

DigitalFUTURES 2025

Simulation and Green Solution for Urban Crime: Application of Large Language Model and Agent-based Model

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The 7h International Conference on Computational Design and Robotic Fabricaion (CDRF 2025)

Contribution

Member



Name:Lu Chen

Tsinghua University

Doctoral Candidate

Major:Landscape Architecture

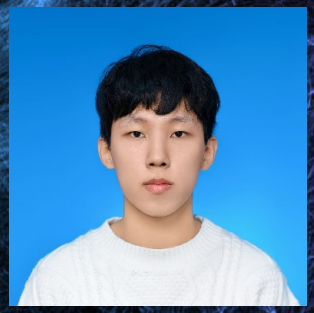


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Major: Architecture



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Major: Architecture

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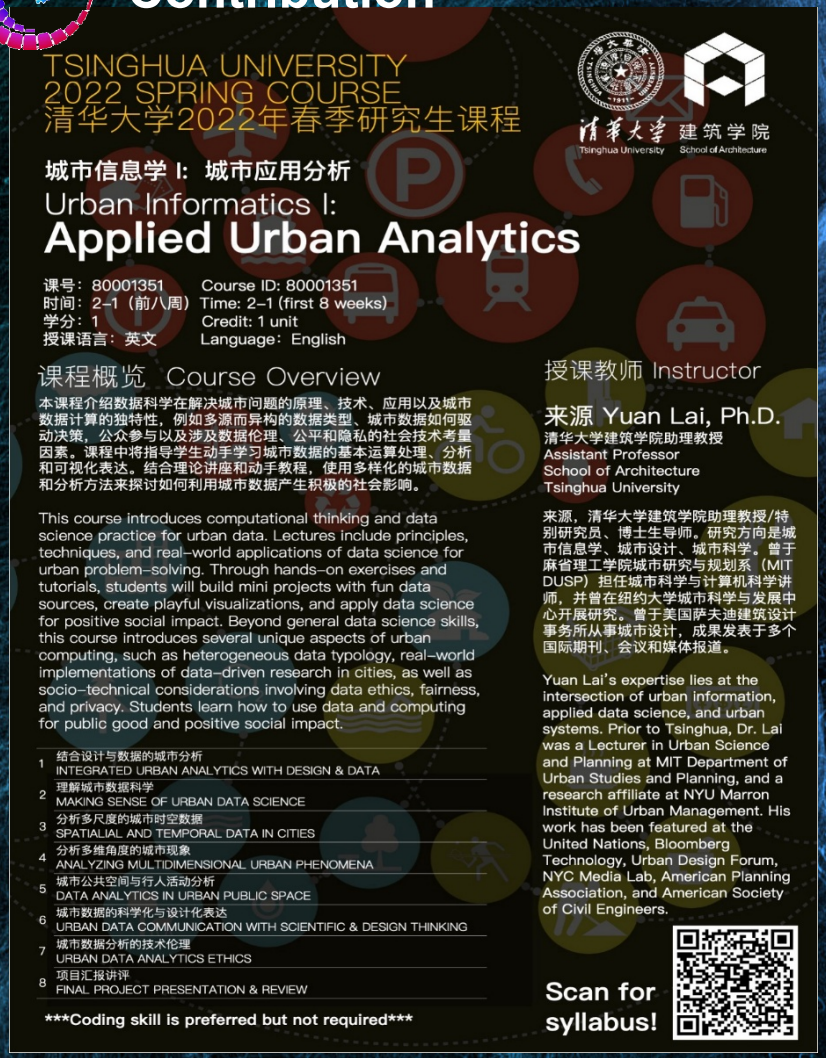
Name:Yuan Lai

Doctor of Engineering (New York University)Associate Professor/Special Researcher, Tsinghua University, and Doctoral Supervisor

Research directions: including urban informatics, urban design, urban data application analysis, and smart city research.

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Contribution





本研究得到
国家自然科学基金面上项目（72274101）、
国家重点研发计划项目（2022YFC3800603）资助

Abstract

Background

Urban environmental safety is critical for sustainable city development,yet the complex mechanisms underlying crime patterns pose significant research challenges.

Methodology

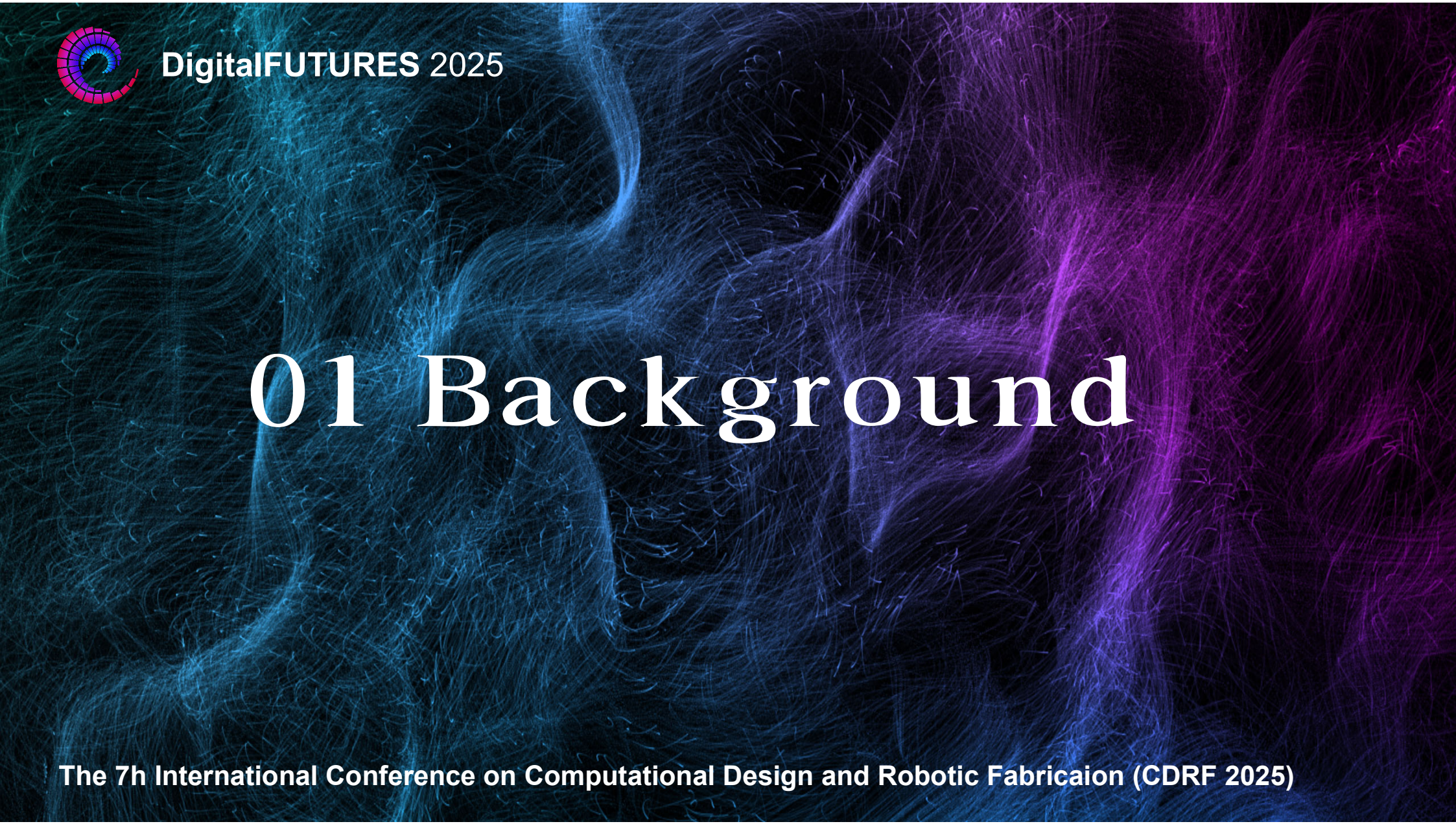
This study analyzes 12,893 criminal judgments (PCJs) from three Chinese megacities over three years using Large Language Models (LLM), developing a crime pattern simulation model that integrates Interpretable Machine Learning (IML) with Agent-Based Modeling (ABM). Then, three urban renewal scenarios were tested.

Key findings

The result shows that: (1) Socioeconomic and builtenvironment factors account for 33.3%-44.5% of outdoor crime spatial variation; (2) Nighttime lighting emerges as a key predictor, while canopy cover exhibits threshold effects on specific crime types; (3) Green regeneration scenarios demonstrate significantly lower crime rates.

Meaning

The proposed multidimensional framework provides actionable spatial planning insights and policy recommendations for safer cities.


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01 Background
The 7h International Conference on Computational Design and Robotic Fabricaion (CDRF 2025)

Background



Overview

Global studies show that 60% of all urban residents in developing countries have been victims of crime at least once over the past five years, 70% of them in Latin America and Africa. Urbanization, particularly in the developing world, has been accompanied by increased levels of crime, violence, and lawlessness. The growing violence and feeling of insecurity that city dwellers are facing daily is one of the major challenges around the world. In some countries, crime and violence have been exacerbated by the proliferation of weapons, substance abuse, and youth unemployment. Crime and violence impact the on everyday life of city residents.

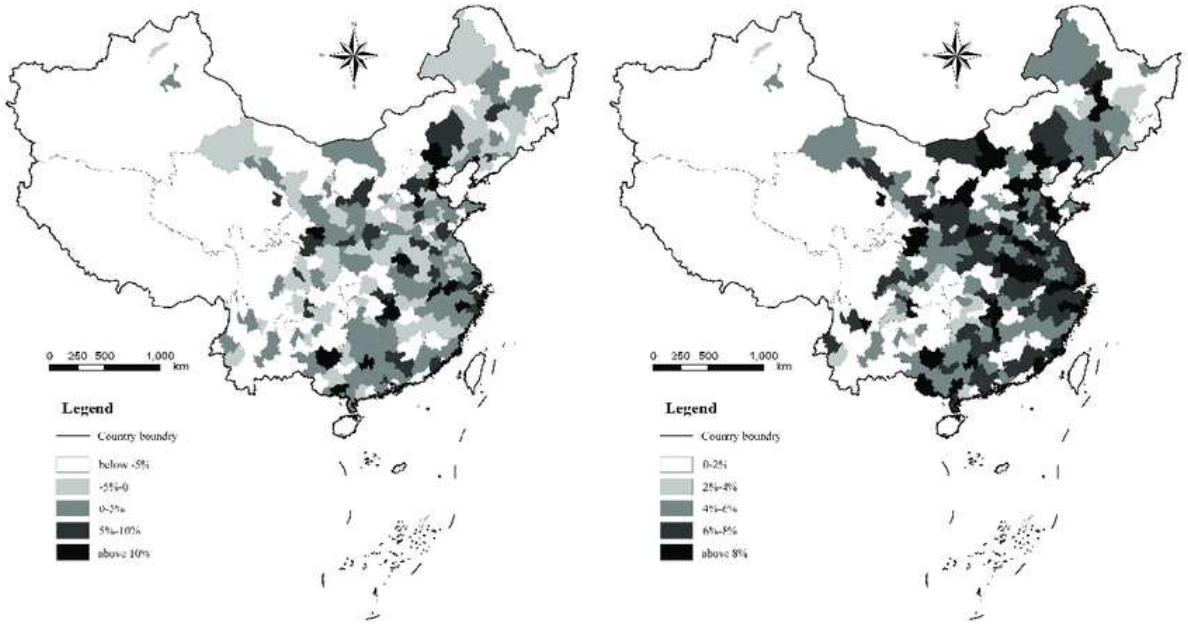
The Challenge

Empirical studies show that it is not the size of urban agglomerations that create criminal surroundings but rather the poor planning, design and management of urbanization.
Studies have shown that a large percentage of urban dwellers in developing and transitional countries have been victims of crime over a five-year period, with victimisation rates reaching 70% in parts of Latin America and the Caribbean and Africa (UN-Habitat, 2007).
Research points to inequalities (UN-Habitat, 2015), lack of institutional and social control and social exclusion (not poverty 1) as underlying causes of crime and violence in urban areas.

https://unhabitat.org/topic/urban-safety

Background

Is China Safe enough?



最高检：严重暴力犯罪持续下降，轻微犯罪持续上升，犯罪结构变化明显

时间：2024-03-09　作者：单皓　来源：高检网　【字体：大 中 小】

“严重暴力犯罪持续下降，轻微犯罪持续上升，犯罪结构变化明显。”3月9日，最高人民检察院发布《刑事检察工作白皮书（2023）》，披露了过去一年刑事案件办案情况并对其进行了分析。

“党的十八大以来，在以习近平同志为核心的党中央坚强领导下，我国持续保持经济快速发展和社会长期稳定。在刑事案件总量长期高位运行的情况下，全国检察机关起诉严重暴力犯罪从1999年16.2万人下降至2023年6.1万人，占比从25.1%下降至3.6%。”最高检检察委员会副部级专职委员、第一检察厅厅长苗生明介绍说，与此同时，判处三年有期徒刑以下刑罚的轻罪案件人数占比从1999年的54.4%上升至2023年的82.3%。

记者注意到，审查逮捕案件中盗窃罪，诈骗罪，帮助信息网络犯罪活动罪（下称帮信罪），掩饰、隐瞒犯罪所得、犯罪所得收益罪（下称掩隐罪），开设赌场罪合计占48.4%。审查起诉案件中危险驾驶罪、盗窃罪、帮信罪、掩隐罪、诈骗罪合计占53.7%。

“职务犯罪惩处力度不断加大，专项整治特定领域腐败成效明显。”苗生明介绍说，全国检察机关起诉职务犯罪1.8万人，其中，起诉县处级以上3209人。积极配合开展医药领域腐败问题集中整治，起诉相关职务犯罪580人；积极参与粮食购销领域腐败问题专项整治，起诉相关职务犯罪385人；强化金融领域新型隐性腐败惩治，起诉相关职务犯罪348人。

打击治理电信网络诈骗犯罪工作也在深入推进中，起诉电信网络诈骗及关联犯罪数量明显上升。数据显示，全国检察机关共起诉电信网络诈骗犯罪51351人，同比上升66.9%。

苗生明告诉记者，受电信网络诈骗犯罪高发影响，帮信罪、掩隐罪、妨害国（边）境管理类犯罪等关联犯罪也呈现上升态势。“其中，起诉帮信罪146579人，同比上升13%；起诉掩隐罪137386人，同比上升66.2%；起诉妨害国（边）境管理类犯罪31442人，同比上升13.3%。”苗生明说。

