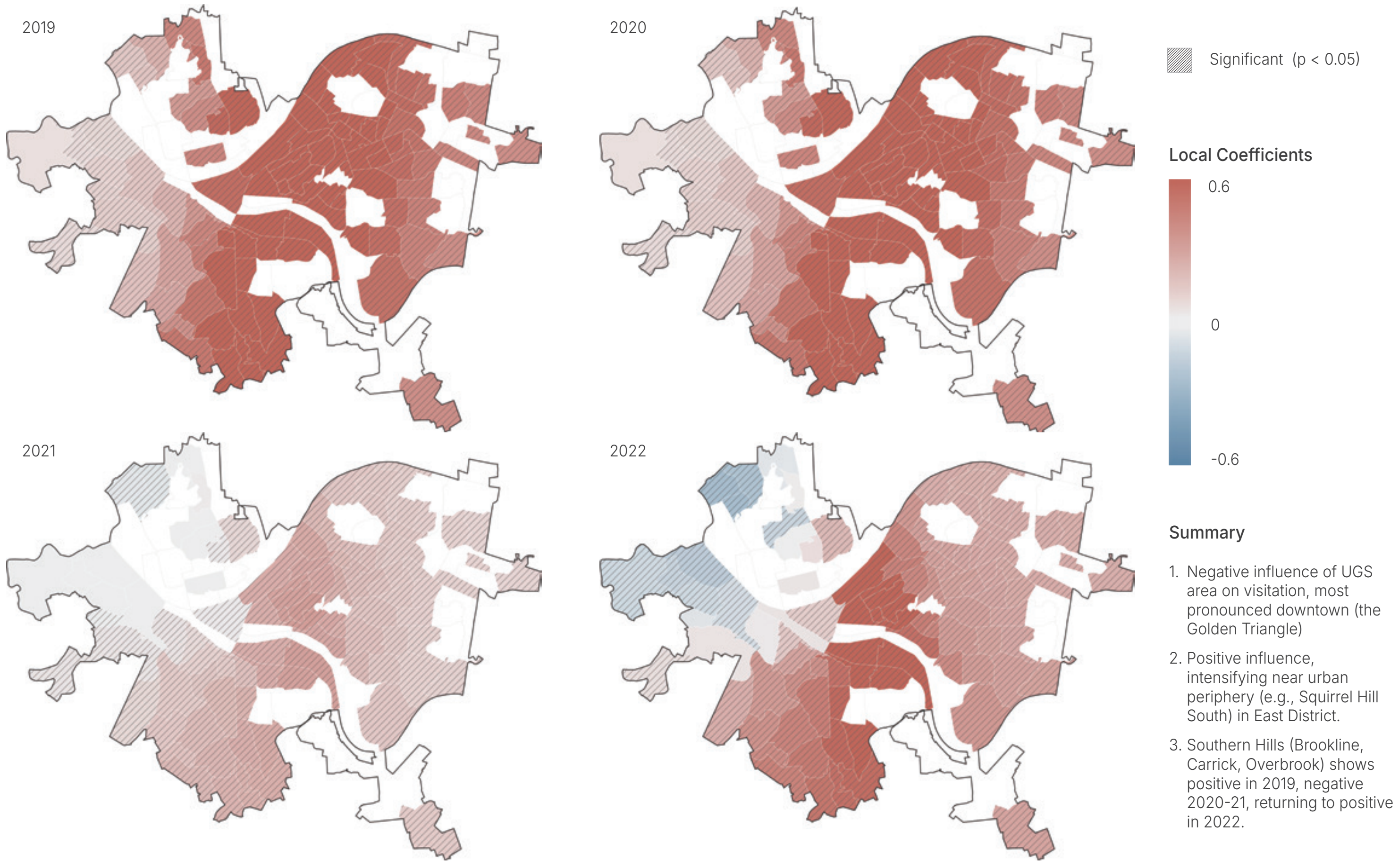
Summary

1. Regression explanatory power ranges between 0.305 and 0.554.
2. While total **population** consistently showed a significant positive correlation with visitation, the impacts of other demographic variables, such as income, age, and race, remained largely **non-significan**.
3. UGS within a **500m radius** exhibited a significant negative effect on visitation, whereas UGS within a **1500m range** demonstrated a consistent stimulative association.
4. Underscore a distinct scale-dependent role of UGS.

Pittsburgh serves as a quintessential archetype of a post-industrial "Rust Belt" city, making it a critical site for studying the spatial and social consequences of urban shrinkage. Having experienced a consistent population decline of 9.20% between 2000 and 2022, the city presents a unique paradox: **while its the physical infrastructure reflects the remnants of a denser past, its UGS has undergone a complex transformation**.

Pittsburgh's rugged topography and fragmented development patterns create a diverse landscape where high-quality central parks coexist with neglected, unmanaged green patches in declining neighborhoods. This stark contrast provides an ideal setting to investigate the interplay between demographic shifts, social equity, and community vitality, offering scalable insights into how shrinking cities globally can re-prioritize resource efficiency and sustainable planning.

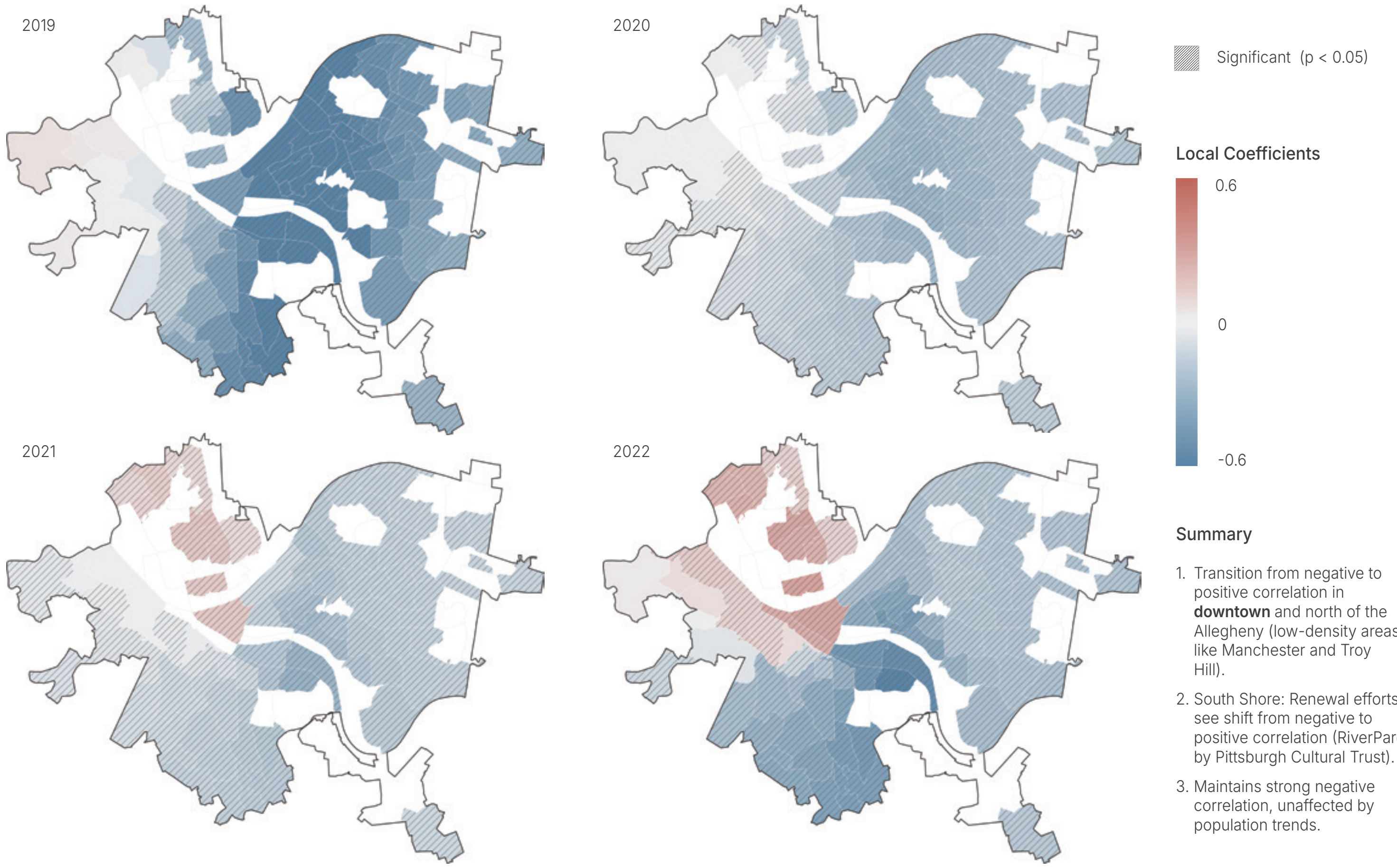
GWR Result for UGS within 1500 Meters' Buffer



Summary

1. Negative influence of UGS area on visitation, most pronounced downtown (the Golden Triangle)
2. Positive influence, intensifying near urban periphery (e.g., Squirrel Hill South) in East District.
3. Southern Hills (Brookline, Carrick, Overbrook) shows positive in 2019, negative 2020-21, returning to positive in 2022.

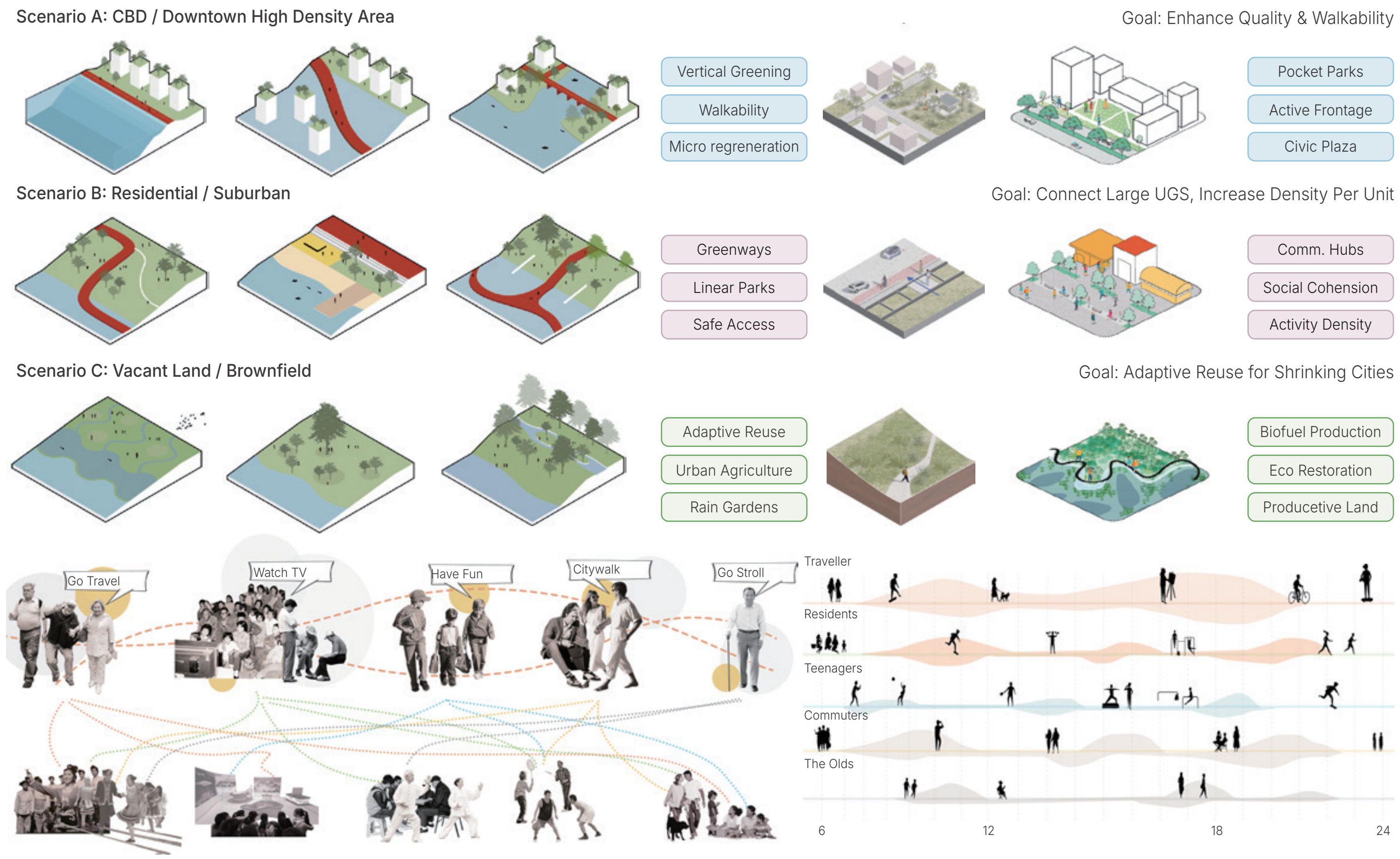
GWR Result for UGS within 500 Meters' Buffer



Summary

1. Transition from negative to positive correlation in **downtown** and north of the Allegheny (low-density areas like Manchester and Troy Hill).
2. South Shore: Renewal efforts see shift from negative to positive correlation (RiverParc by Pittsburgh Cultural Trust).
3. Maintains strong negative correlation, unaffected by population trends.

Suggestion



Other Works

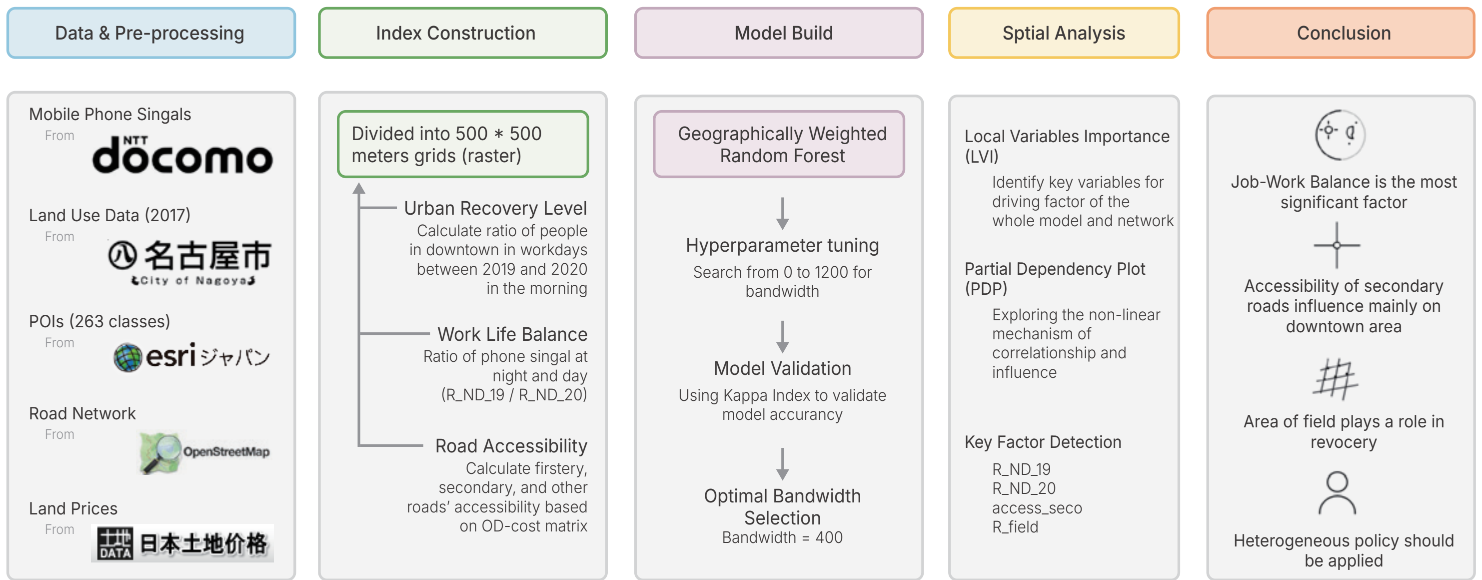
For more interesting projects, please refer to my personal website
https://xuanyuzhou.org/

Evaluating the social- economic recovery impacts of built environment for post-pandemic- A case study of COVID-19

Group Member: **Xuanyu Zhou**, Wei Cai
Instructor: Prof. Shuang Ma, Zhejiang University; Prof. Shuangjin Li, Hiroshima University
CRediT: 70% Methodology, 70% Data Curation, 50% Writing-Original Draft, 50% Visualization
Time: 2023.10-2024.12

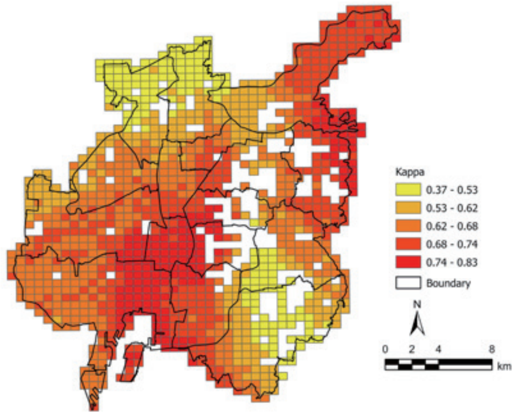
Tech Slack: GIS, R, GWRF, OD Flow, Mobile Phone Signal, LULC
Key Words: Urban recovery, Post-pandemic, Geographical weighted random forest, Built environment, Spatial heterogeneity
Link: https://doi.org/10.1177/27541231251314132

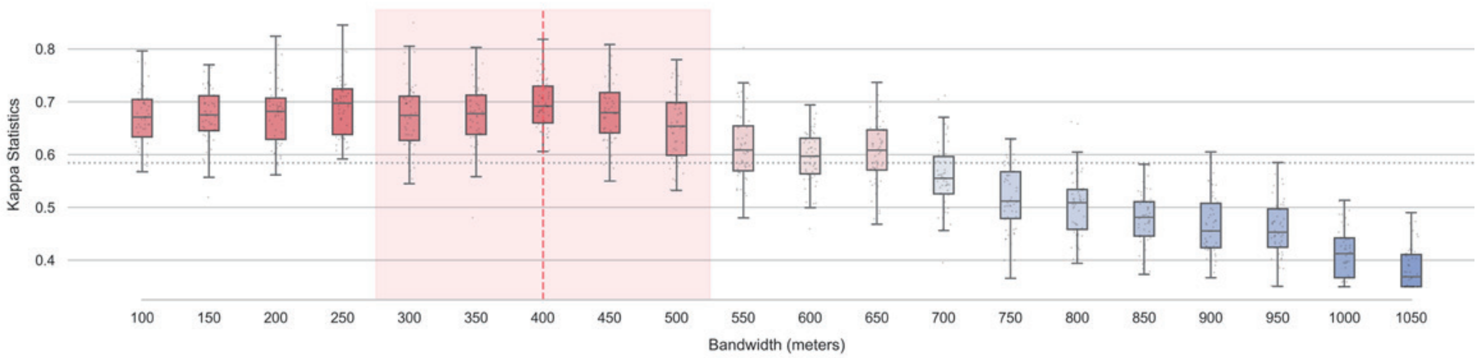
Graphical Abstract



The performance of GWRF

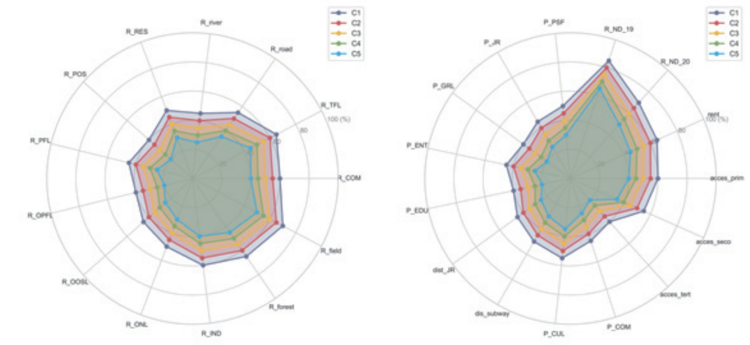
We systematically evaluated the predictive accuracy of GWRF model by testing bandwidth values ranging from 0 to 1200. The results indicated that the model's Kappa coefficient reached a **local peak at a bandwidth of 400** but experienced a sharp decline after surpassing 600, suggesting that incorporating data from beyond a certain spatial range negatively impacts local sub-model training. Based on these findings and computational efficiency considerations, a bandwidth of 400 was selected for the final analysis. Spatial visualization showed that the **model achieved its highest accuracy in central areas** like the Atsutaku District, while performance was comparatively lower in peripheral regions such as the Midori, Tenpaku, Kita, and Nishi districts.