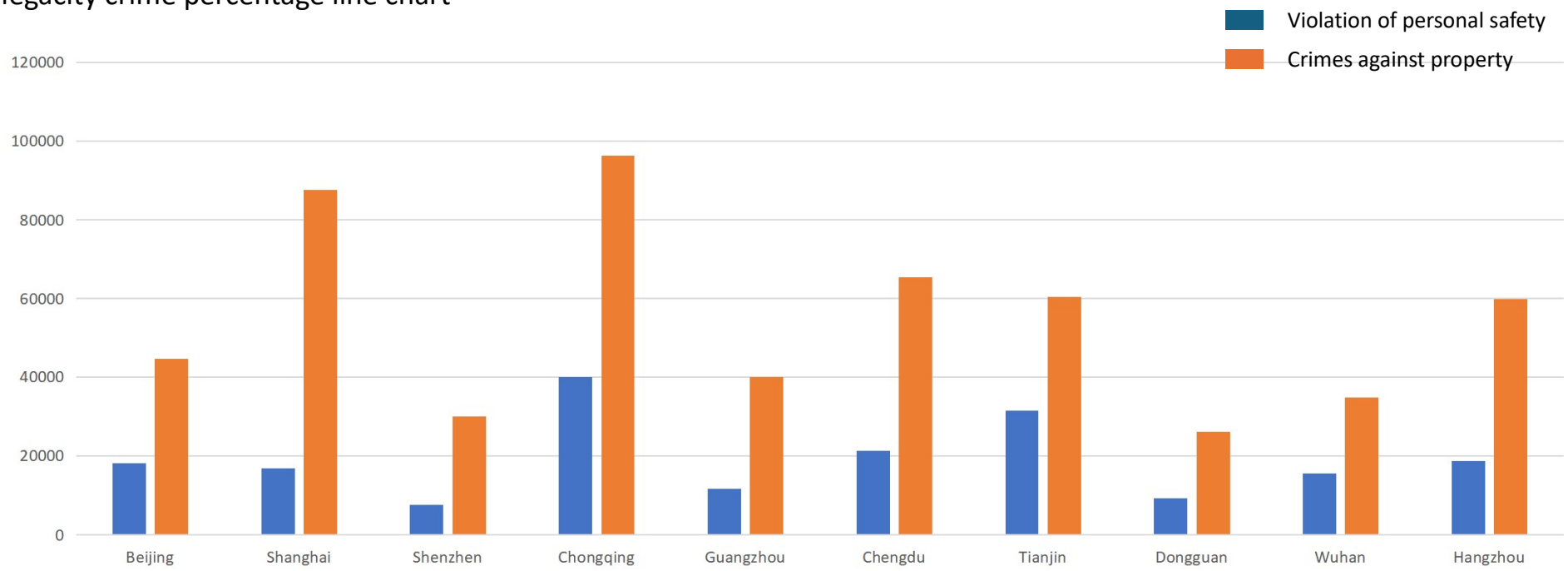
The crime rate of Chinese cities (2000–2013). (**a**) Average arrest rate; (**b**) Average prosecution rate;

Source: Peng C, Sun W, Zhang X. Crime under the light? Examining the effects of nighttime lighting on crime in China[J]. Land, 2022, 11(12): 2305.
https://www.spp.gov.cn/spp/zdgz/202403/t20240309_648430.shtml

Background

中国裁判文书网
China Judgements Online

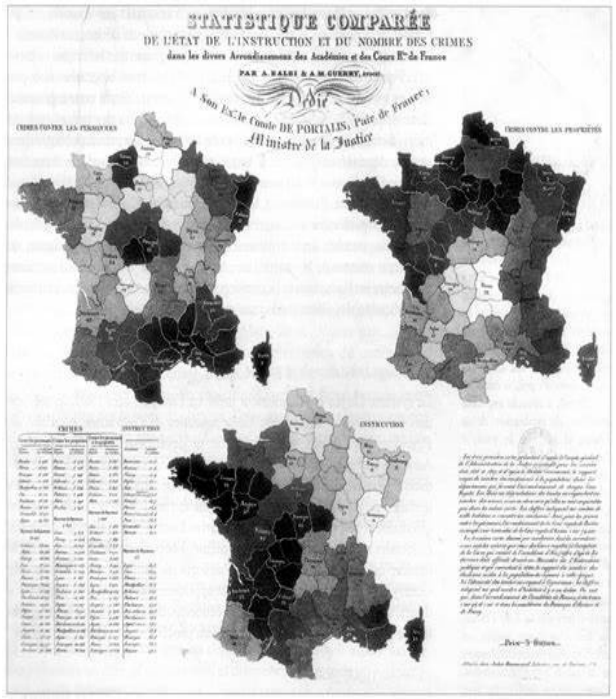
Megacity crime percentage line chart



There are more types of crimes against property than crimes against personal security

Background

What can we do as a planer?



Cartographic school
This school of thought advocates mapping the location of crime to reflect regional differences, and analyzing the natural and social causes behind the differences.

1830s

1930s

Chicago School
In the early 20th century, Park and Burgess, representatives of the Chicago School, proposed the Concentric Ring Model based on their research on the distribution of crime in Chicago.



1961



Eyes on the Street
It is necessary to deeply explore the rules of urban space use and create a safe and applicable urban space through careful design.

1972



CPTED Theory
Jeffery builds on the research of Jacobs and Newman to propose crime prevention through environmental design, which refers to ways to avoid crime through the rational design of urban space and the effective use of the built environment.

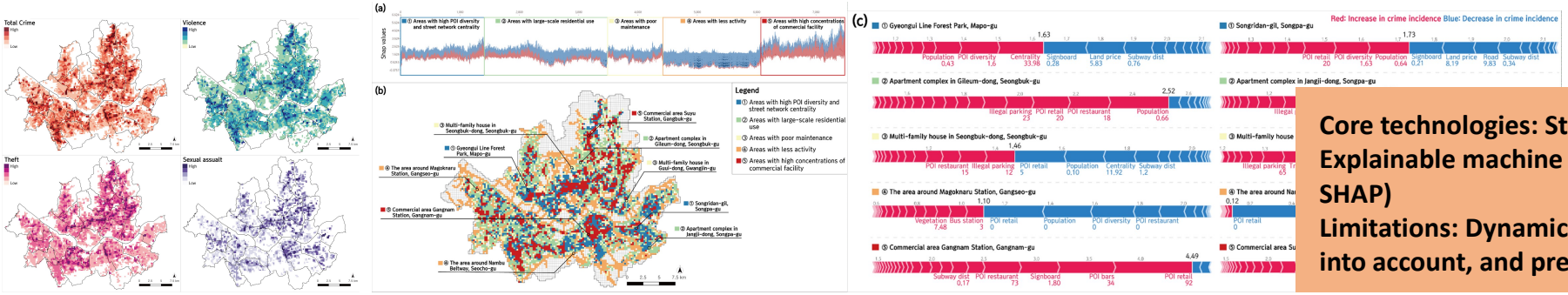
2000



Spatial syntax
Hillier and Shu (2000) found that streets or spaces with a high degree of integration tend to be the safest when they are more visible and attract crowds.

Relative works

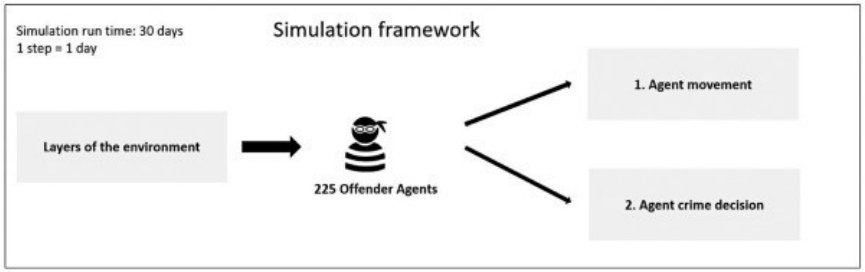
Revealing the correlation between static urban characteristics (POI density, nighttime lighting etc) and crime.

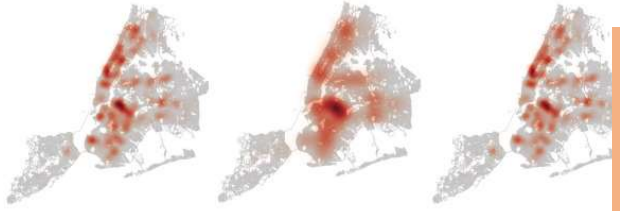


Core technologies: Statistical attribution; Explainable machine learning (represented by SHAP)
Limitations: Dynamic mobility data is not taken into account, and prediction cannot be realized

Kim S, Lee S. Nonlinear relationships and interaction effects of an urban environment on crime incidence: Application of urban big data and an interpretable machine learning method[J]. Sustainable Cities and Society, 2023, 91: 104419.

Urban Crime Simulation and Analysis from the Perspective of Individual Behavior





(a) Scenario 1 – spatial data. (b) Scenario 2 – spatial and temporal data. (c) Scenario 3 – interact with spatial and tempo data.

Core technologies: Agent models, reinforcement learning, large language models, etc.

Limitations: Still in the exploratory stage, with insufficient persuasiveness in simulating individual behavior

Rosés R, Kadar C, Malleson N. A data-driven agent-based simulation to predict crime patterns in an urban environment[J]. Computers, Environment and Urban Systems, 2021, 89: 101660.



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02 Methodology

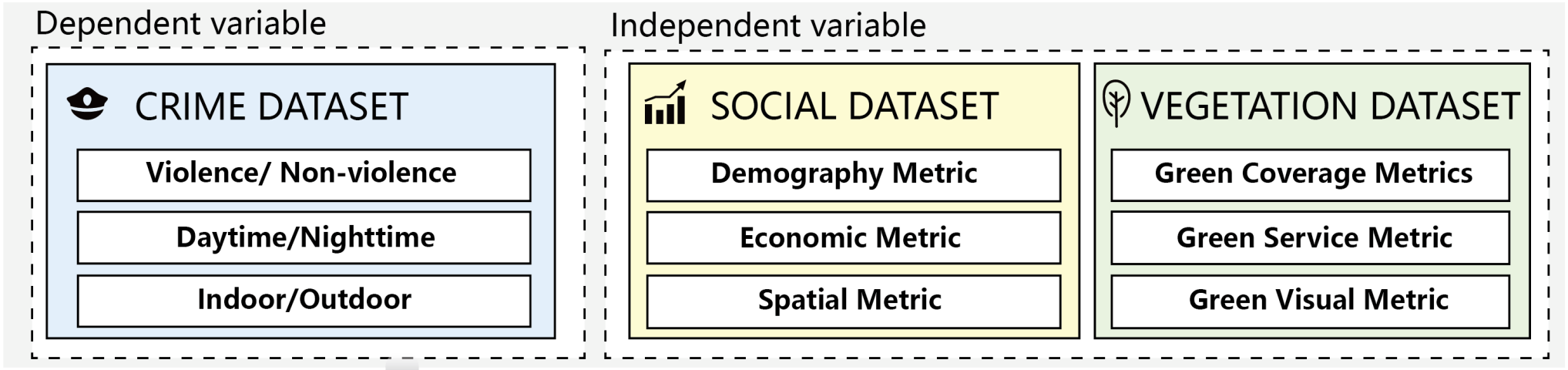
&

03 Key findings

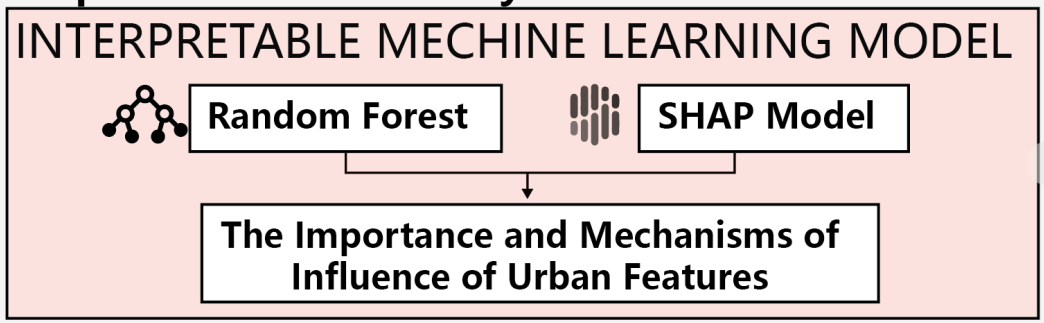
The 7h International Conference on Computational Design and Robotic Fabricaion (CDRF 2025)