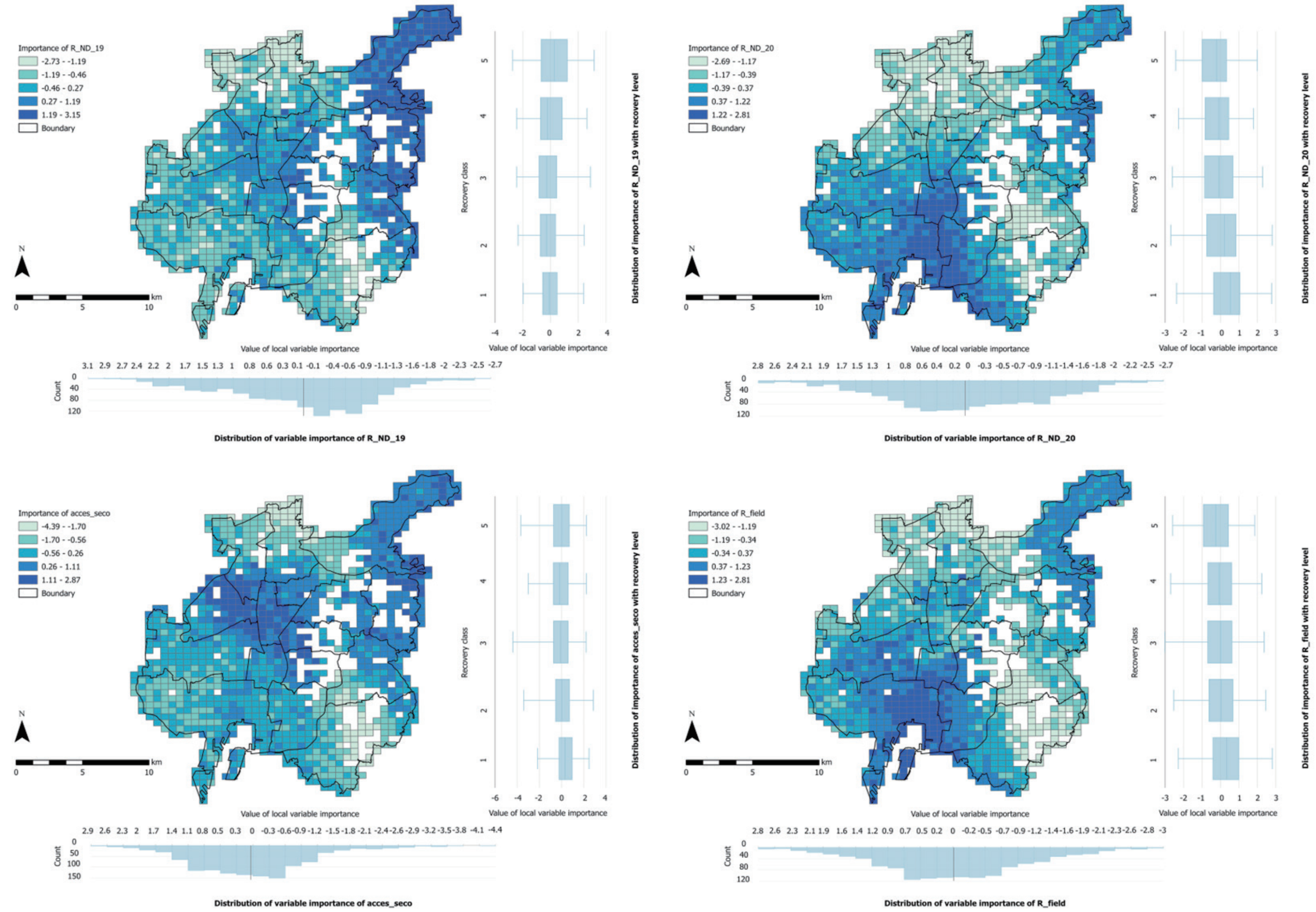




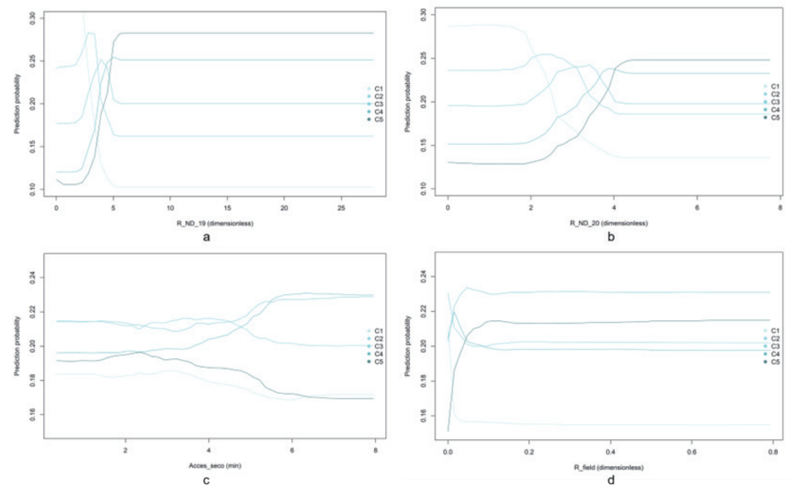
Visualizing and analyzing feature importance

We used radar plots to show how various built environment factors influenced different levels of urban recovery across Nagoya. While most factors had consistent impacts across all recovery levels, they generally showed a slightly stronger influence in areas with lower recovery rates. In terms of land use, **field land** was identified as a vital factor for recovery, whereas other natural areas like forests and rivers were less significant. Among all studied variables, the **ratio of nighttime to daytime signaling data** had the highest impact, followed closely by the **accessibility of secondary roads**.





Visualizing and analyzing feature importance



The researchers used partial dependence plots to explore how the most significant features, particularly the pre-pandemic job-housing balance (R_ND_19), influence urban recovery levels. First of all, the analysis reveals that recovery is highly sensitive to changes in the balance between jobs and housing. And secondly, locations where jobs significantly outnumber housing units are much more likely to suffer from poor recovery. However, in areas where residential functions are overwhelmingly dominant, with housing units exceeding jobs by more than four times, the **job-housing mismatch actually benefits urban recovery and leads to higher recovery levels.**

Future life expectancy: Effects of bike ride-related physical activity, air pollution, and traffic accidents in the scenarios of built environment and climate transformation

Group Member: Wanshi Li, **Xuanyu Zhou**, Tao Ma, Yinbin He
Instructor: Prof. Shuang Ma, Zhejiang University; Prof. Shuangjin Li, Hiroshima University
CRediT: 50% Methodology, 50% Software, 30% Data Curation, 30% Writing-Original Draft, 50% Visualization
Time: 2024.2-2025.1

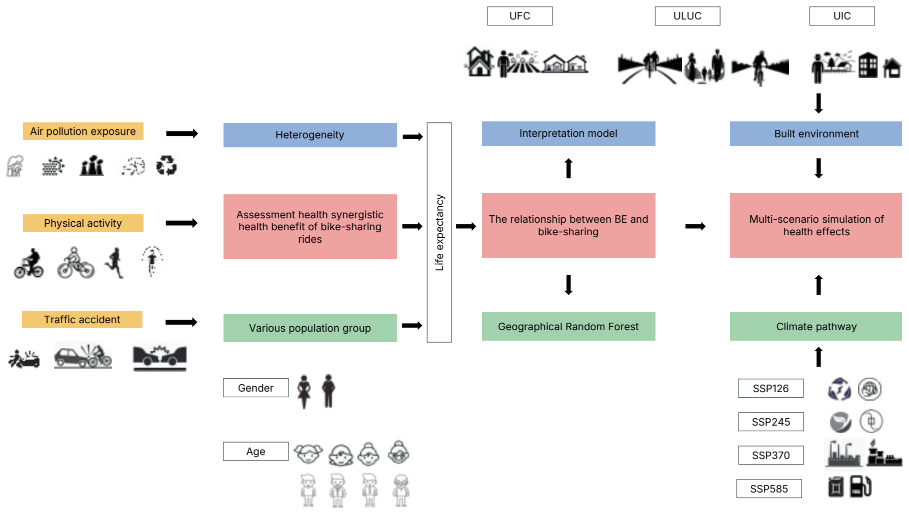
Tech Slack: GIS, R, Python, OD-Flow, G-RF, POIs, OSM, Mobile Phone Signal
Key Words: Bike-sharing, Life expectancy, Synergistic health effects, Built environment, Climate transformation

Background

Bike-sharing is widely recognized for promoting physical activity and extending life expectancy, but these benefits are significantly counterbalanced by risks associated with air pollution exposure and traffic accidents in urban environments. Most existing research **fails to account for the complex synergistic health effects**, while overlooking the spatial and demographic heterogeneities inherent in urban populations.

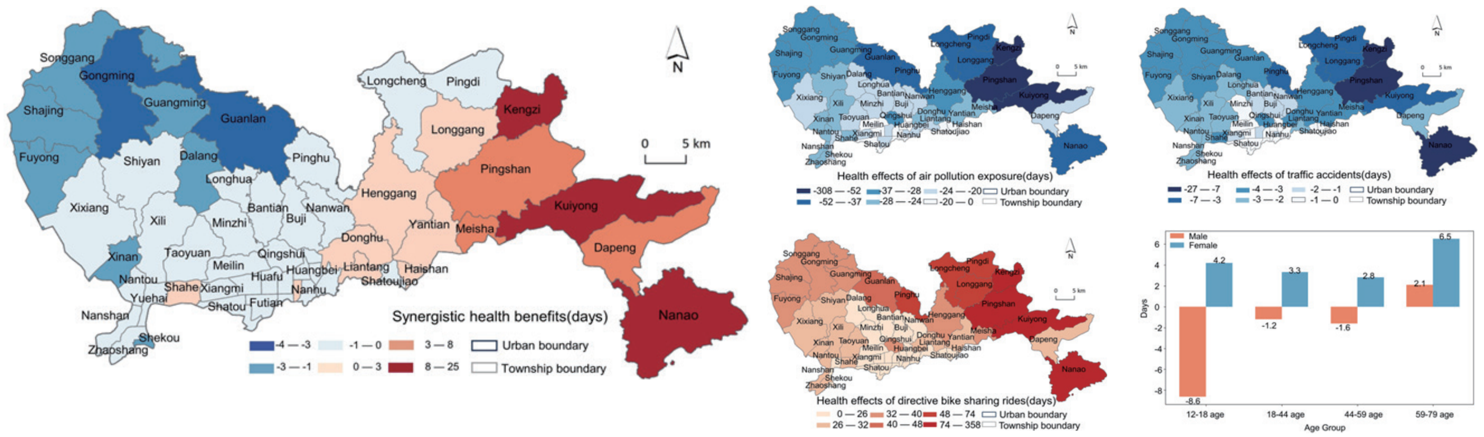
Furthermore, there remains a critical knowledge gap regarding **how strategic modifications to the built environment, when integrated with various climate transformation scenarios**, will collectively influence future life expectancy outcomes.

Research Framework



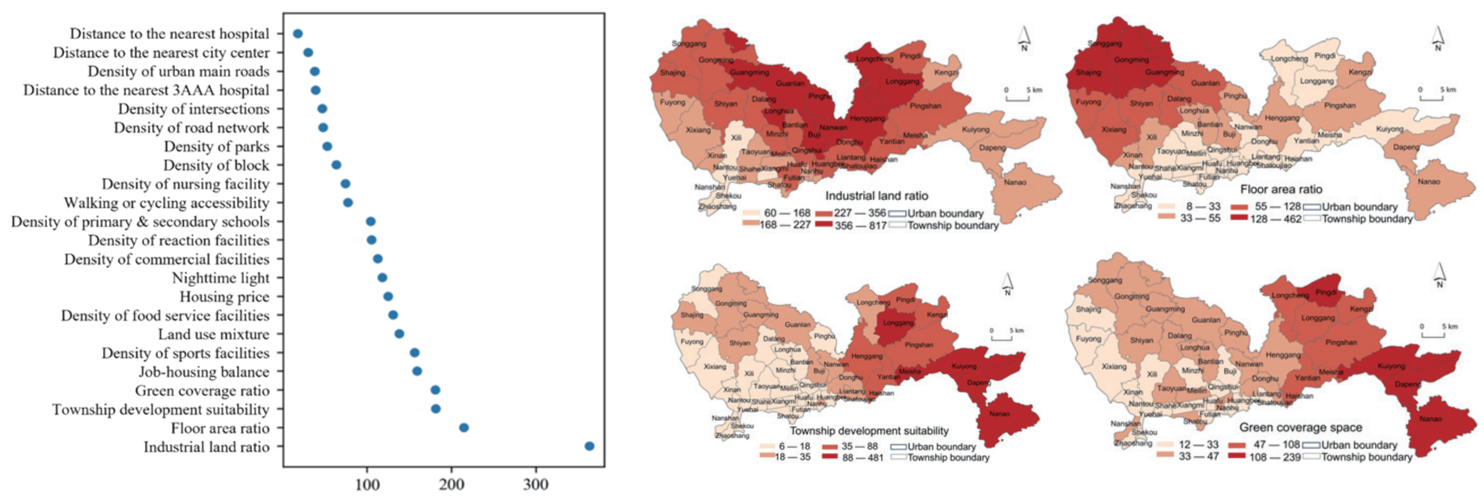
Data

Bike Sharing	Building Outline	Night Light	POIs	PM2.5	Phone Signal	Temperature
Shenzhen Municipal Transportation Bureau	Amap	Google Earth Engine	Open Street Maps Amap	Shenzhen Meteorological Bureau	China Unicom	Shenzhen Meteorological Bureau
9,297,709 rides Apr 1 - Apr 14 2021	3,157 communites	Shenzhen, 2021	-	Apr 1- Apr 14 2021	April 2021	Apr 1- Apr 14 2021