Methodology

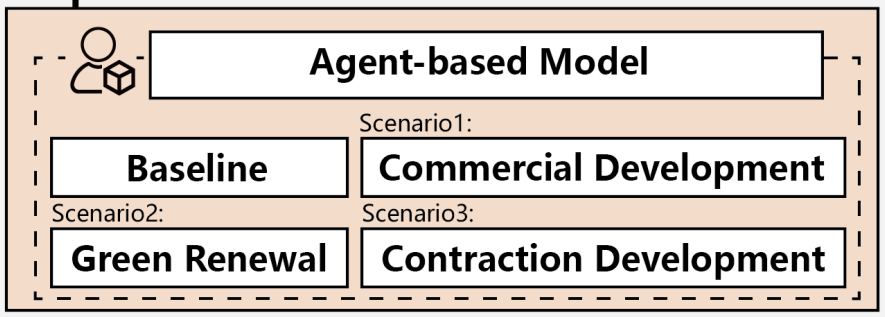
Step 1: Dataset Establishment



Step 2: Mechanism Analysis

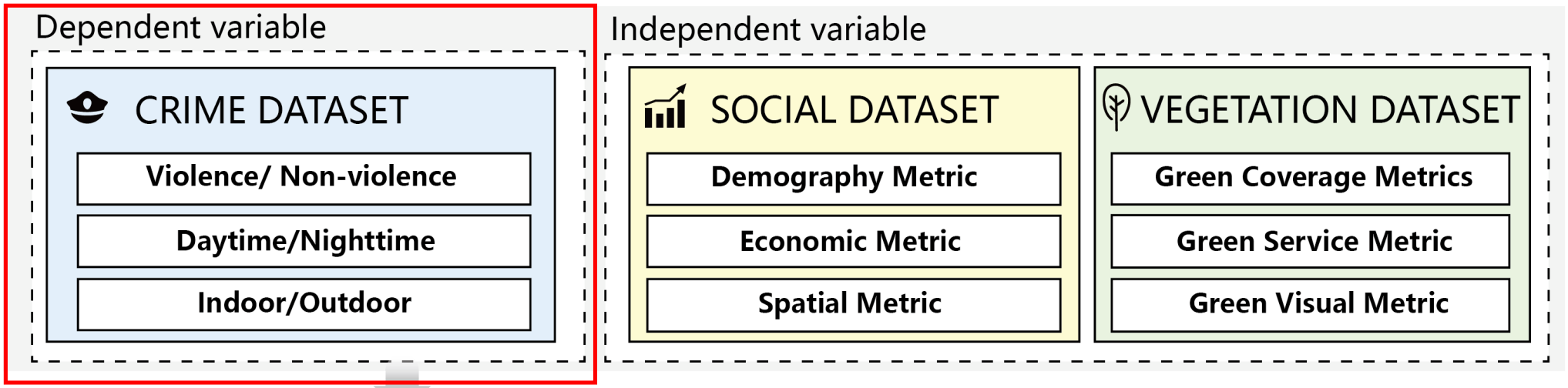


Step 3: Multi-scenario Simulation

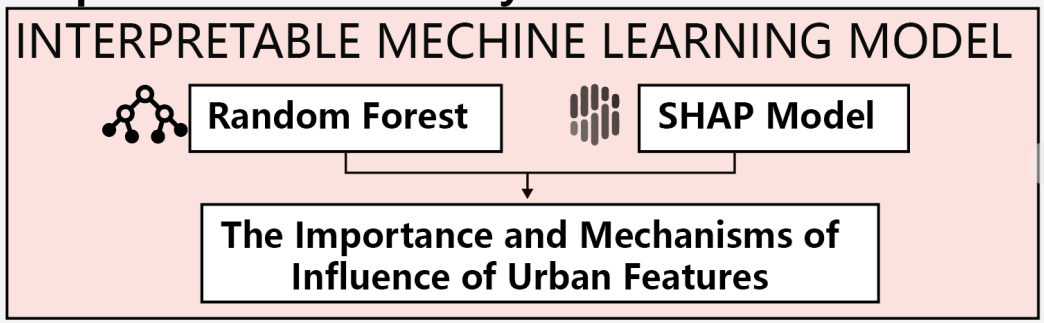


Methodology

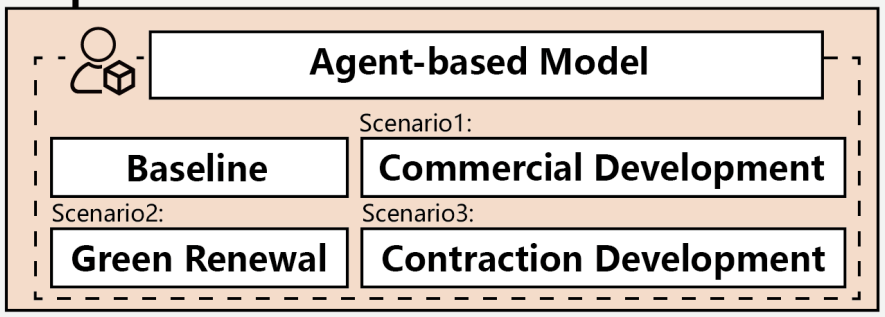
Step 1: Dataset Establishment



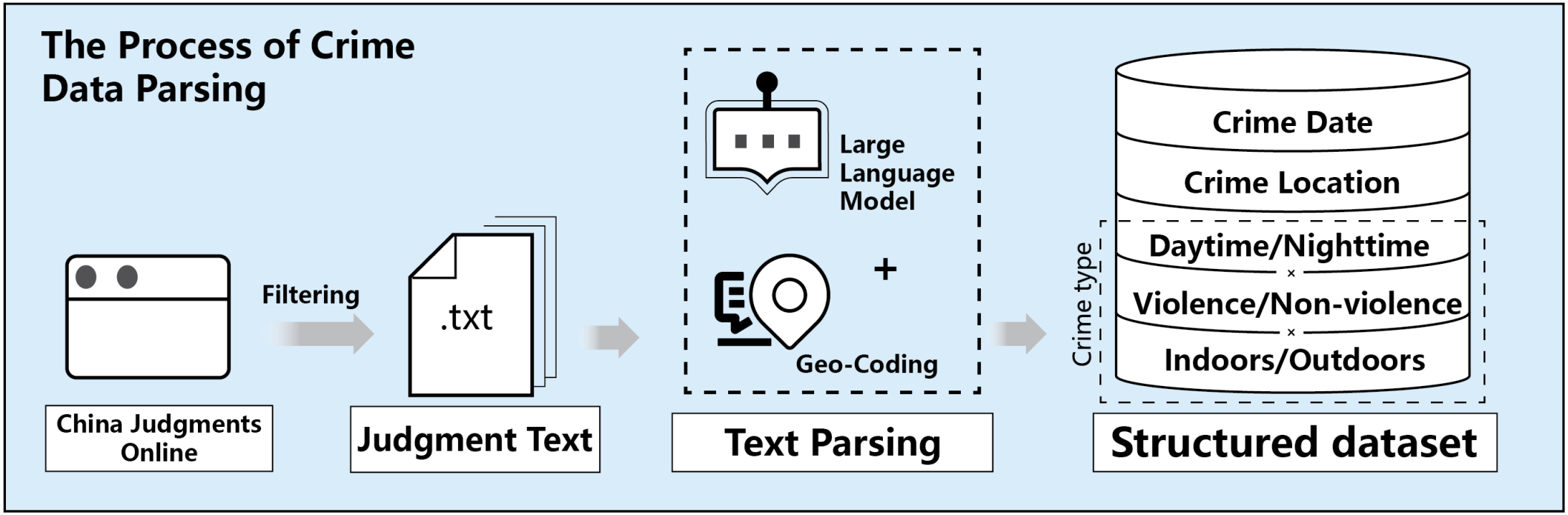
Step 2: Mechanism Analysis



Step 3: Multi-scenario Simulation



Methodology



Methodology



Methodology

刘[redacted]故意伤害一审刑事判决书

案　由 故意伤害 点击了解更多　　案　号 （2022）京0113刑初909号

发布日期 2023-04-07　　浏览次数 211

北京市顺义区人民法院

刑 事 判 决 书

（2022）京0113刑初909号

公诉机关北京市顺义区人民检察院。

被告人刘[redacted]，男，1977年12月26日出生于山西省长治市，专科文化，户籍所在地山西省长治市潞州区。因犯抢劫罪，于1999年11月23日被山西省长治市城区人民法院判处有期徒刑十三年，并处罚金1000元，于2000年1月25日被山西省长治市中级人民法院裁定维持原判，同年11月29日被山西省长治市中级人民法院再审判处有期徒刑六年，并处罚金1000元；因犯抢劫罪，于2011年12月12日被山西省长治市郊区人民法院判处有期徒刑一年零五个月，并处罚金1000元；因犯盗窃罪，于2015年12月24日被山西省长治市城区人民法院判处有期徒刑一年零六个月，并处罚金人民币5000元；因犯盗窃罪，于2017年6月23日被山西省长治市城区人民法院判处有期徒刑九个月，并处罚金人民币2000元；因犯盗窃罪，于2018年6月15日被山西省长治市城区人民法院判处有期徒刑一年零二个月，并处罚金人民币1000元；因犯盗窃罪，于2020年6月16日被山西省长治市潞州区人民法院判处有期徒刑一年，并处罚金人民币2000元。因涉嫌犯故意伤害罪，于2021年11月3日被羁押，次日被刑事拘留，拘留当日被取保候审，于2022年8月29日被逮捕，现羁押于北京市顺义区看守所。

辩护人刘勇，广东德法理（北京）律师事务所律师。

辩护人张鹤子，广东德法理（北京）律师事务所实习律师。

北京市顺义区人民检察院以京顺检刑诉〔2022〕825号起诉书指控被告人刘树平犯故意伤害罪。本院适用普通程序，并依法组成合议庭，公开开庭审理了本案。北京市顺义区人民检察院指派检察官朱茂叶出庭支持公诉，被告人刘树平及其辩护人刘勇、张鹤子到庭参加诉讼。本案现已审理终结。

北京市顺义区人民检察院指控：2021年11月2日14时许，在北京市顺义区南法信镇员工宿舍内，被告人刘树平与被害人苗某（男，44岁，吉林省人）因工作问题发生纠纷，其中刘树平持菜刀将苗某身体砍伤，刘树平后被民警查获。经鉴定，苗某身体所受损伤构成轻伤二级。

另，刘树平已赔偿被害人苗某损失并获谅解。

Crime Date　Crime Type　Crime Location　Daytime? or Night time?　Indoors? or Outdoors?

以上情节对被告人从轻处罚。

上述事实有被害人苗某的陈述，证人杨某、曹某的证言，被告人刘树平的供述，司法鉴定意见书，现场勘验笔录，照片，扣押决定书、扣押清单、扣押笔录，刑事判决书，诊断证明，谅解书，“110”接警单、受案登记表、到案经过、身份信息、出警录像等予以证实，足以认定。

Methodology

智谱清言

高德开放平台 lbs.amap.com

```
PROMPT = """
你是一个专业的信息提取助手。你需要从给定的判决书文本中提取以下信息，并以JSON格式返回。
请提取以下字段：
涉嫌罪名，犯罪人（即被告人）姓名 ，犯罪人性别， 犯罪人出生年份，犯罪人籍贯，犯罪人民族，室内或室外，是否属于暴力犯罪
                犯罪日期， 犯罪时刻， 案发地点，判决法院


输出格式要求：
    使用JSON格式输出
    每个字段的值应该是一个整数或者带有小数点的数字
    如果未找到相关信息，该字段返回None

示例输出格式JSON：
    {'涉嫌罪名': '故意杀人罪',
    '犯罪人姓名': '周某', '犯罪人性别': '男', '犯罪人出生年份': '1980年',
    '犯罪人籍贯': '安徽省临泉县','犯罪人民族': '汉族',
    '犯罪日期': '2017年8月15日', '犯罪时刻': '13时许', "犯罪区域":"室内", "是否属于暴力犯罪":"是",
    '案发地点': '北京西站南广场环岛东侧',"判决法院":"北京市丰台区人民法院"}

请严格按照以上要求进行信息提取和格式化输出。对于找到的信息，请完整保留原文表述，不要进行改写或简化。

"""
```

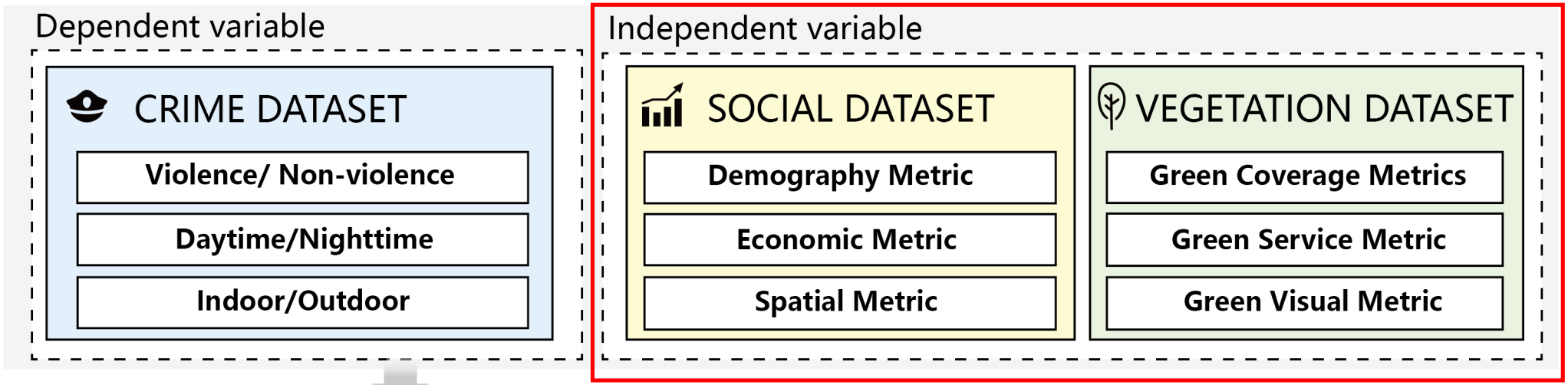
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2024-12-18 10:04:34.826 | INFO     | feature_extract:extract_data_with_retry:76
2024-12-18 10:04:46.220 | INFO     | feature_extract:extract_data_with_retry:76
2024-12-18 10:04:57.765 | INFO     | feature_extract:extract_data_with_retry:76
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    "犯罪人出生年份": 1992,
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  "犯罪人籍贯": "汉族",
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```

Methodology

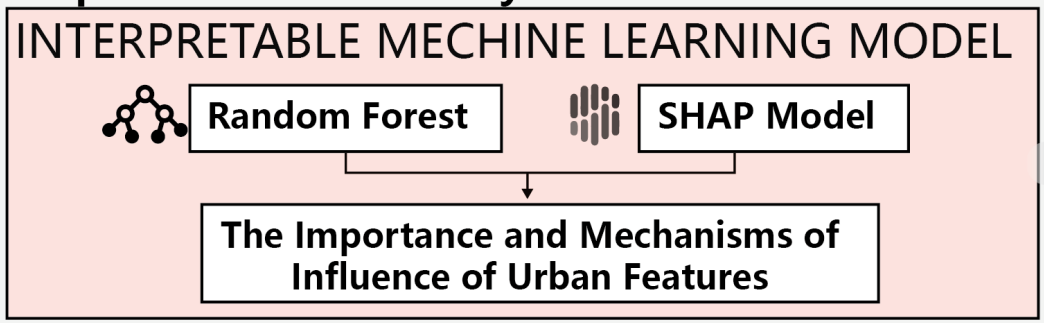
Classification	Criminal Charges	Total Number
Violation of Citizens' Personal Rights	Intentional Homicide	14
	Intentional Injury	732
	Rape	24
	Forcible Indecent Assault	36
	Negligent Homicide	19
Violation of Property	Theft	4310
	Robbery	41
	Snatching	17
Endangering Public Safety	Intentional Destruction of Property	54
	Dangerous Driving	7007
	Traffic Accident Offense	639

Methodology

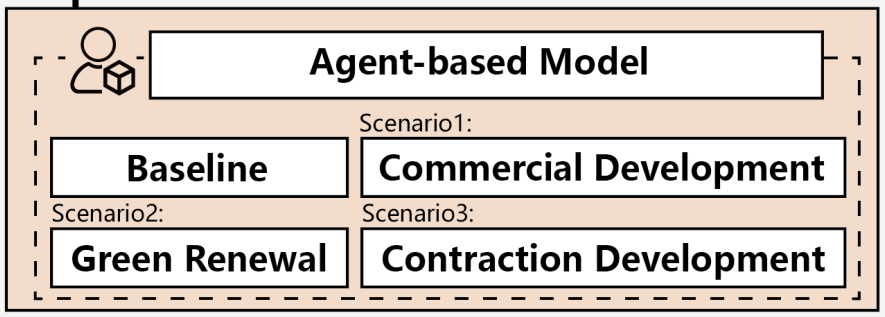
Step 1: Dataset Establishment



Step 2: Mechanism Analysis



Step 3: Multi-scenario Simulation



Methodology

Data Categories	Secondary Classification	Data set name	Source	Primary data or not
Social dataset	Demography Metric	Population size	China population census	Second-hand data
		Educational level		
		Population Age structure		
	Economic Metric	Per capita income level	China population census	
		Nighttime light index	NPP/VIIRS	
		Real estate prices	LianJia Web	
	Spatial Metric	Point of Interest (POI) density	AMap API	Primary data
		Floor Area Ratio (FAR)		
		Road network(RN) density		
Green space dataset	Natural Characteristic Metric	Annual average vegetation cover	China regional 250m fractional vegetation cover data set (Gao, J. et al., 2023)	Second-hand data
		Average Green View Rate（GVR）	Baidu Map API	Primary data
	Green Service Metric	Park Area per capita	EULUC-China(Gong et al., 2020)	Second-hand data

In the dataset, Spatial metrics are derived from the Amap API, including urban POI quantities, road vectors, building footprints, and corresponding floor counts:

$$POI\ density = num\ of\ POI / neighborhood\ area \quad (1)$$

$$FAR = \sum 3.5 * height\ of\ build\ i * area\ of\ building\ i / neighborhood\ area \quad (2)$$