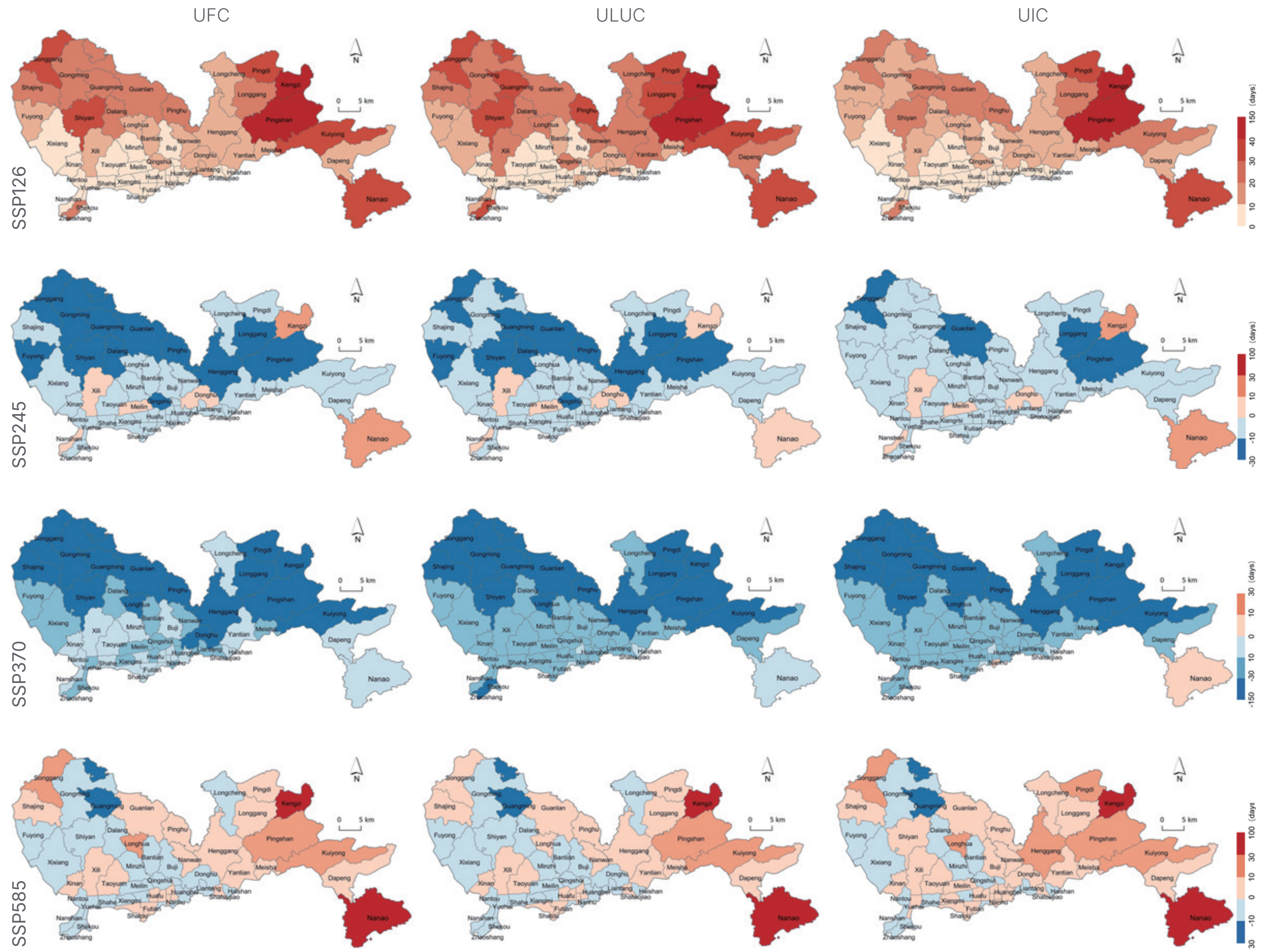
Synergistic health effects from bike-sharing rides. (A) Spatial distributions of synergistic health effects from bike-sharing rides. (B) Spatial distributions of life expectancy loss of air pollution exposure. (C) Spatial distributions of life expectancy loss of traffic accidents. (D) Spatial distributions of life expectancy extension of bike-sharing rides. (E) Synergistic health benefits in different age and gender group.

Result for Local Variables Importance



The industrial land ratio, township development suitability, floor area ratio, township development suitability and green coverage ratio have the strongest influence on ride duration, significantly higher than the other factors. The spatial distribution of influencing coefficient (LVI) exhibit an obviously spatial clustered distribution, which reveal that the importance of various built environment to bike-sharing ride related physical activities is crucial similar at adjacent townships. Precisely, the industrial land ratioratio of industrial land has a greater impact in townships located to northern Shenzhen, with the highest LVI appear in townships such as Guanlan, Pinghu, Henggang townships (between 356 - 817). For floor area ratio, townships with highest LVI situated to northwestern city, which is different from townships located in southeastern city where the LVI for street development suitability and ratio of green space are crucial. These findings can support bike-sharing rides utilizing through urban planning strategies.

Result for SSP Simulation



Exploring the relationship between resident emotions and built Environment in Beijing based on a geographical weighted random forest approach

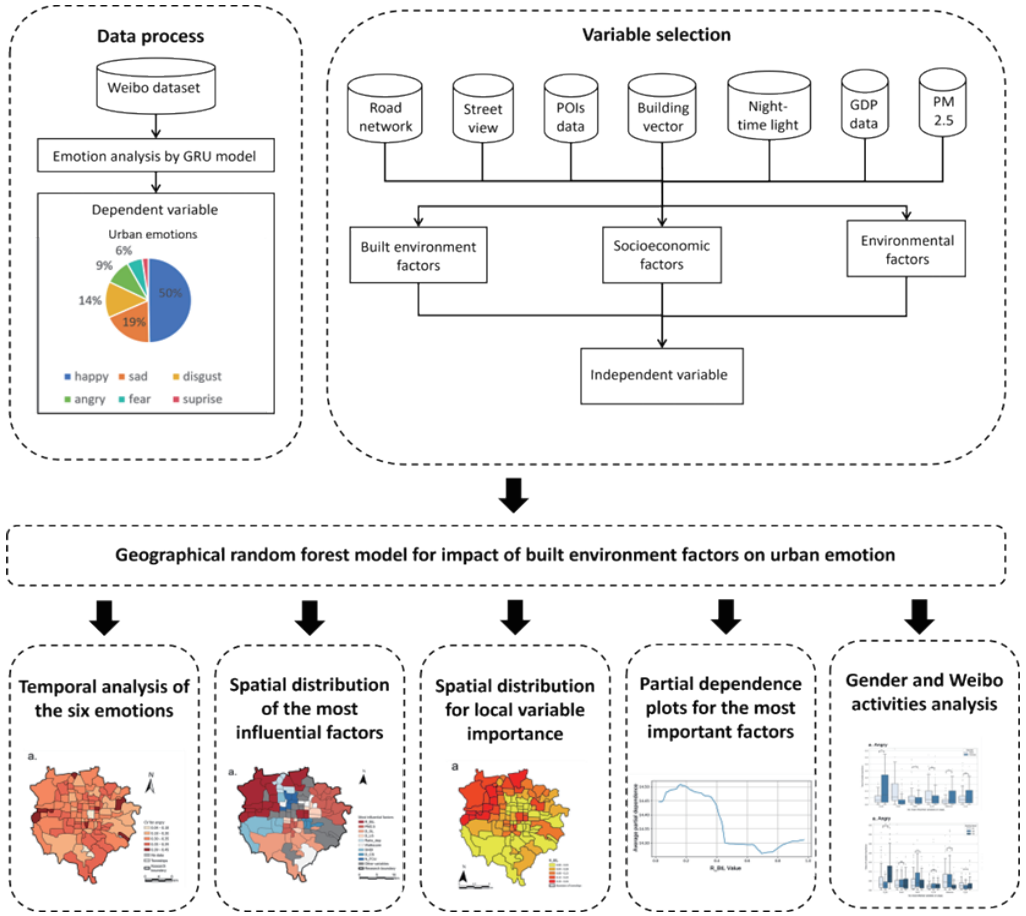
Group Member: Qianyi Yu, Xuanyu Zhou
Instructor: Prof. Shuang Ma, Zhejiang University; Prof. Shuangjin Li, Hiroshima University
CRediT: 30% Methodology, 50% Data Curation, 30% Writing-Original Draft, 30% Visualization
Time: 2024.6-2025.10

Tech Slack: GIS, R, Python, Prophet, GRU, POIs, OSM, Kruskal-Wallis
Key Words: Public emotion, Built environment, Geographical weighted random forest, Social media data, Spatio-temporal stability

Introduction

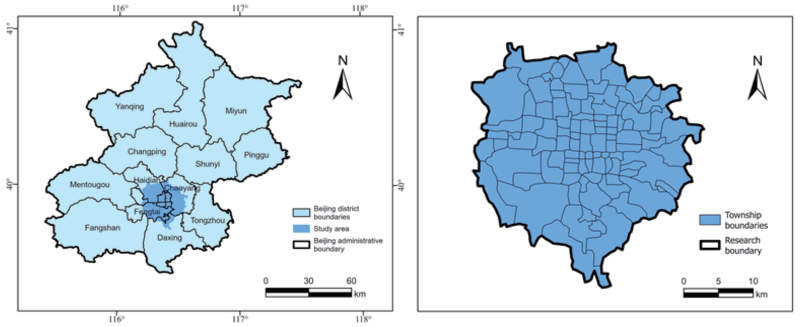
While the built environment significantly shapes resident well-being, traditional linear models often **fail to capture the complex, non-linear dynamics of human psychology**. By recognizing that psychological responses often follow non-linear patterns where benefits may diminish after an optimal point, the research addresses a critical gap in understanding **how tailored urban design can better support public emotional health**.

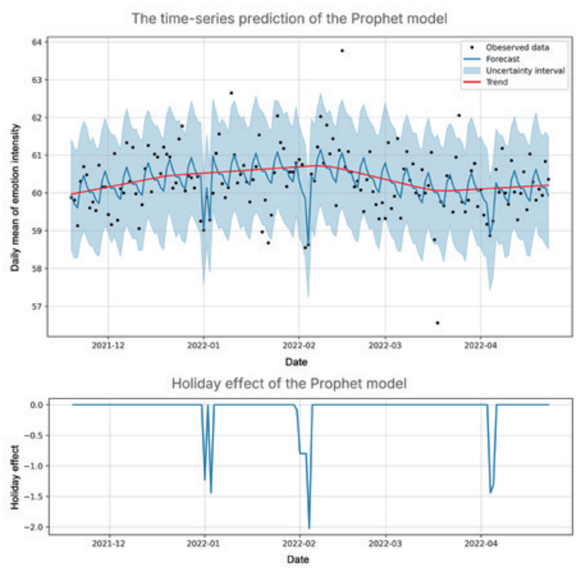
To enable large-scale evaluation, this research utilizes **geotagged Weibo data** as a stable indicator of daily public emotion, overcoming the limitations of traditional, high-cost surveys. By employing a Geographic Weighted Random Forest (GWRF) model, the study quantifies spatial heterogeneity and explores how gender and digital activity levels moderate emotional responses to the city. These findings identify critical environmental thresholds, providing a robust, evidence-based framework for more precise and human-centric urban planning in dense metropolitan areas like Beijing.