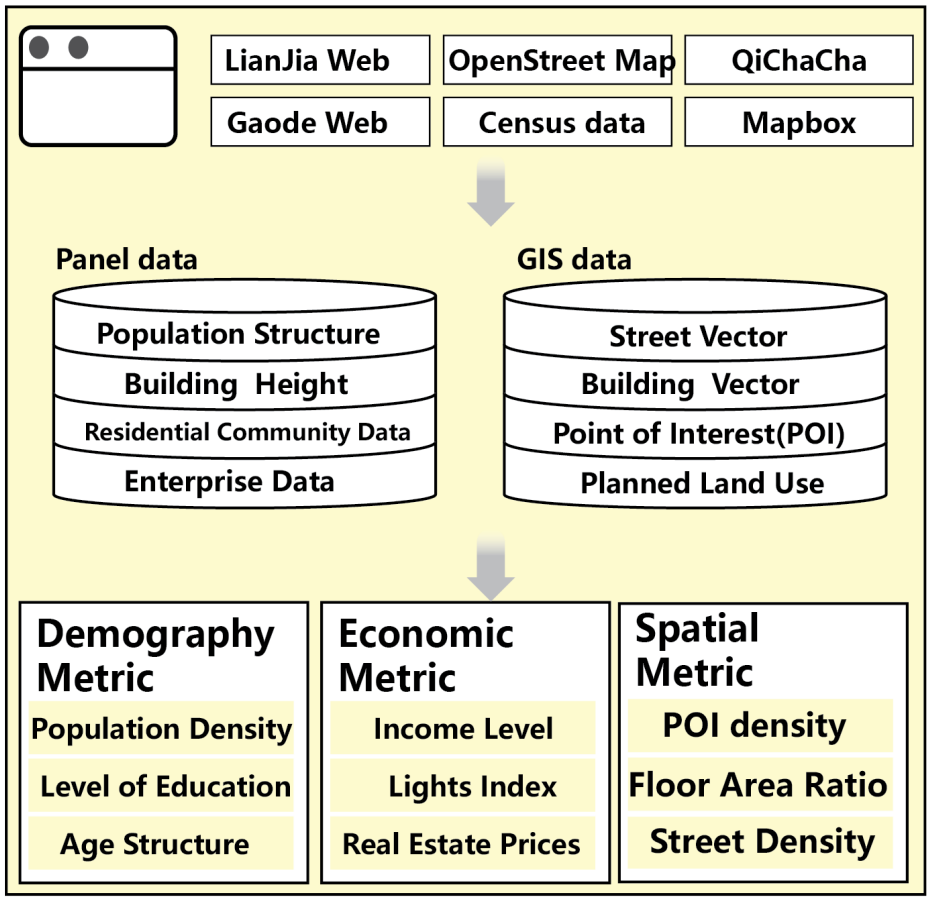
$$RN\ density = total\ road\ length / neighborhood\ area \quad (3)$$

For GVR, we established urban street sampling points at 150m intervals, collected initial street view panoramic images through the Baidu Map API, and then calculated GVR for each image using the Segformer model trained by cityscapes datase.

$$Average\ GVR = \sum GVRi / N \quad (4)$$

Data Sources and Methods

SOCIAL DATASET



The Source of Data

链家 连接每个家的故事

OpenStreetMap

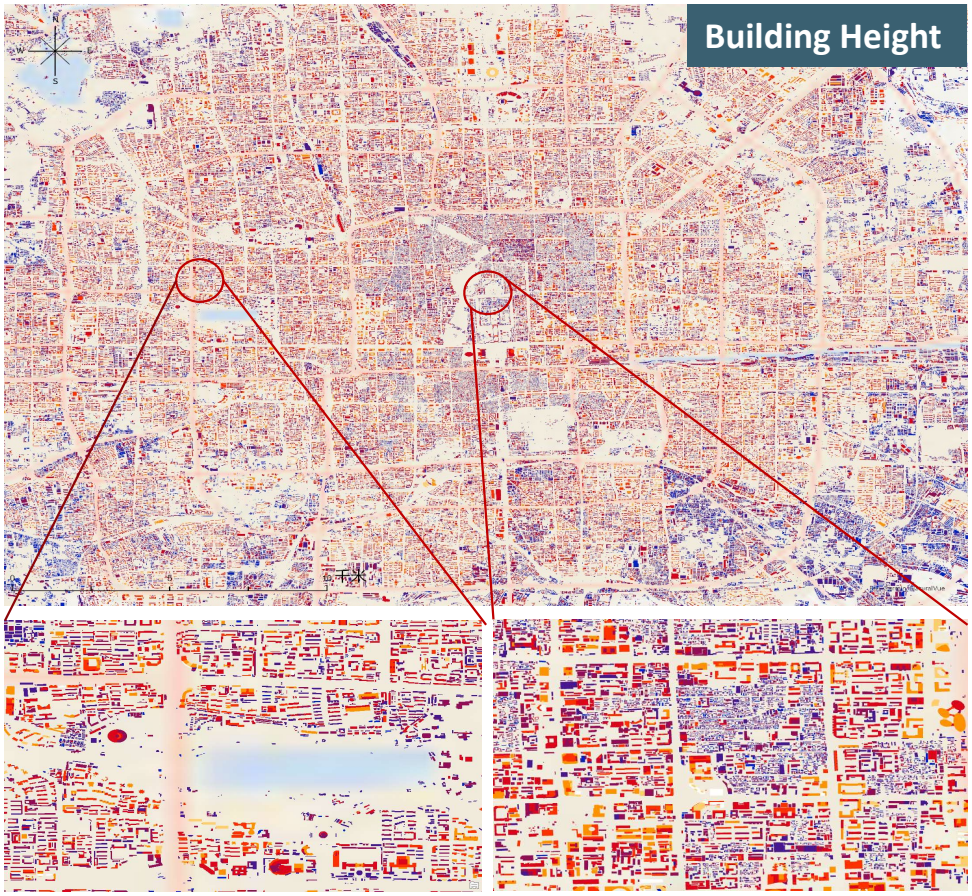
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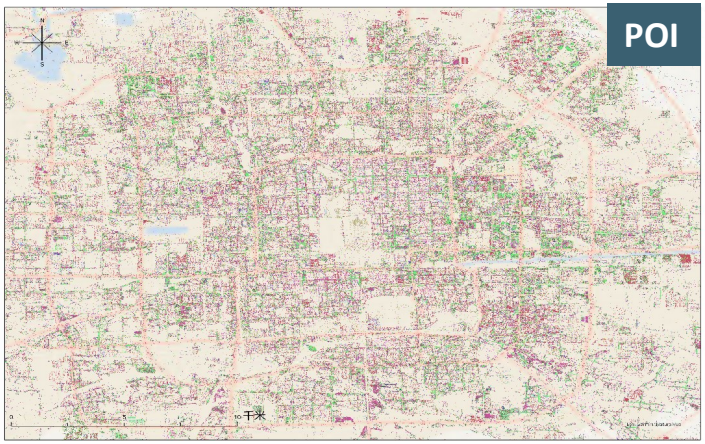
高德地图

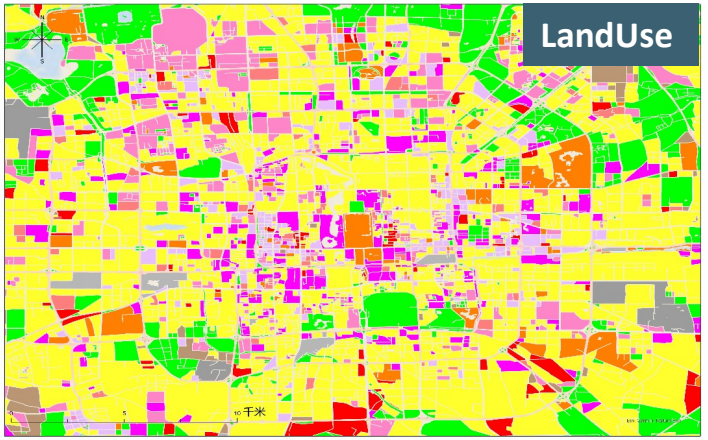
中国人口普查 CHINA POPULATION CENSUS

mapbox

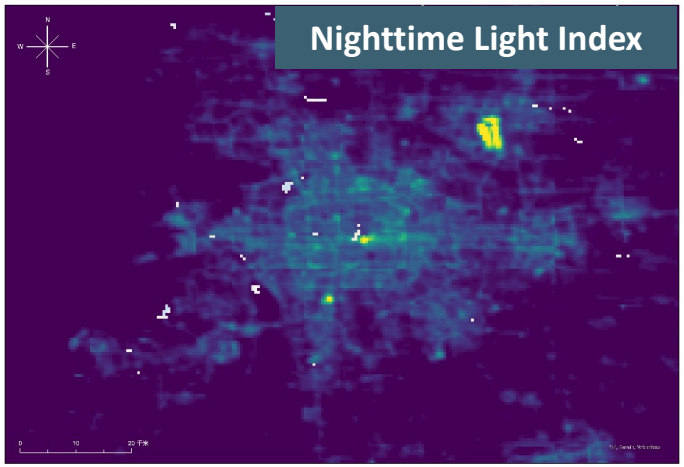
Data Sources and Methods

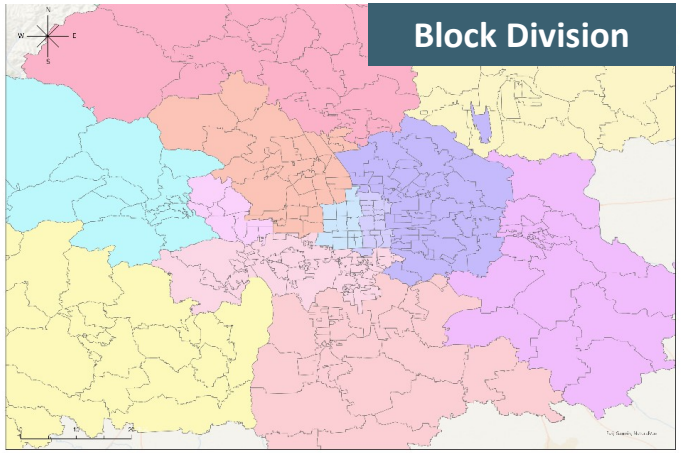






Methodology

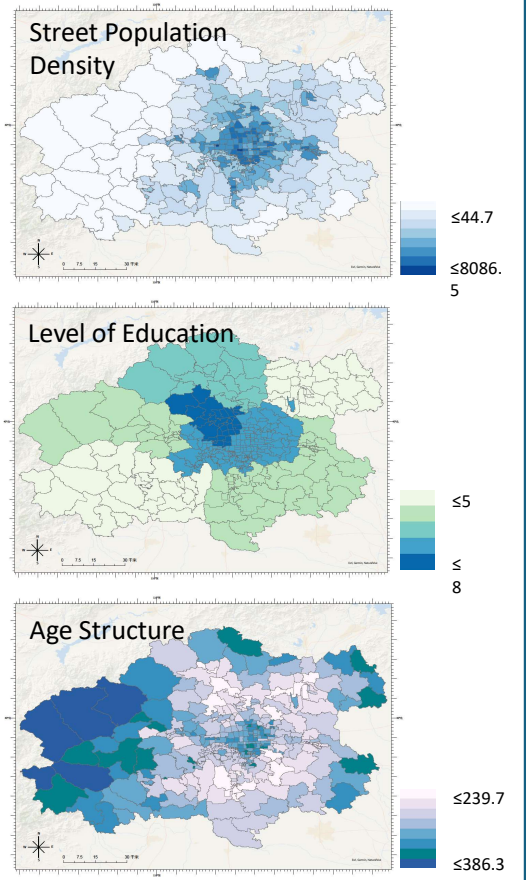




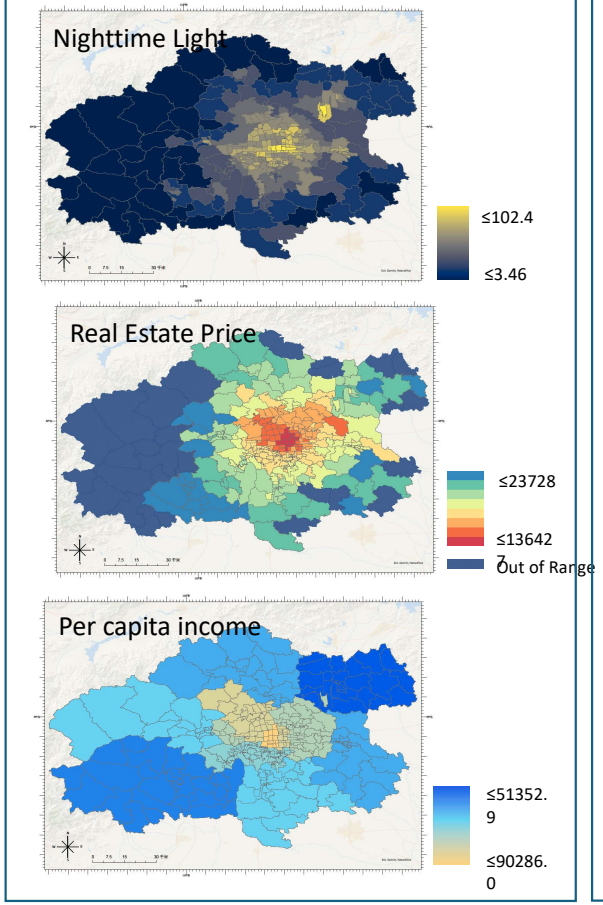
	A	B	C	D	E	F	G	H
1			总人口（人）	0-14岁人口（人）	15-59岁人口（人）	60岁及以上人口（人）	65岁及以上人口（人）	居住本乡、镇、街道，户口在本乡、镇、街道人口（人）
2		中心城区+近郊	20121388	2371596	13848948	3900844	2646281	7371795
3	东城区	东城区	708829	98290	423011	187528	129249	419008
4	东城区	东华门街道	38090	4512	23733	9845	7082	21032
5	东城区	景山街道	25374	2849	15095	7430	4976	16228
6	东城区	交道口街道	31951	4518	19093	8340	5547	21078
7	东城区	安定门街道	32173	4063	19136	8974	5850	21875
8	东城区	北新桥街道	55449	7473	32890	15086	10037	36334
9	东城区	东四街道	33670	4654	20289	8727	5880	20747
10	东城区	朝阳门街道	30473	4332	18306	7835	5378	18065
11	东城区	建国门街道	33094	3870	20429	8795	6201	19470
12	东城区	东直门街道	46712	7039	28966	10707	7623	26107
13	东城区	和平里街道	102227	15481	59983	26763	19575	62020
14	东城区	前门街道	9081	778	5963	2340	1535	4344
15	东城区	崇文门外街道	44545	6646	26569	11330	7870	23031
16	东城区	东花市街道	47864	8375	27678	11811	8276	27593
17	东城区	龙潭街道	53930	9002	30402	14526	10133	33487
18	东城区	体育馆路街道	31977	3626	19201	9150	6189	18092
19	东城区	天坛街道	27429	2915	15995	8519	5726	17048
20	东城区	永定门外街道	64790	8157	39283	17350	11371	32457
21	西城区	西城区	1106214	157912	660981	287321	201032	642058
22	西城区	西长安街街道	36645	4892	22575	9178	6434	21077
23	西城区	新街口街道	84866	11604	52463	20799	14307	46303
24	西城区	月坛街道	97771	14672	54235	28864	21438	67431
25	西城区	展览路街道	114831	15556	70086	29189	20674	66116
26	西城区	德胜街道	116338	21237	67531	27570	20451	73453
27	西城区	金融街街道	54849	7970	35070	11809	8494	31377
28	西城区	什刹海街道	75447	9433	46089	19925	13389	45367
29	西城区	大栅栏街道	28985	2766	18531	7688	4780	16369
30	西城区	天桥街道	34427	4028	19322	11077	7634	22921
31	西城区	椿树街道	27417	4097	17005	6315	4266	14789
32	西城区	陶然亭街道	42231	6928	24286	11017	7518	26094
33	西城区	广安门内街道	60318	7638	35108	17572	12487	36518
34	西城区	牛街街道	51410	6164	30080	15166	10728	27352

2020 China Population Census Data—Beijing

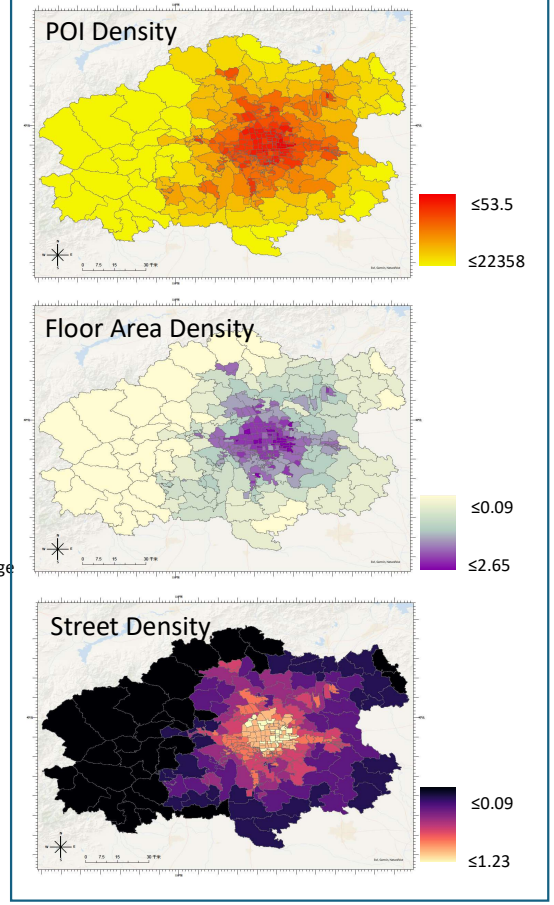
Demography Metric



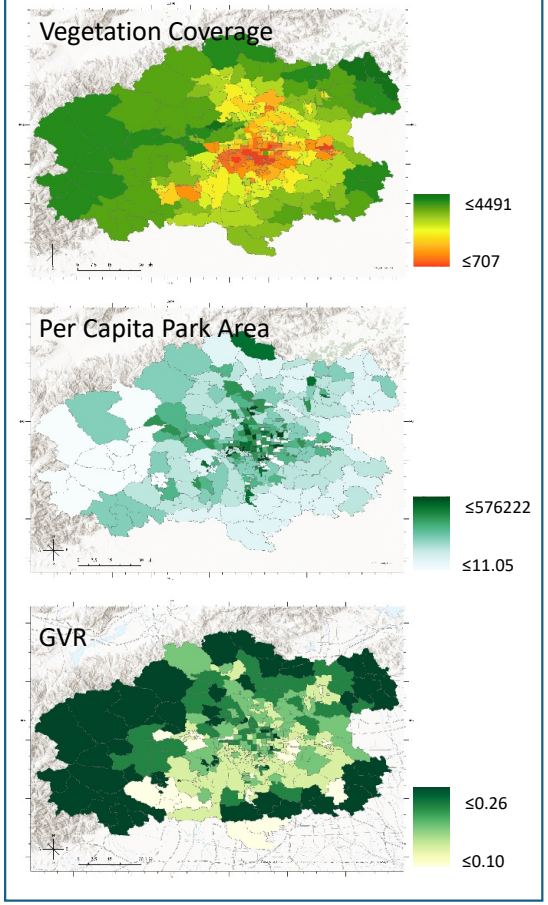
Economic Metric



Spatial Metric

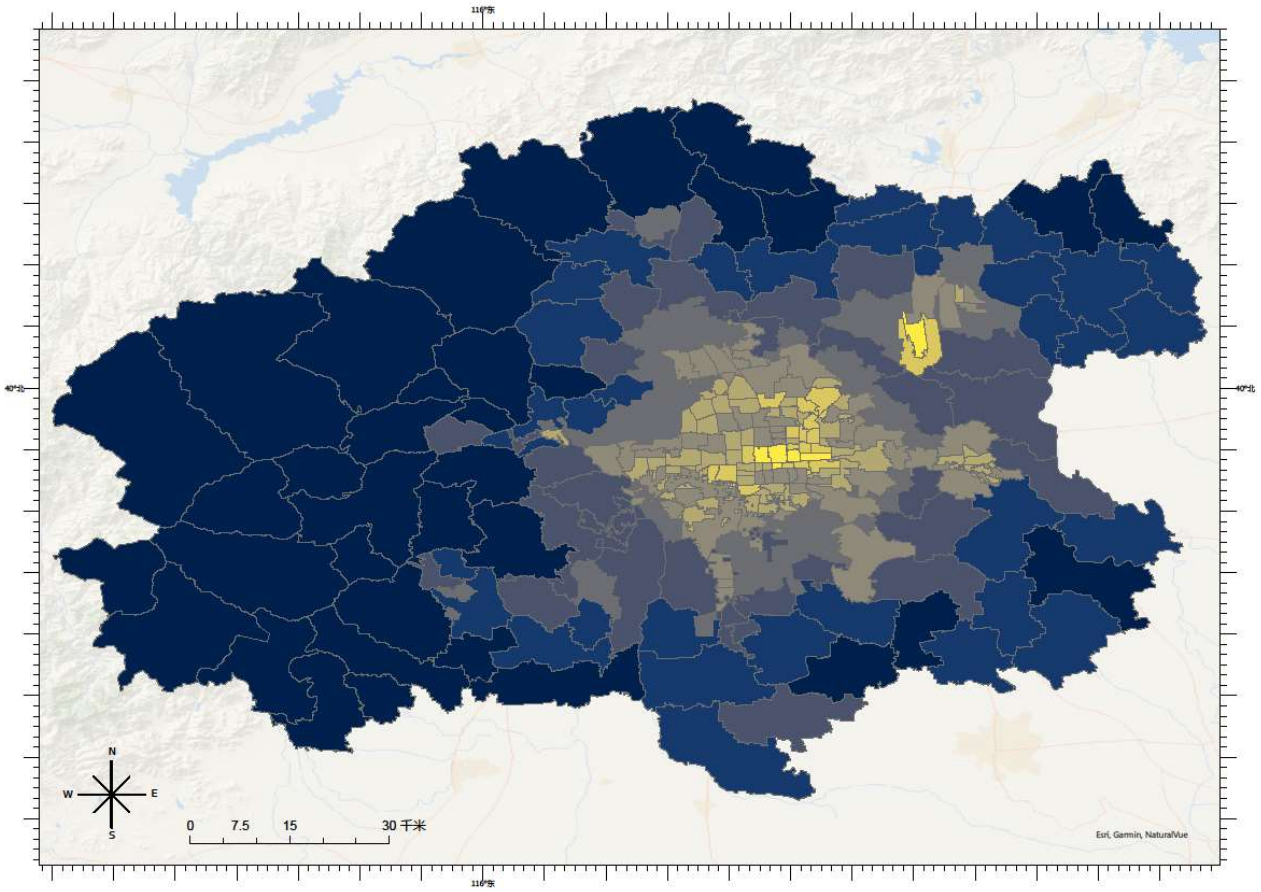


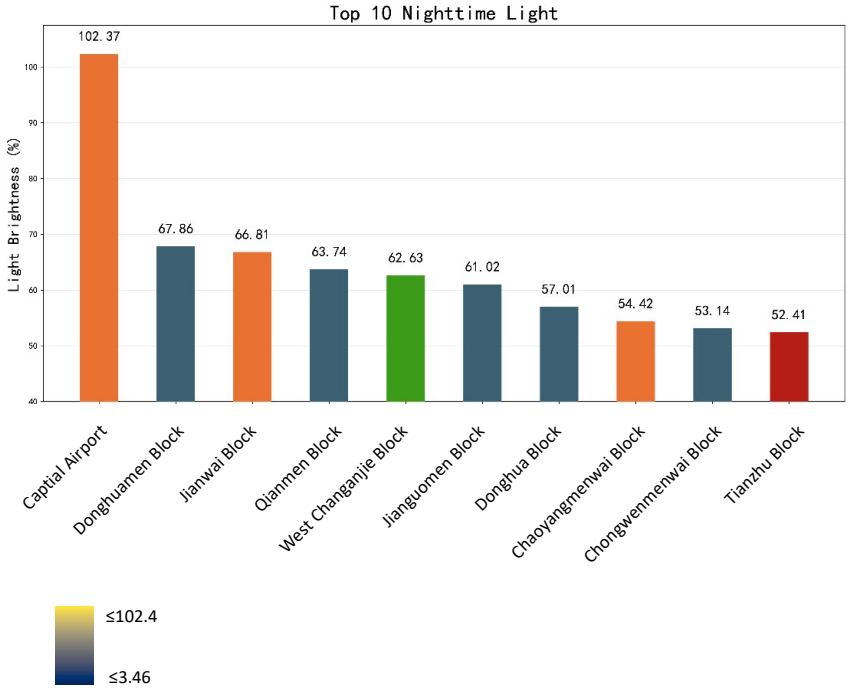
Green Metric



Criminal Behavior and Urban Space Theory

2.3 Spatial Metric

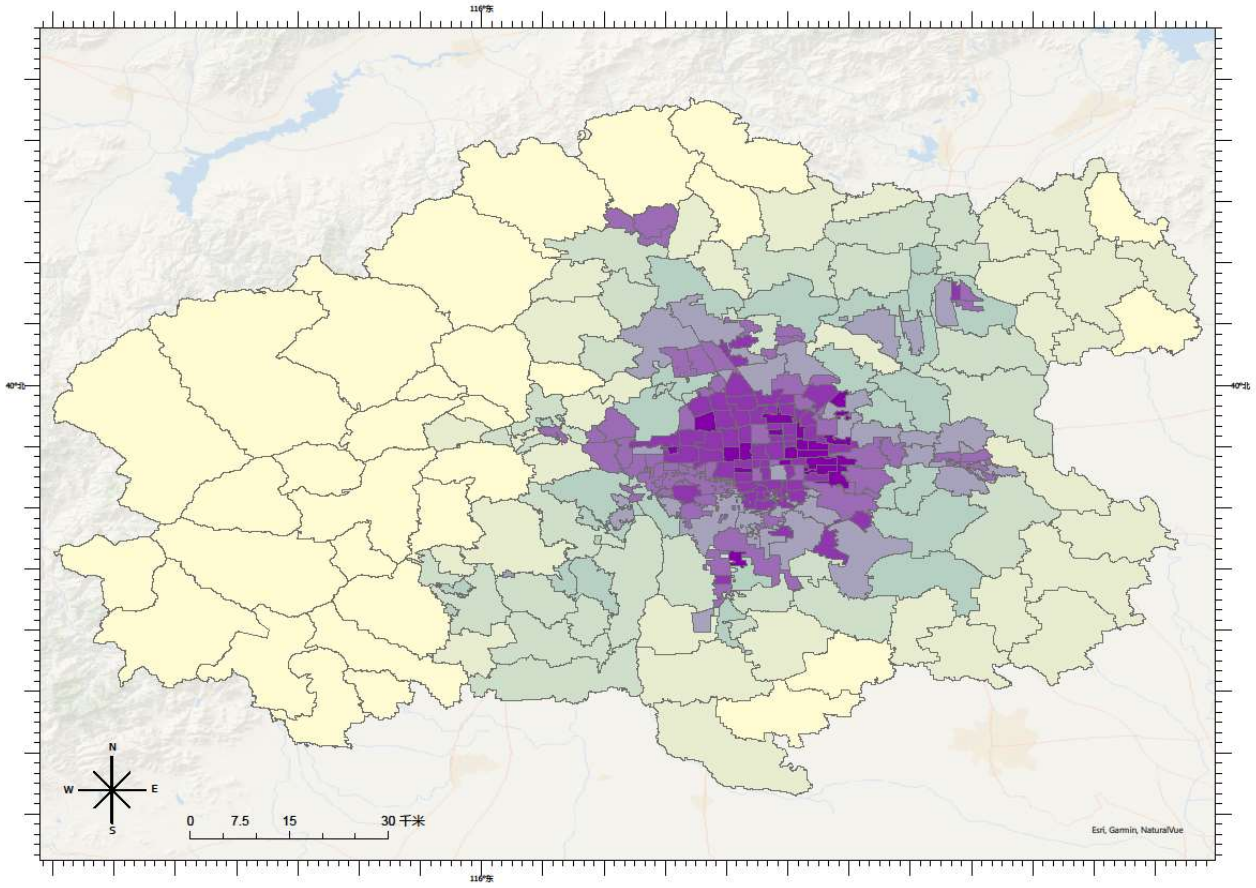


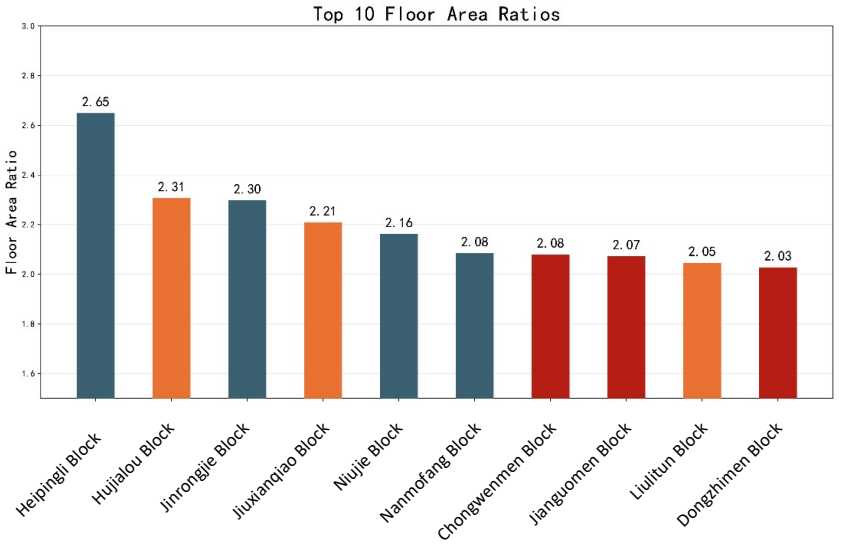


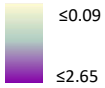
Nighttime Light
An indicator used to show the use of nighttime lighting in Beijing, which is closely related to crime.