Temporal stability of six emotions extracting from Weibo posts

The Prophet model achieved high accuracy (RMSE: 0.74), showing that **public emotions remain stable over time despite brief holiday fluctuations**. This low variability confirms that aggregated social media data effectively filters out individual randomness, making it a reliable indicator for analyzing how the built environment impacts emotions at the township scale.



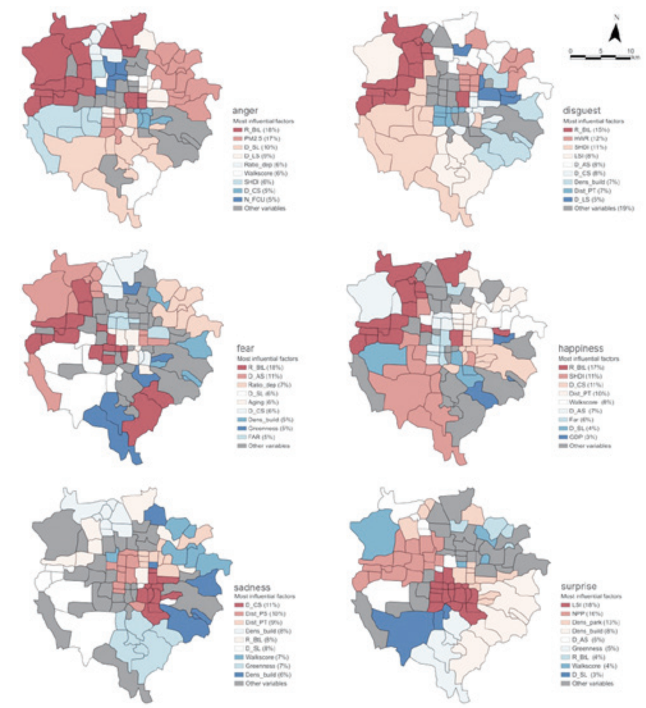


Spatial distribution for the most influential factors affecting emotions across different townships

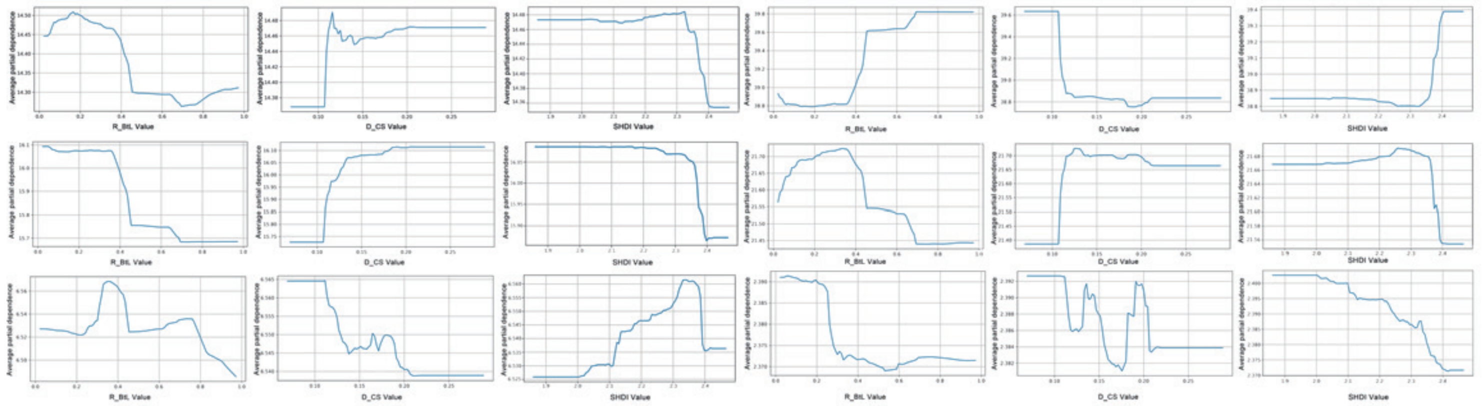
Negative emotions like anger, disgust, and fear are largely driven by the building-to-land ratio (R_BtL), air quality (PM2.5), and land-use diversity (SHDI). These factors show **distinct spatial clustering**, with R_BtL significantly impacting northern and western townships, suggesting that physical density is a primary trigger for resident distress in these areas.

Happiness and sadness are closely linked to residential density and the accessibility of community services or public transport, particularly in southwestern and eastern townships. Meanwhile, the emotion of **surprise is uniquely influenced by landscape complexity and nighttime light intensity**, with these factors being most dominant within the urban core and northwestern regions.

Overall, the research reveals a **distinct core-periphery pattern where urban centers experience diverse environmental influences compared to the more homogeneous drivers found in outlying townships**. The building-to-land ratio (R_BtL) maintains the most widespread impact across four of the six emotion types, particularly in the northwest, while land-use diversity and community service accessibility play pivotal roles in the southwest and eastern regions, respectively. These spatially heterogeneous results underscore the necessity for localized urban interventions that address the specific environmental triggers unique to each township.

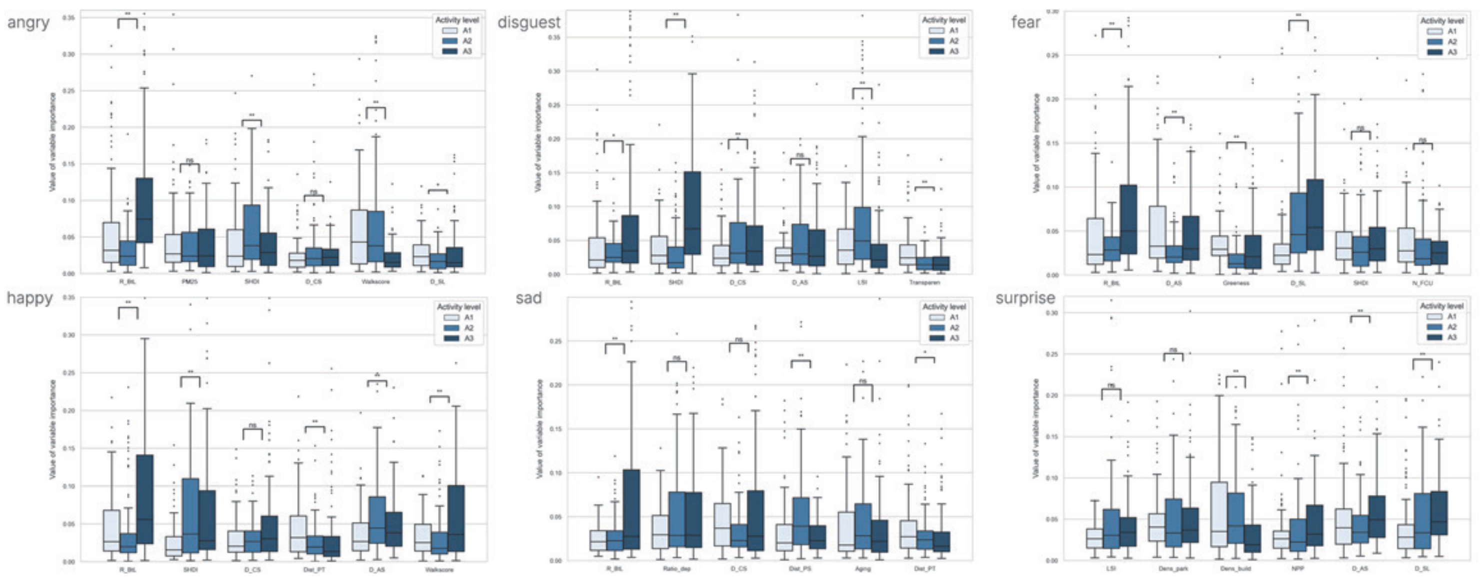


Nonlinear and threshold effects of dominant built environment factors



In terms of the relationship between urban environmental metrics and emotional well-being, the analysis **identifies specific optimal thresholds**, specifically when an R_{btl} value exceeding 0.75, a D_{cs} of 0.11, and an SHDI greater than 2.4, that effectively maximize happiness while simultaneously minimizing negative emotions such as anger, disgust, and sadness.

Different impacts of the dominant built environment factors across gender and Weibo activity



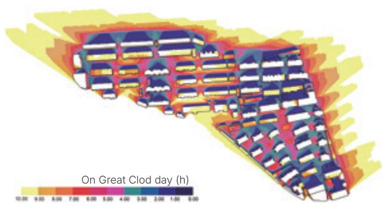
Anti-Utopia Community Life

Group Work for Constructive Detailed Plan Studio
Member: Xuanyu Zhou, Qianyi Yu (Equal contribution)
Instructor: Prof. Wenli Dong, Zhejiang University
Time: 2023.9-2024.1

Histroic Unit Map

Current Greenland Analysis

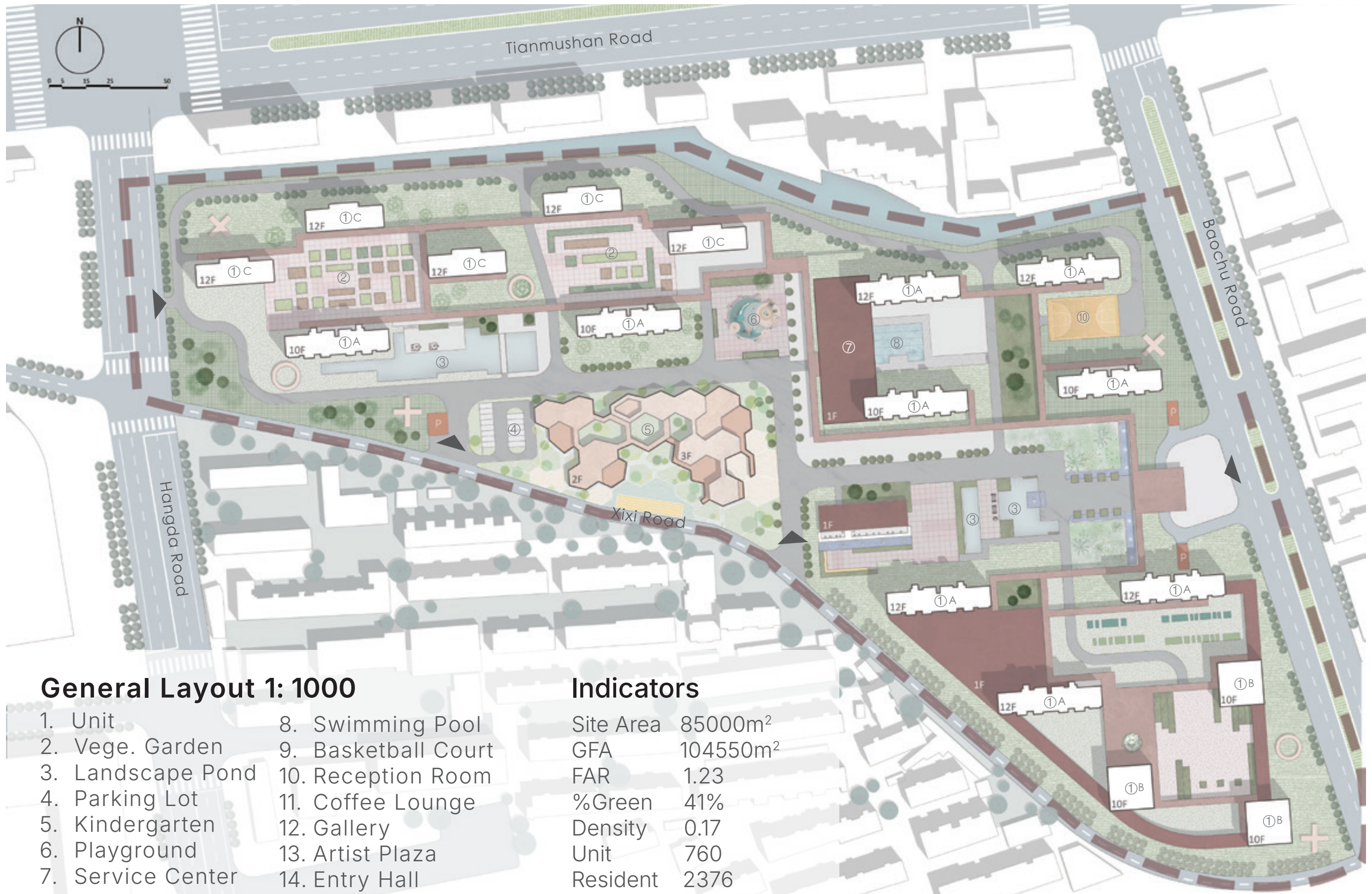
Building Hight Analysis



Sunshine Duration Analysis

Location Analysis

Life Circle Analysis



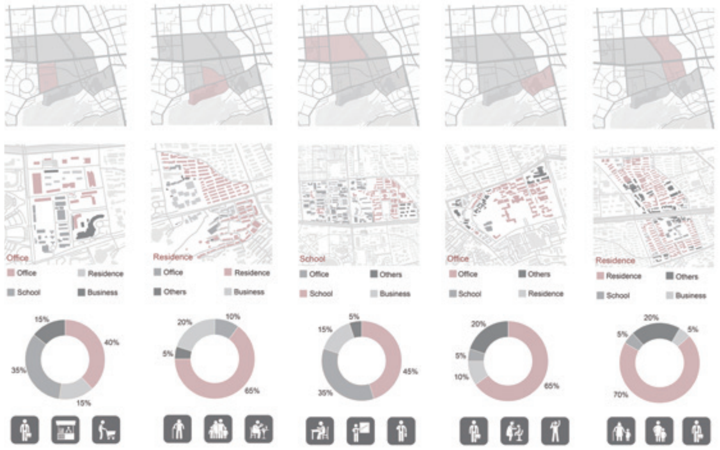
General Layout 1: 1000

1. Unit
2. Vege. Garden
3. Landscape Pond
4. Parking Lot
5. Kindergarten
6. Playground
7. Service Center
8. Swimming Pool
9. Basketball Court
10. Reception Room
11. Coffee Lounge
12. Gallery
13. Artist Plaza
14. Entry Hall

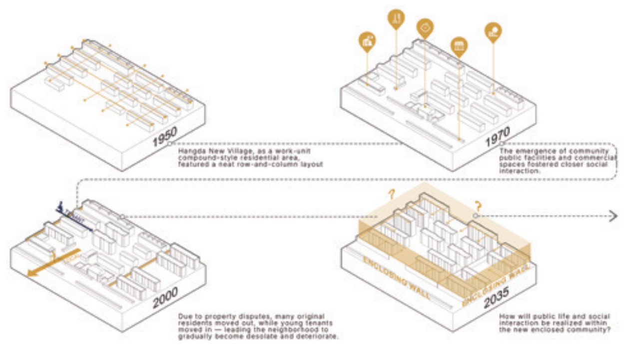
A - Type A Unit B- Type B Unit C- Type C Unit

Indicators

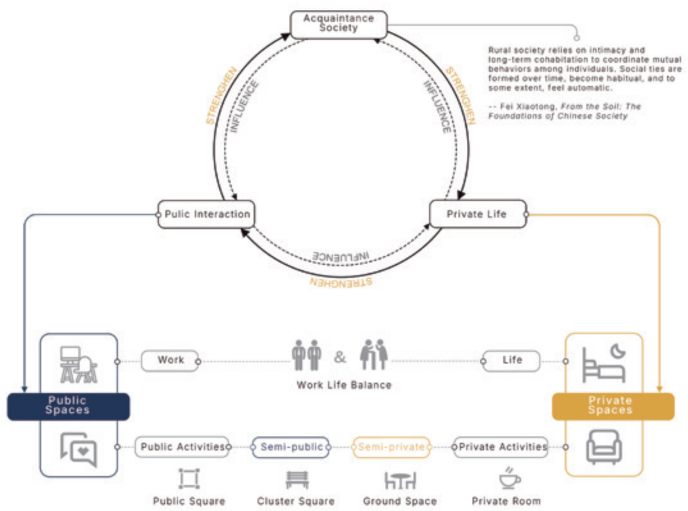
Site Area	85000m^2
GFA	104550m^2
FAR	1.23
%Green	41%
Density	0.17
Unit	760
Resident	2376
Lots	954



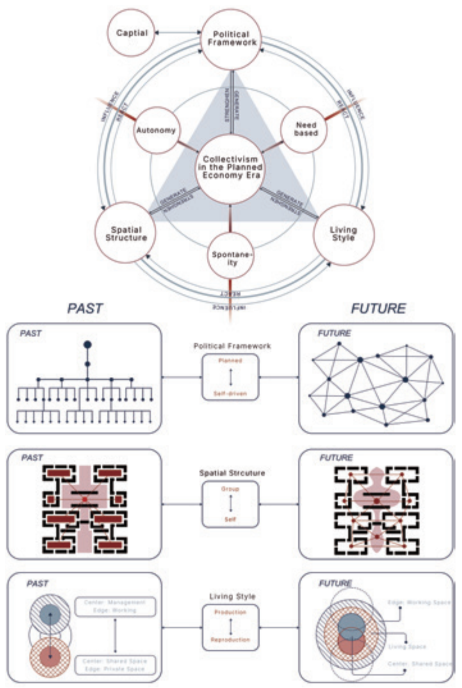
Crowd Analysis



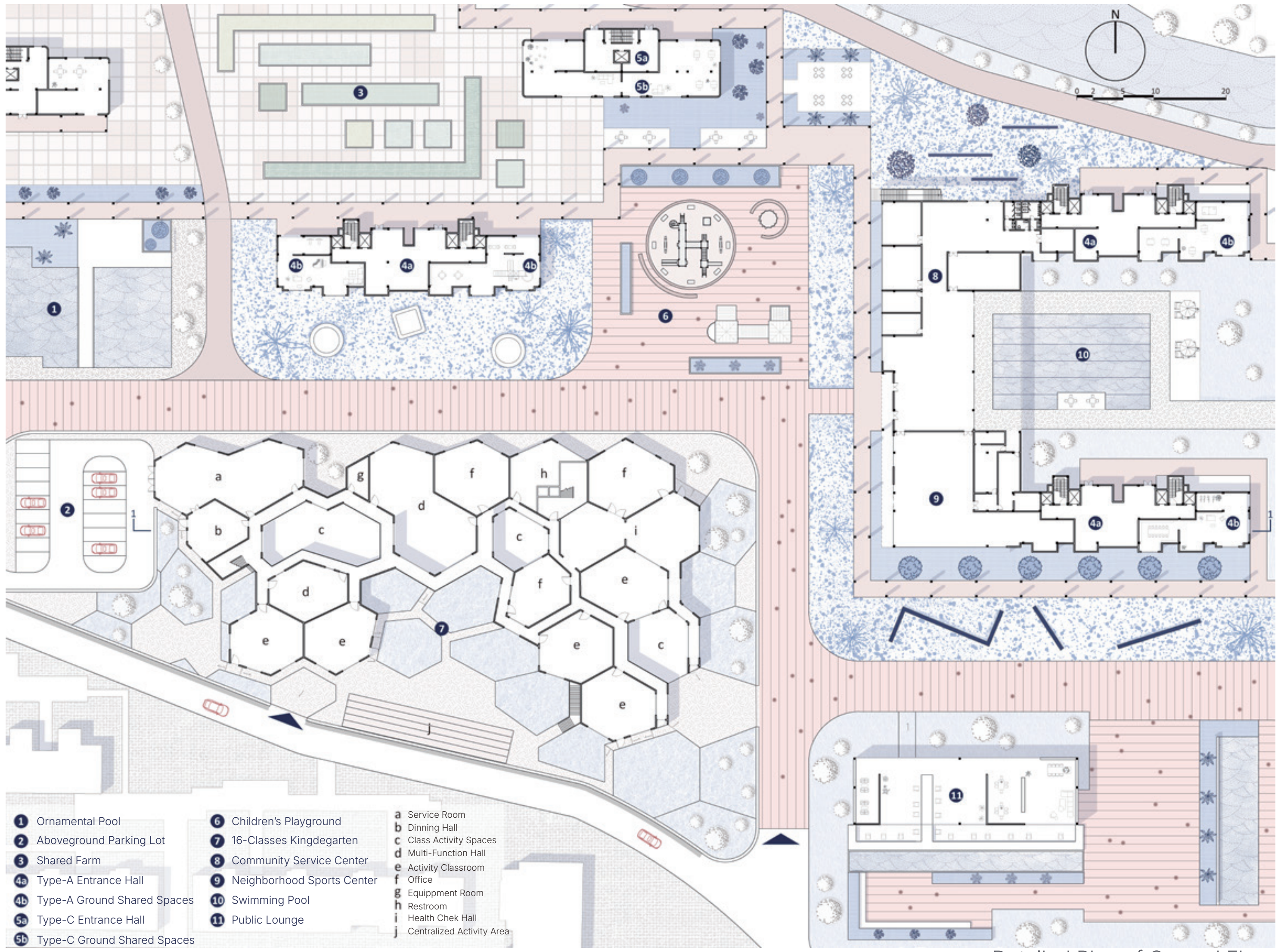
Timeline of Changes in Hangda New Village Neirhborhood



Design Ideas



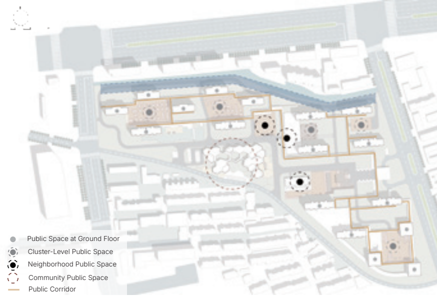
Social Typology Analysis



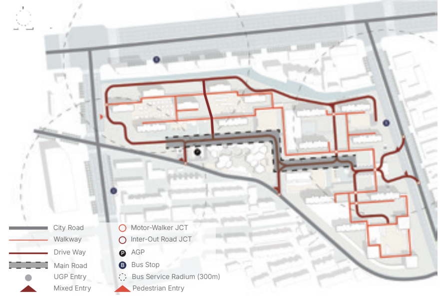
Detailed Plan of Ground Floor

Detailed Design Strategies

We established a **three-tier road hierarchy** within the district to streamline movement. To ensure a safe and tranquil living environment, all motor vehicles are restricted from ground-level access. Moreover, Our strategy **maximizes the insertion of green pockets** throughout the site, transforming vacant areas into vibrant social anchors and outdoor activity spaces. Besides, to enhance user engagement, the district is organized into three distinct **interest-driven clusters**. Also, a community service center and a kindergarten are strategically placed at the heart of the development to provide essential services. Furthermore, Within the building structures themselves, we have **embedded public communal spaces**. These vertical social hubs are designed to foster spontaneous interaction, communication, and collaboration among residents.