Criminal Behavior and Urban Space Theory

2.3 Spatial Metric





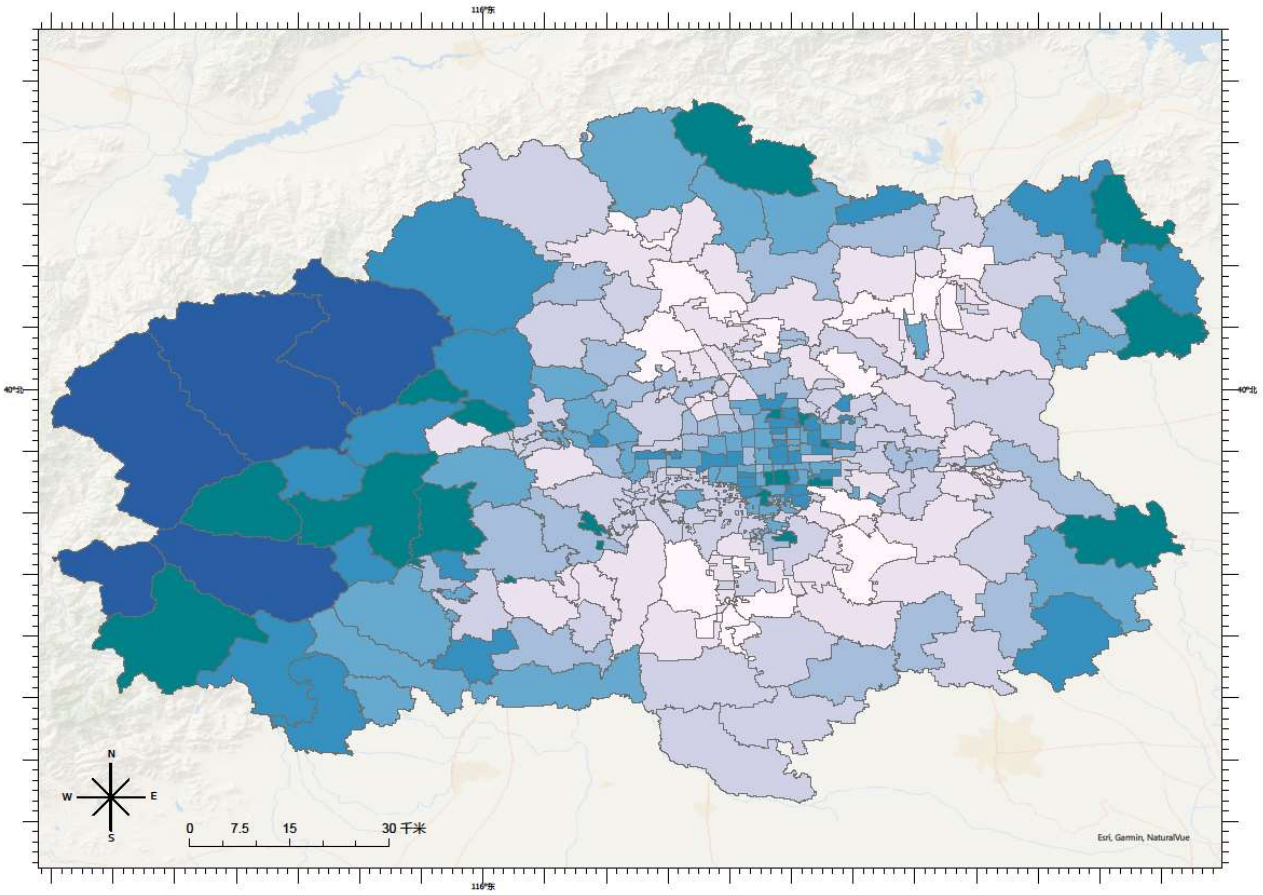


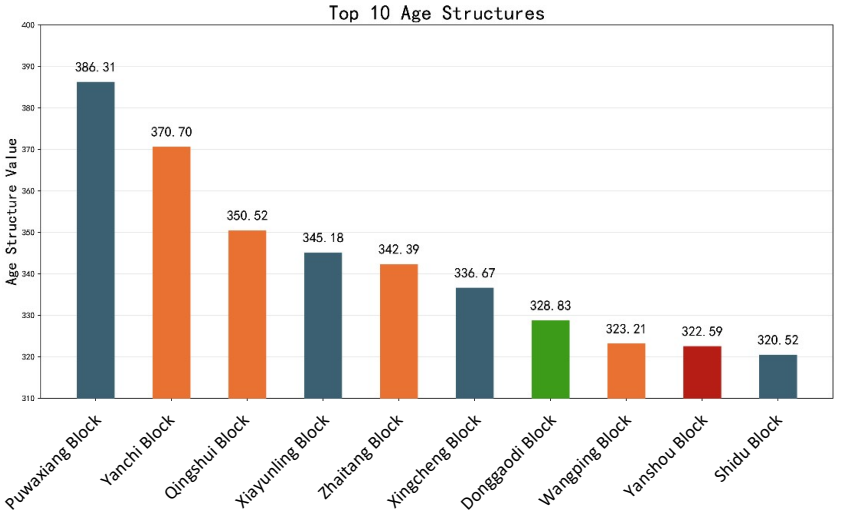
Floor Area Density

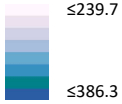
An indicator used to indicate the intensity of site use. The larger the plot ratio, the greater the intensity of use and the higher the floor height around the street.

Criminal Behavior and Urban Space Theory

2.3 Spatial Metric

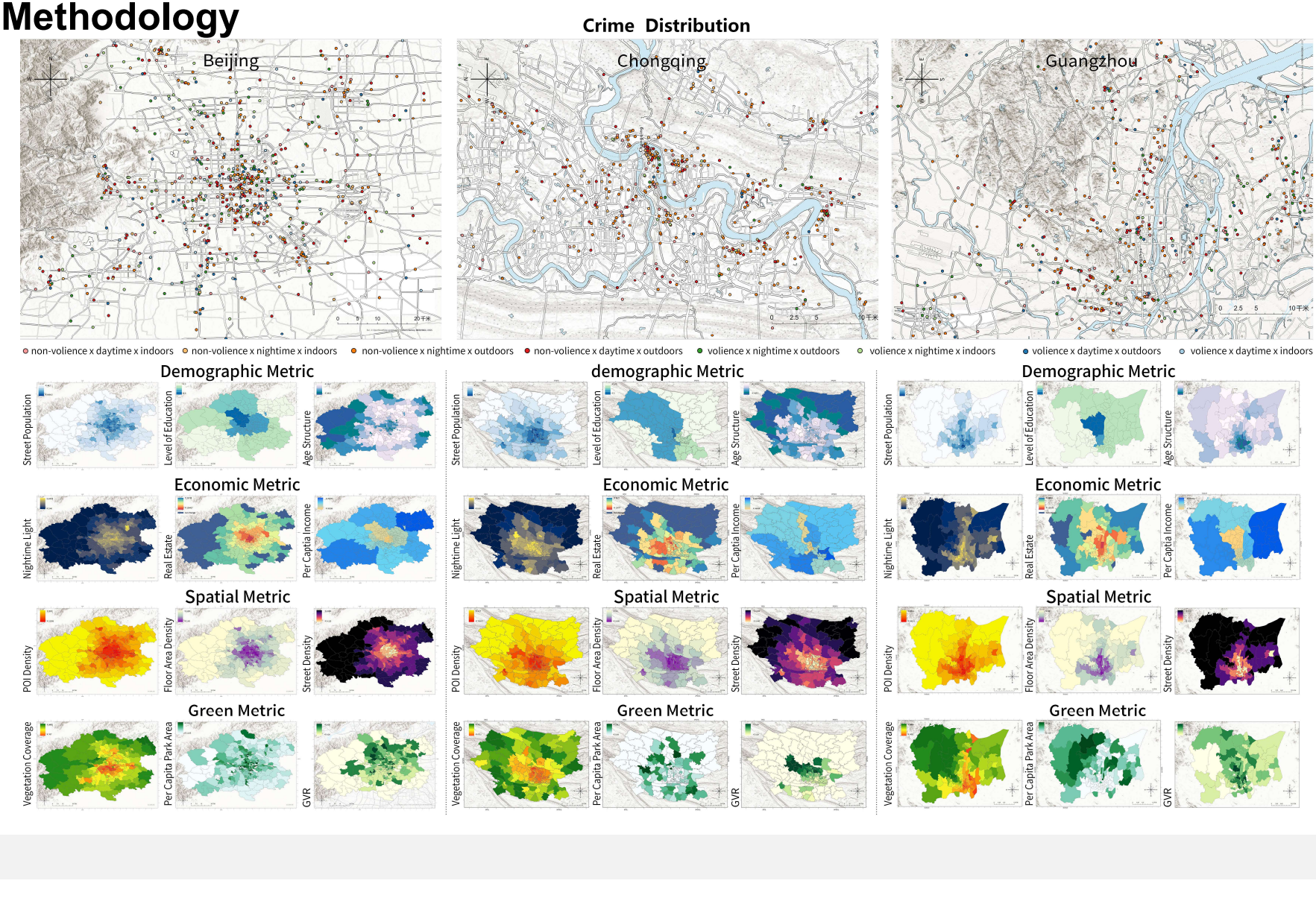






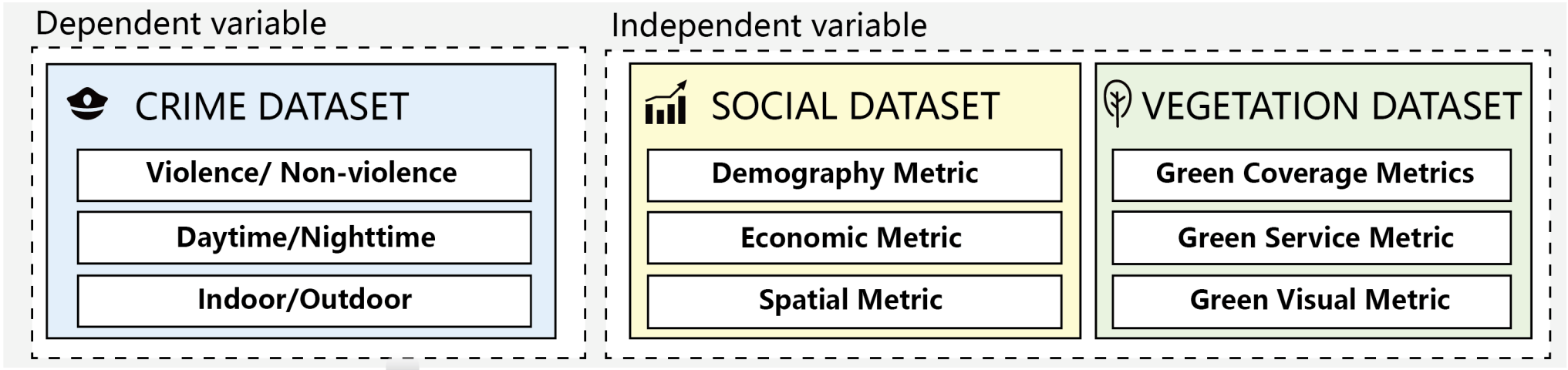
Age Structure
An indicator used to indicate the age of a city. The larger the value, the older the average age of the area and the more serious the aging problem.

Methodology

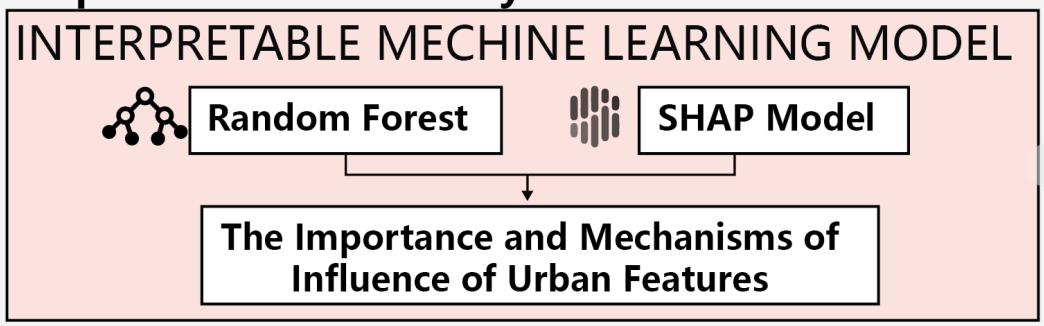


Methodology

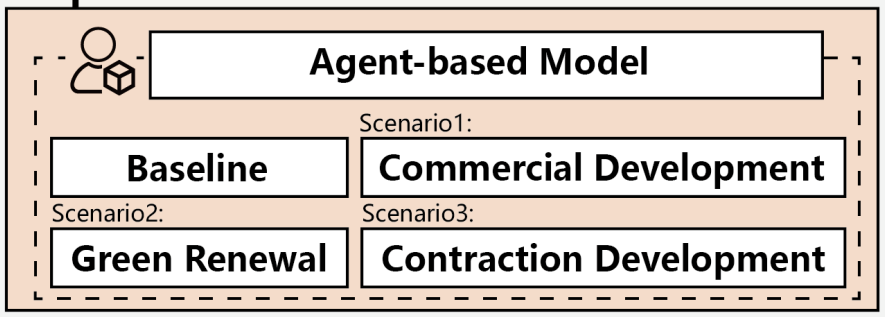
Step 1: Dataset Establishment



Step 2: Mechanism Analysis



Step 3: Multi-scenario Simulation





DigitalFUTURES 2025

03 Key Finding

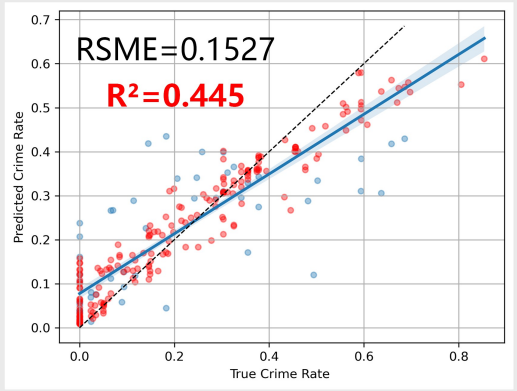
The 7h International Conference on Computational Design and Robotic Fabricaion (CDRF 2025)