Map of Public Spaces



Map of Traffic Flows

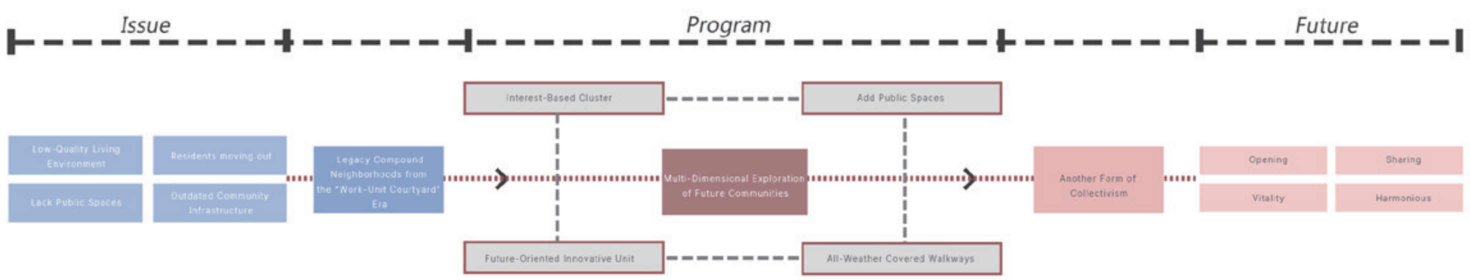
Map of Green Spaces

Map of Clusters

Shared Garden

Swimming Pool

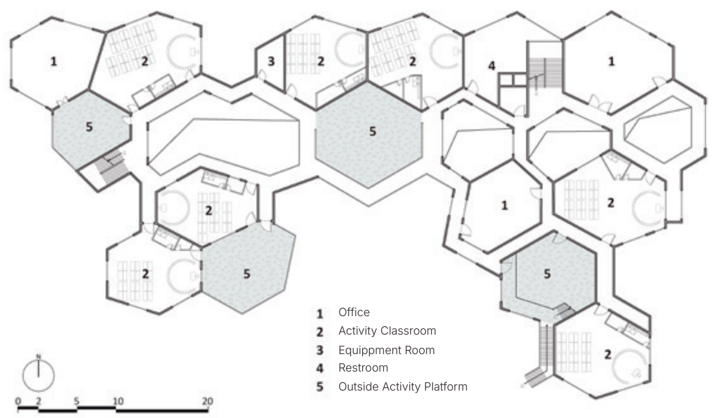
Community Library

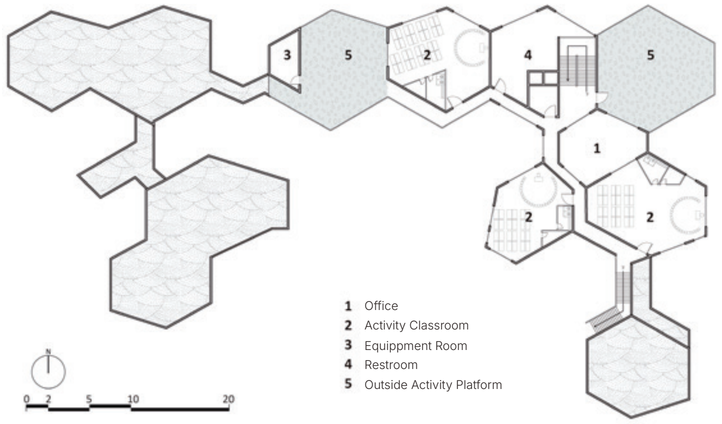


Design Conception

Section of Community Center

Elevation and Plan of the Kingdegarten

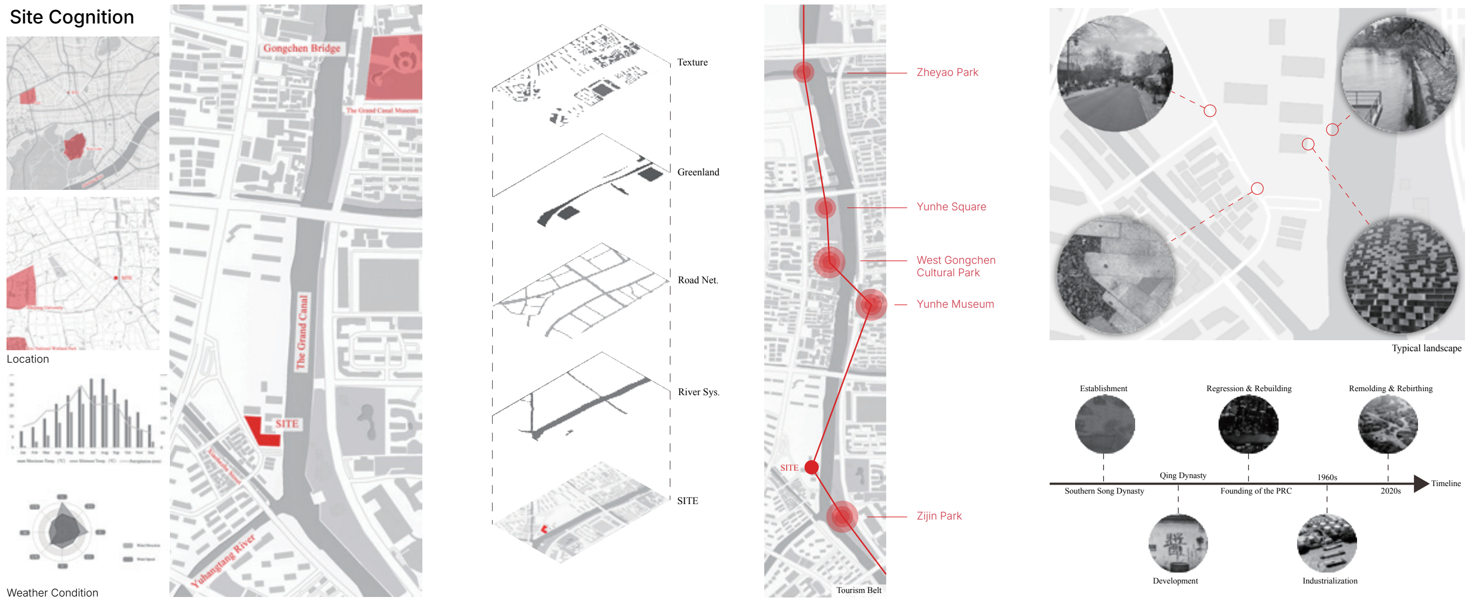




Xiaohe Historic Street: Creative Studio Design

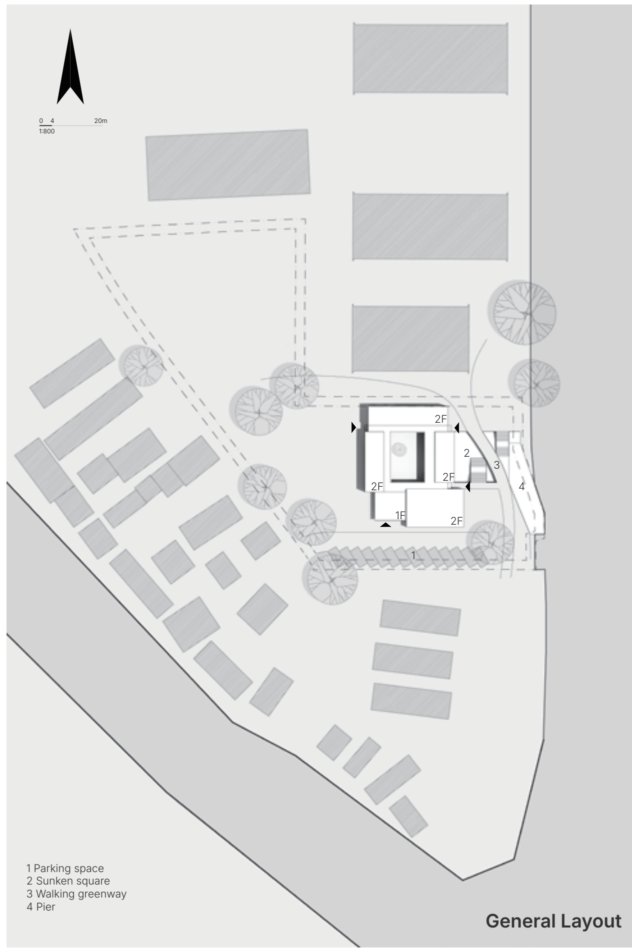
Indisivual Work for Architecture Design Studio
Instructor: Jun Gao, Zhejiang University
Time: 2024.3-2024.7