Methodology

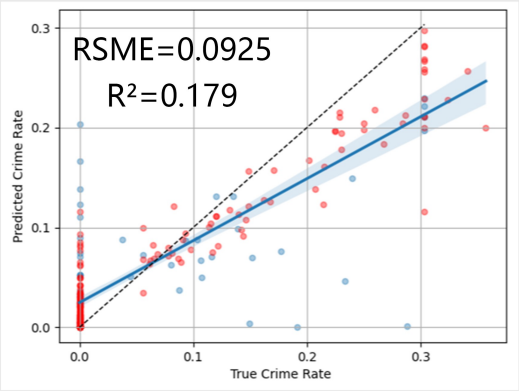
NIGHTTIME

VIOLENCE

Violence x Nighttime x Outdoors

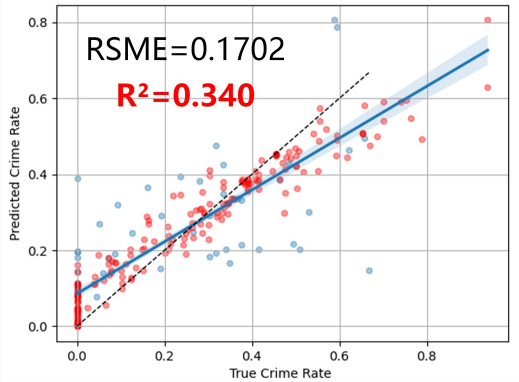


Violence x Nighttime x Indoors

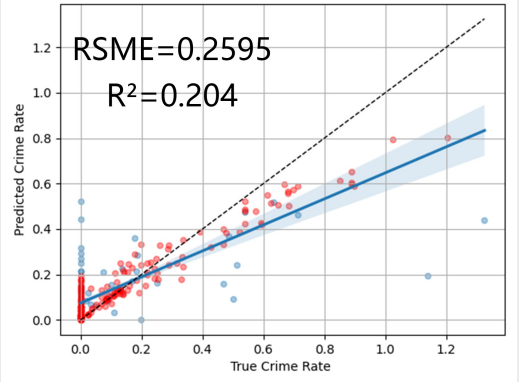


NON-VIOLENCE

Non-Vio x Nighttime x Outdoors



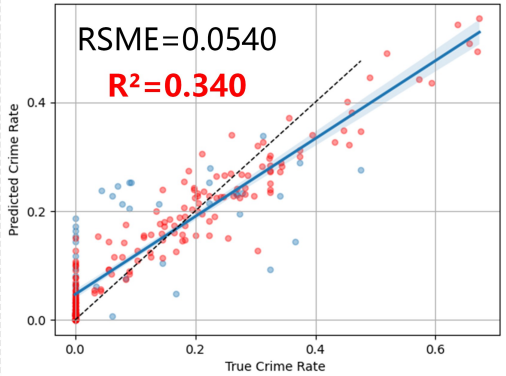
Non-Vio x Nighttime x Indoors



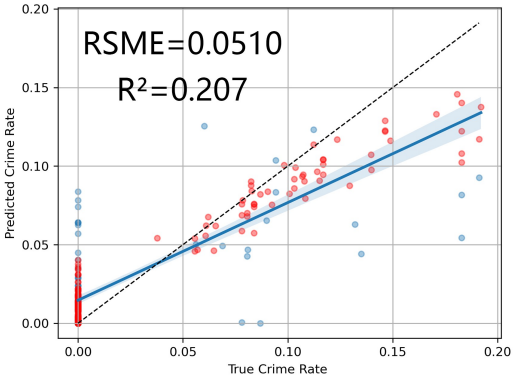
DAYTIME

VIOLENCE

Violence x Daytime x Outdoors

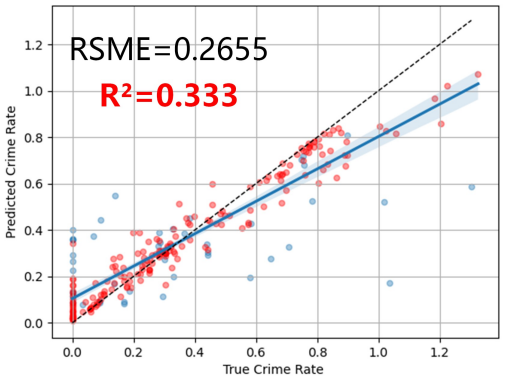


Violence x Daytime x Indoors

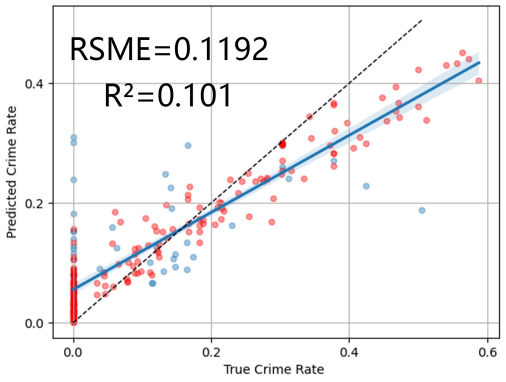


NON-VIOLENCE

Non-Vio x Daytime x Outdoors

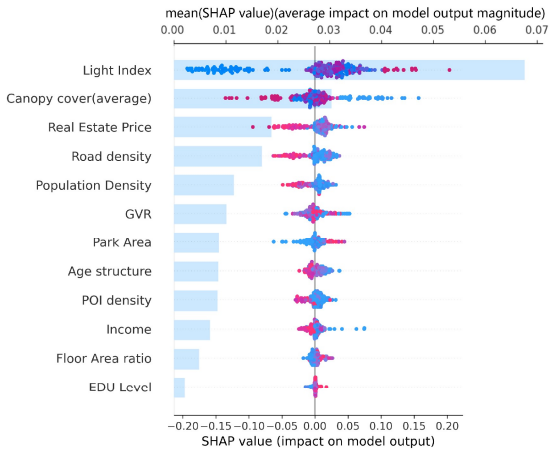


Non-Vio x Daytime x Indoors

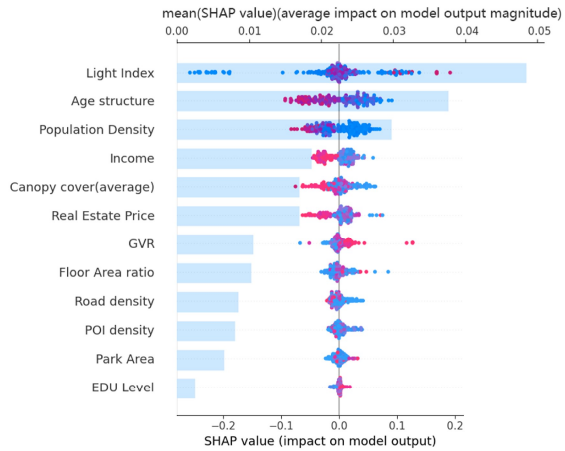


Methodology

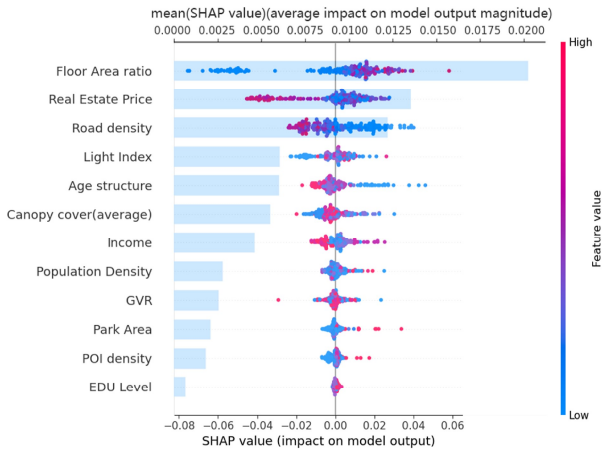
Violence x Nighttime x Outdoors



Non-Vio x Nighttime x Outdoors

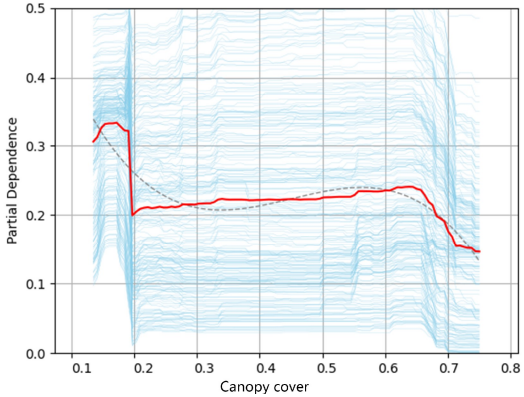


Violence x Daytime x Outdoors

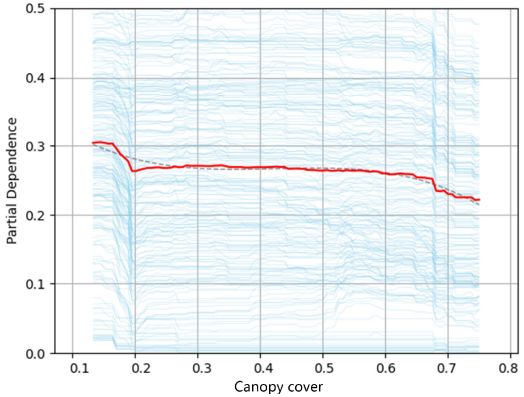


(a)

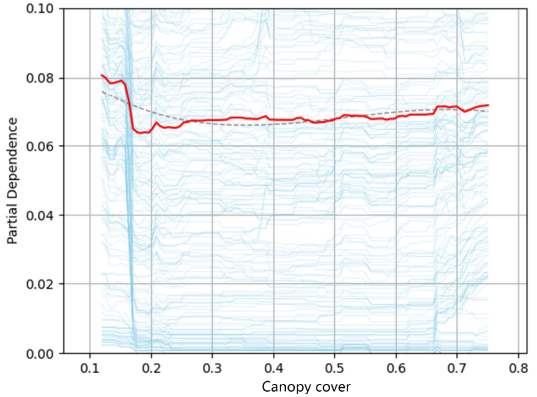
PDP of Canopy cover for Violence x Nighttime x Outdoors



PDP of Canopy cover for Non-Vio x Nighttime x Outdoors



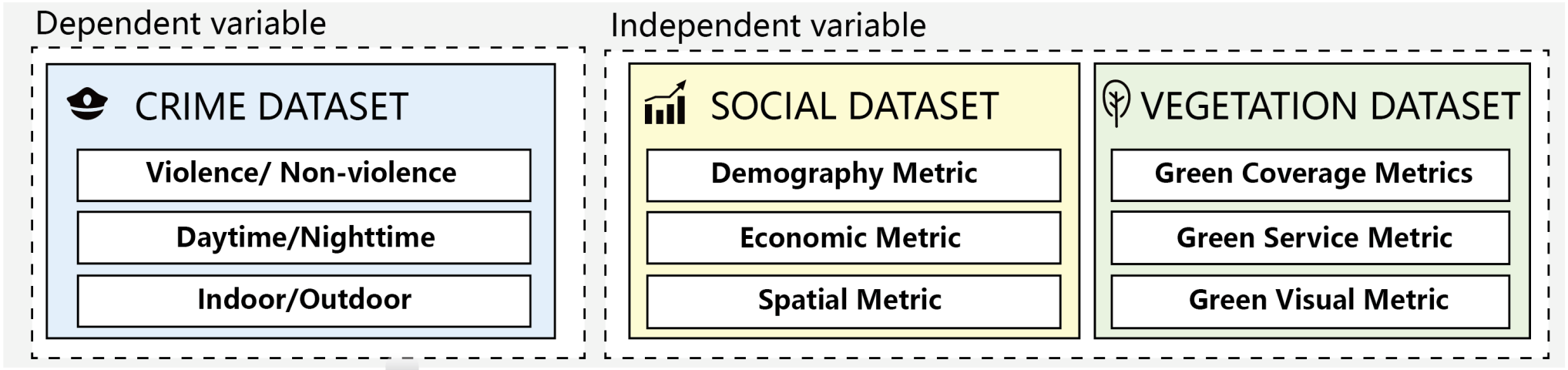
PDP of Canopy cover for Violence x Daytime x Outdoors



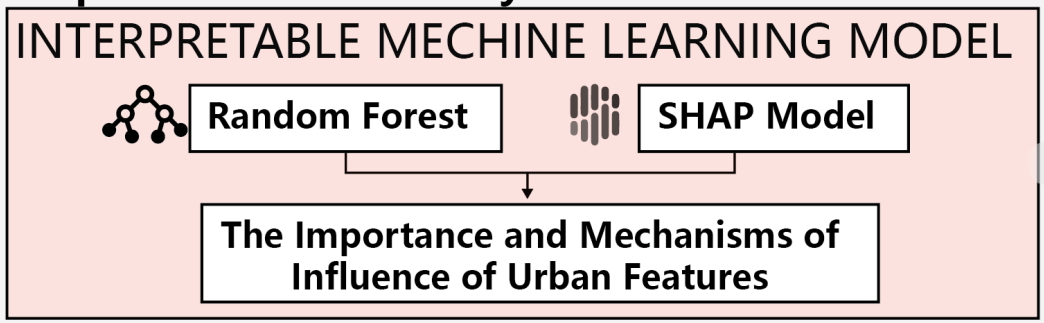
(b)

Methodology

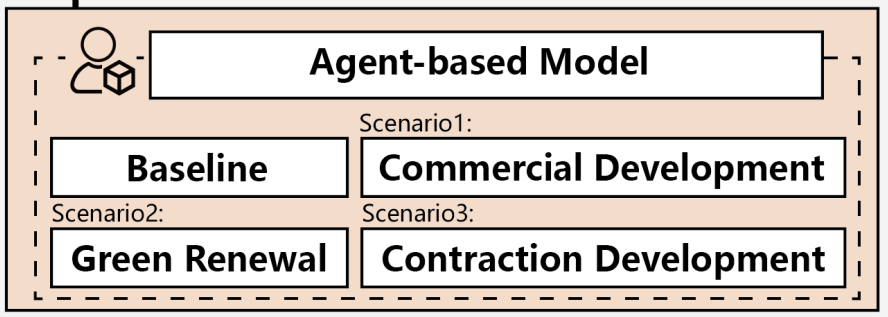
Step 1: Dataset Establishment



Step 2: Mechanism Analysis

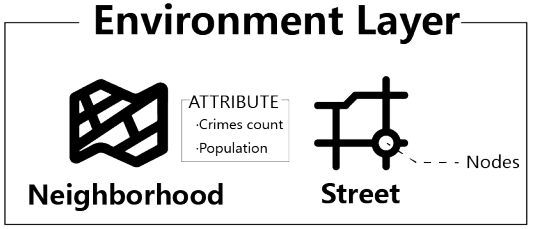


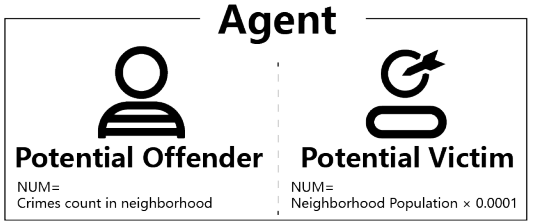
Step 3: Multi-scenario Simulation

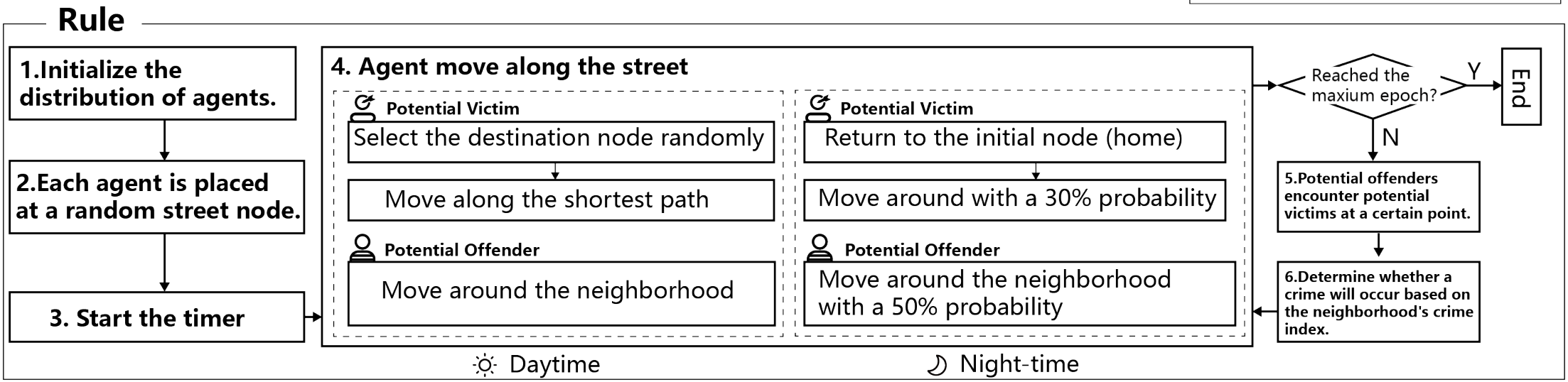


Methodology

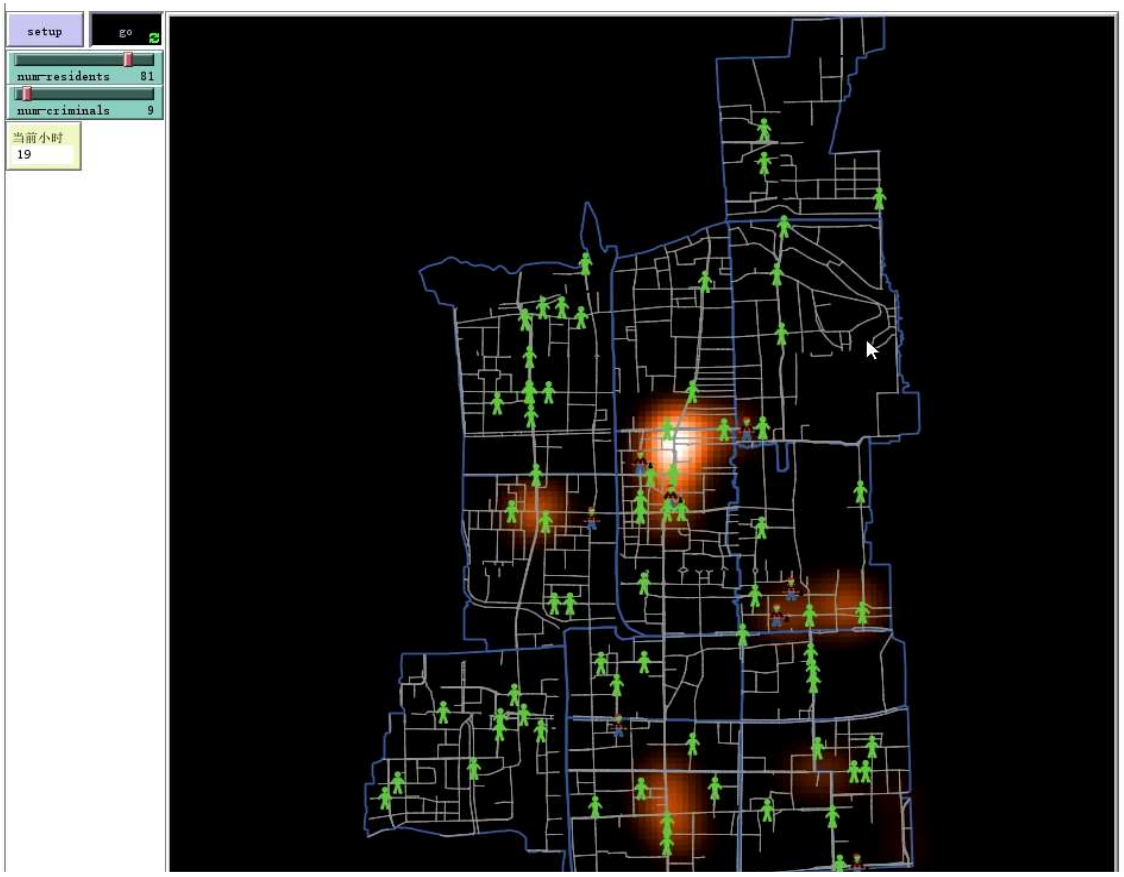
ABM enables the simulation of social systems and complex socio-spatial phenomena. **The study combines the IML results and the urban road network to establish a three-way "potential offender-potential victim-urban environment" ABM**, and applies the model to the central city of Beijing, predicting the changes of the urban crime pattern under three different old urban areas development scenarios.