Site Cognition



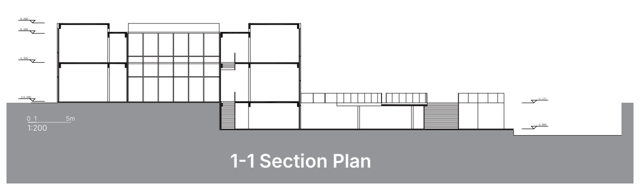
Main Entrance

South Elevation North Elevation West Elevation East Elevation

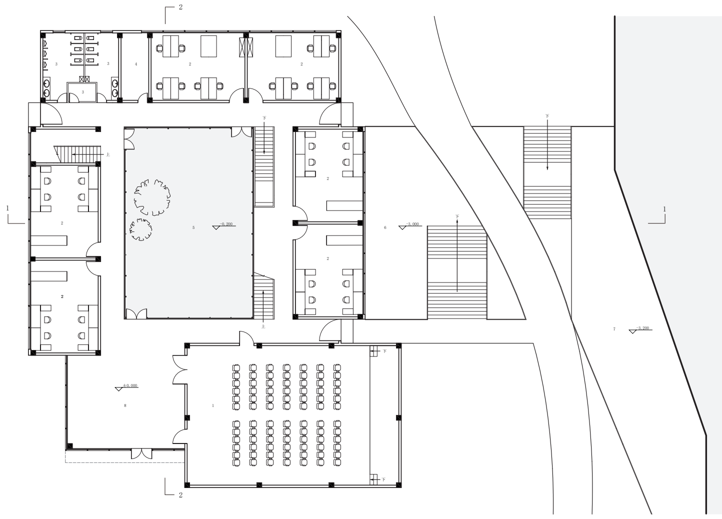


1 Parking space
2 Sunken square
3 Walking greenway
4 Pier

General Layout

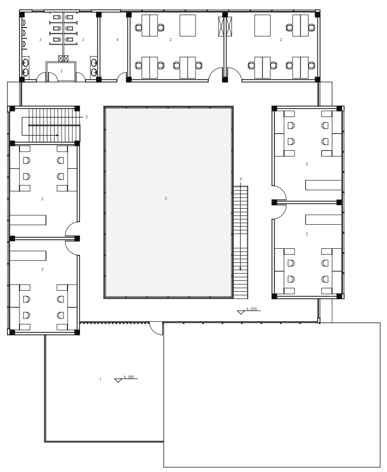


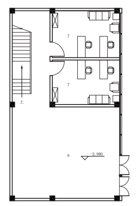
1-1 Section Plan



1st Floor Plan

1 Multi-function hall
2 Studio
3 Washroom
4 Equipment room
5 Courtyard
6 Sunken square
7 Pier
8 Lobby

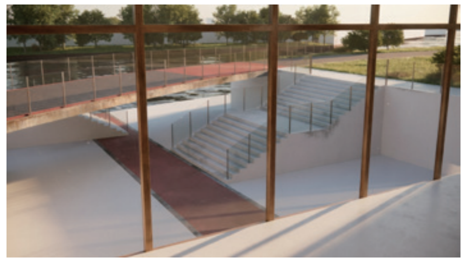




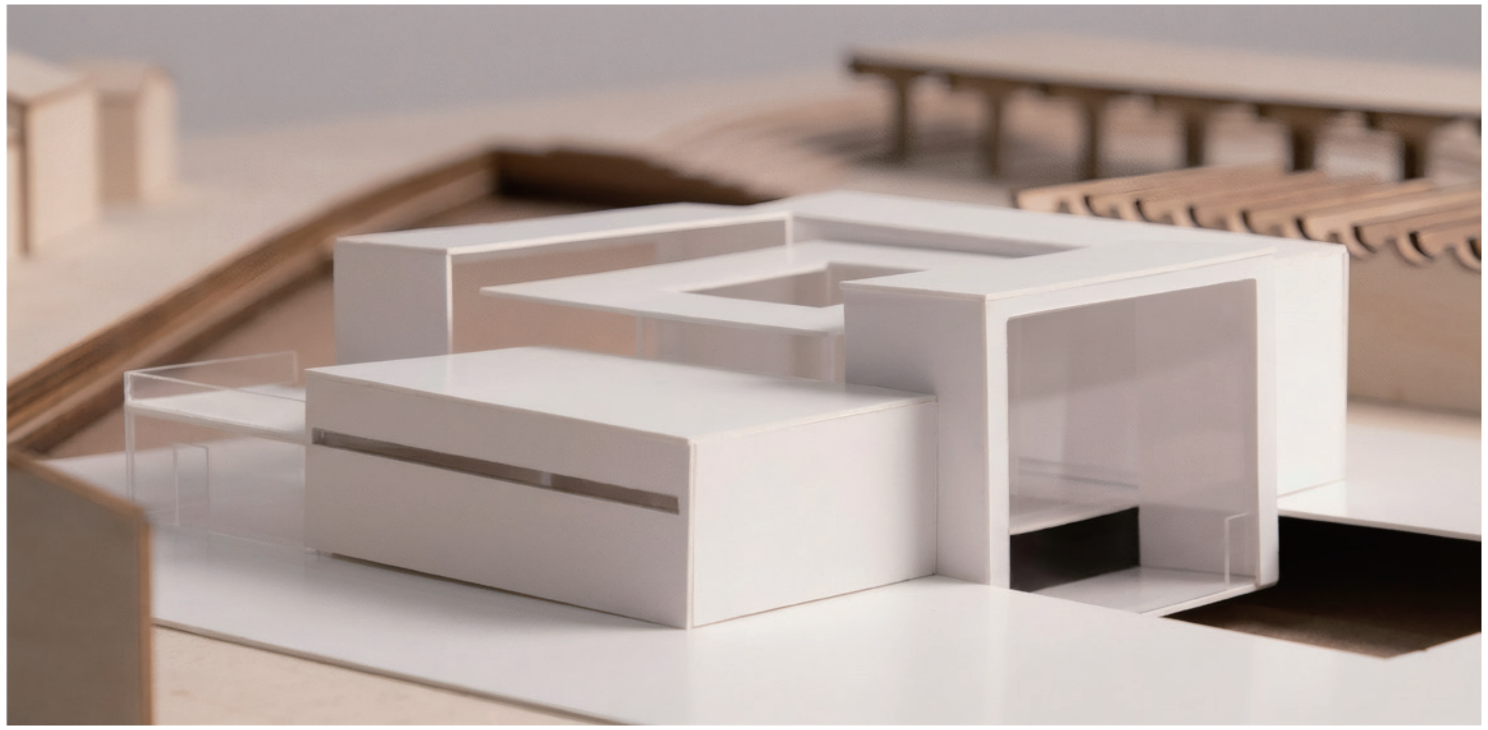
1 Outdoor terrace
2 Studio
3 Washroom
4 Equipment room
5 over Courtyard
6 Waiting hall
7 Property office

2nd Floor Plan Ground Floor Plan

Series Rendering



Model



Mapping the Fractures: Critical Mapping for Chinatown L.A.

Indisivual Work for LDARCH 140 at UC Berkeley
Instructor: Prof. Anna Livia Brand, University of California Berkeley
Time: 2025.1-2025.5

Xuanyu Zhou LDARCH 140

LA Chinatown: Gentrificaiton
BOX 1

Los Angeles' Chinatown, rebuilt in 1938 after the demolition of the old Chinese district, has long faced systemic injustices, including racial violence, forced displacement, and resource neglect. In 1871, a brutal massacre killed at least 18 Chinese residents. By the 1930s, Union Station construction erased the original community.

Now, Chinatown faces **gentrification** as luxury developments displace low-income immigrant families. This project examines three critical sites to reveal how spatial and demographic changes have shaped injustice. Through public space analysis and critical cartography, the study highlights the community's resistance efforts to protect housing, cultural spaces, and environmental equity.

Cornfield: Green inequity
BOX 2

The Los Angeles State Historic Park sits on the northern edge of Chinatown, a 32-acre former Southern Pacific Railroad yard. In 2001, Ed Roski Jr.'s 80 million warehouse project sparked fierce community opposition. The Chinatown Yards Alliance and other 35 organizations, launched political, legal, and media campaigns that halted development and secured the land for public use.

While initial funding only covered land acquisition, the 2005 **Not A Cornfield** project was launched to convert the industrial brownfield into an actual cornfield for public, including free film screenings, musical performances, and fireside drum circles. Finally opened in 2017, the park preserves historical features like the Zanja Madre aqueduct while provides green space in the urban core.

Montview Villa: Affordable housing
BOX 3

Built in the 1980s as affordable housing with 30-year rent restrictions, residents in Montview Villa apartments faced dramatic rent increases when protections expired in 2019. In response, tenants—many of them low-income immigrants and seniors—organized a rent strike through the **Montview Tenants Association**, supported by Chinatown Community for Equitable Development (CCED).

Their collective resistance, including protests at City Hall and calls for eminent domain intervention, demonstrated the power of grassroots mobilization. After years of negotiations, in April 2024, the city reached a compromise: 15 million to freeze rents at 2019 levels for ten years, along with structured payment plans for tenants' arrears.

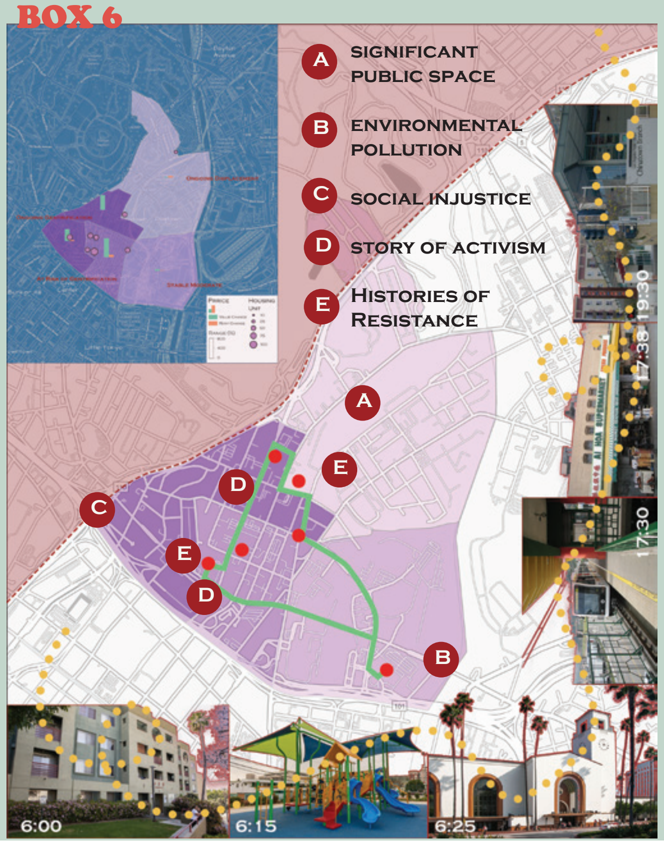
College Station: Gentrification
BOX 4

The College Station project is located at the heart of Chinatown. In the early 2010s, Atlas Capital Group proposed building a 725-unit luxury residential complex, offering **little** affordable housing. This sparked widespread concern among Chinatown's predominantly low-income, immigrant residents, who feared rising rents and cultural displacement.

CCED and local tenant groups organized a fierce opposition campaign, staging protests, community meetings, and legal challenges against the project's Environmental Impact Report. Activists demanded stronger affordability requirements and protection for existing residents. Community resistance **delayed** its progress and **raised** public awareness about gentrification pressures facing historic ethnic enclaves.

TIMELINE
BOX 5

CRITICAL CARTOGRAPHY
BOX 6



CONTEXT MAPS
BOX 7A

Chinatown serves as a crucial affordable housing enclave near downtown Los Angeles, providing essential workforce, including low-income immigrants and seniors.

VISUALS
BOX 7B

Transformation of Old Chinatown to New Chinatown in 100 years, shown in Cornfield and Metro A Line Chinatown station.

References list
BOX 8

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DESCRIPTION OF CRITICAL CARTOGRAPHY
BOX 9

The picture unfolds through the critical lens of a low-income senior living in Hillside Villa Apartments, an affordable housing complex in Chinatown. Each morning, he leaves his modest unit and walks to a nearby market for breakfast. A short ten-minute walk brings him to Union Station, where he works. After finishing his shift, he passes through Chinatown Station and stops by Ai Hoa Supermarket to purchase essentials before returning home. Yet, the familiar streets he walks daily are shadowed by rising rent pressures. He joins a community-led protest at the Los Angeles Public Library, fighting for housing justice. Just feet away, across the US-110 freeway, lies a wealthier, tranquil community—a stark spatial divide fueling the gentrification creeping into Chinatown.

This critical cartography overlays everyday paths with spatial injustice: the top-left corner charts the surge in rent and housing prices since 2010, points mark remaining affordable housing units, and deeper color shading signals the intensifying severity of gentrification across the neighborhood.

MAPPING THE FRACTURES

Chinatown, L.A.

BOX 10

Landscape Design of Qiushi Avenue and Huxin Island, Zhejiang University

Indisivual Work for Landscape Design Studio at Zhejiang University
Instructor: Prof. Yonghua Li, Zhejiang University
Time: 2024.9-2024.12

Landscape Design for Huxin Island

1
Pedestrian-friendly Path

Key	Safe Accessible
Size	Medium
Complex.	Low

Barrier-free walkways provide an equal and convenient route for everyone to access most areas of the healing space.

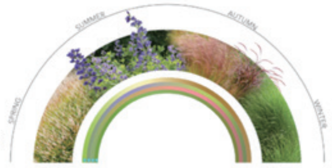
2
Lying-down Lawn

Key	Leisure Garden
Size	Small
Complex.	Low

The gentle interface also helps participants relax both physically and mentally.

3
Seasonal Adaptive Planting

Hakone Grass
Japanese Fatsia
Banana Shrub
Chain Fern
Japanese Maple
Japanese Laurel
Pink Muhly Grass
Tall Fescue Sod
Bermuda Grass Sod



Landscape Design for Qiushi Ave.