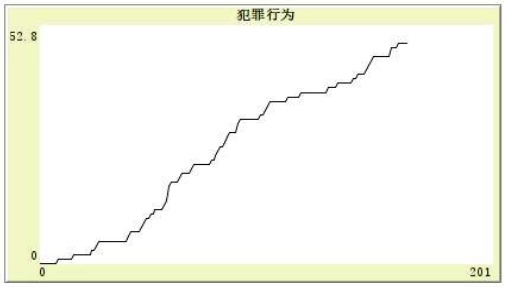






Methodology

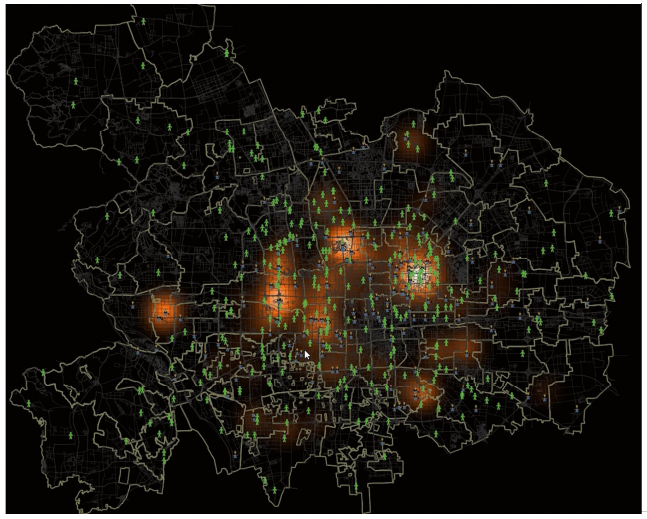




Netlogo

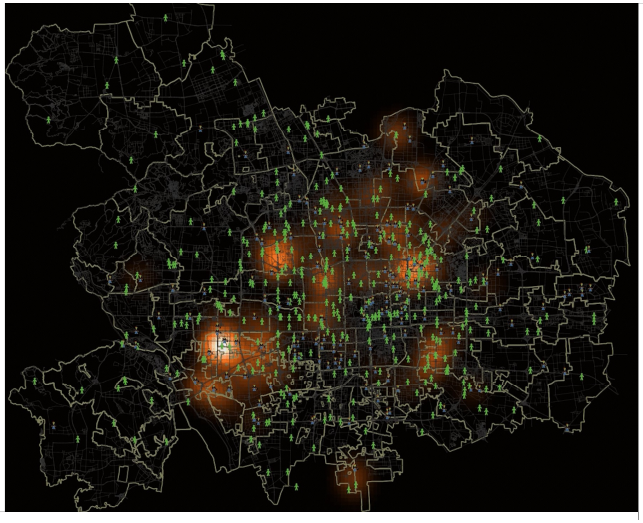
The model is a highly generalized virtual world of urban crime, which presupposes the distribution of potential offenders and potential victims based on the population of different neighborhoods. When a potential offender and a potential victim meet at a certain point according to the rule-based movement, the decision of whether a crime occurs is based on the Agent Crime index of the neighborhood where they meet.

Methodology



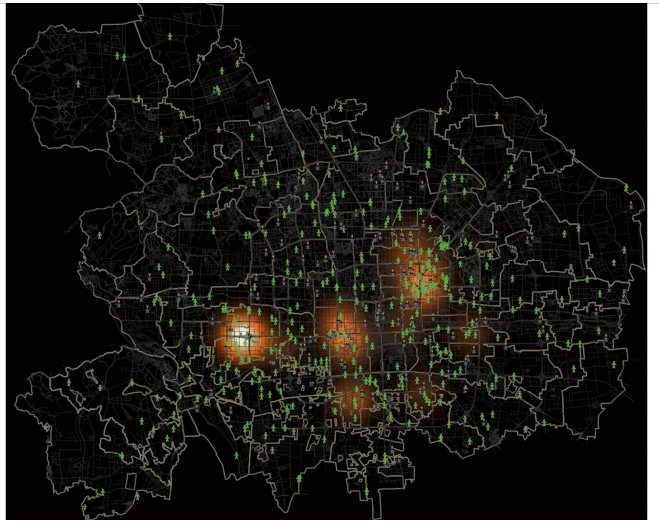
Commercial Development

Commercialization of old urban areas and further strengthening of core areas



Green Renewal

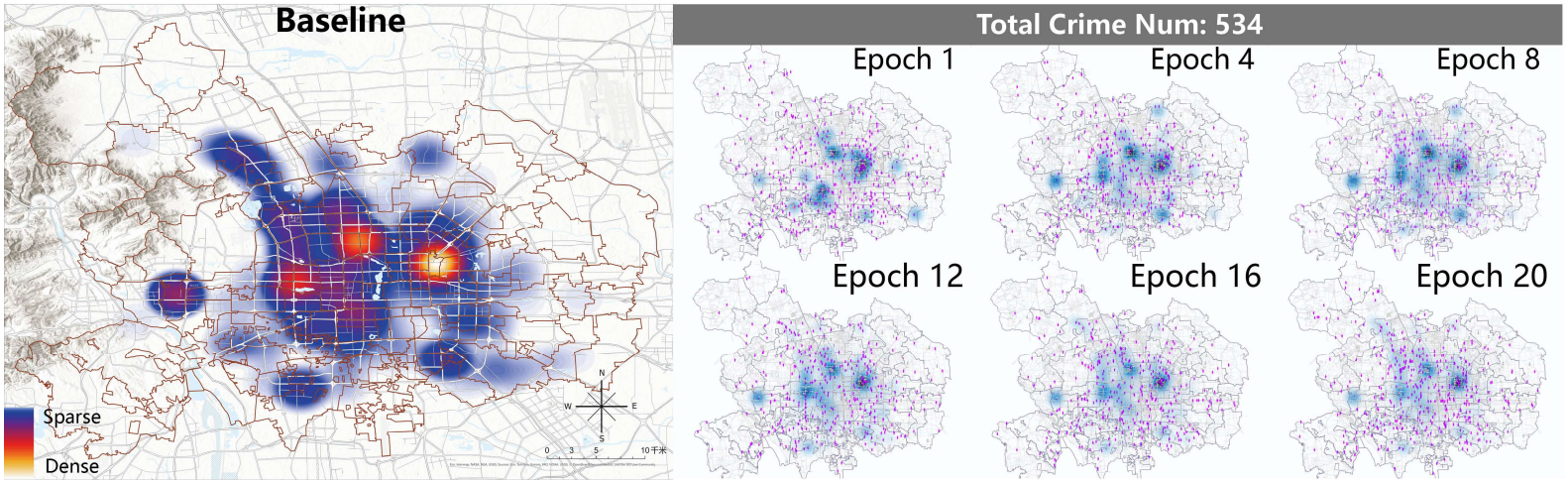
Renovation of vegetation in old urban areas and creation of micro-parks by utilizing fragmented spaces

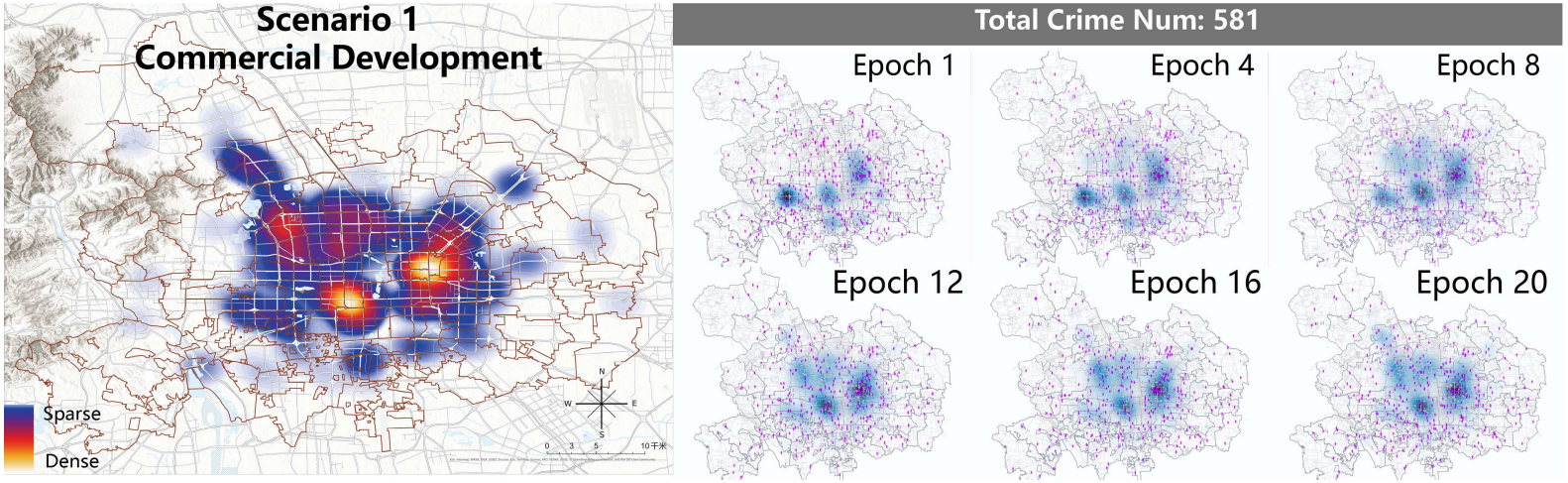


Contraction Development

Inhibition of further construction development in core areas and decentralization of urban construction to peripheral areas

Methodology

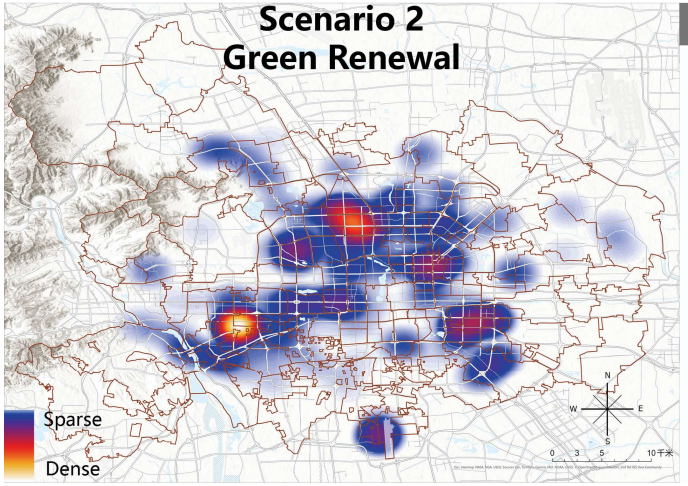


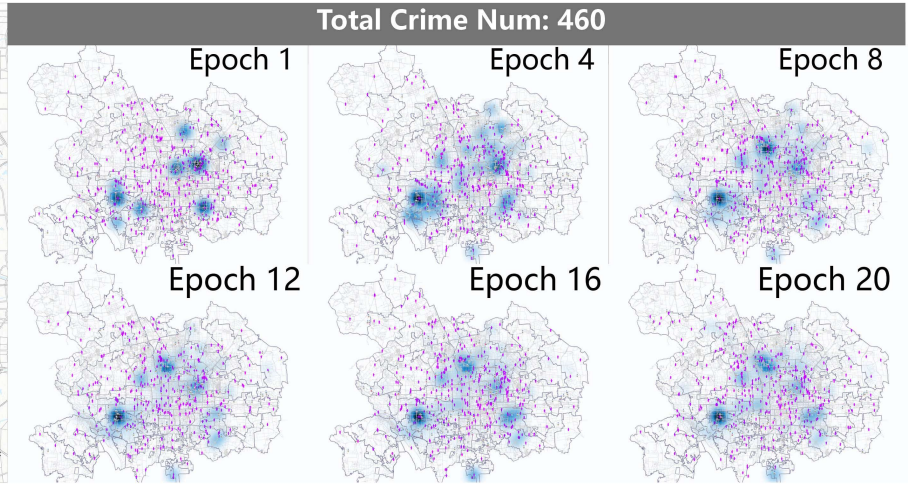


Old urban areas with top 20% of nighttime lights:
population+1%, nighttime lighting +15%, POI density +10%

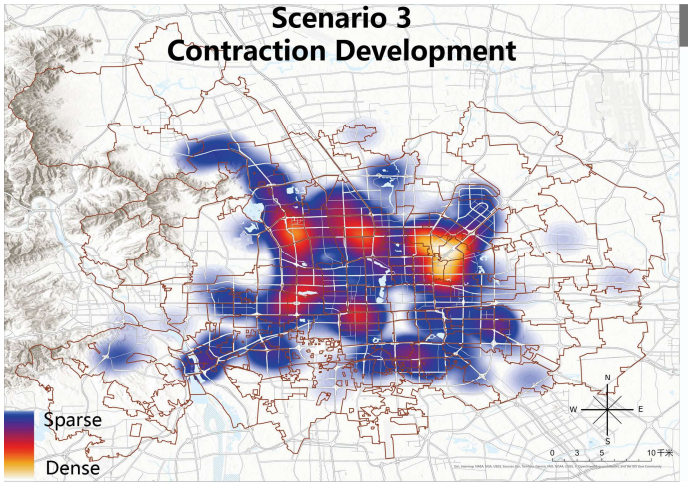
Old urban areas with bottom 20% of nighttime lights:
population -1%, nighttime lights -15%, POI density -10%

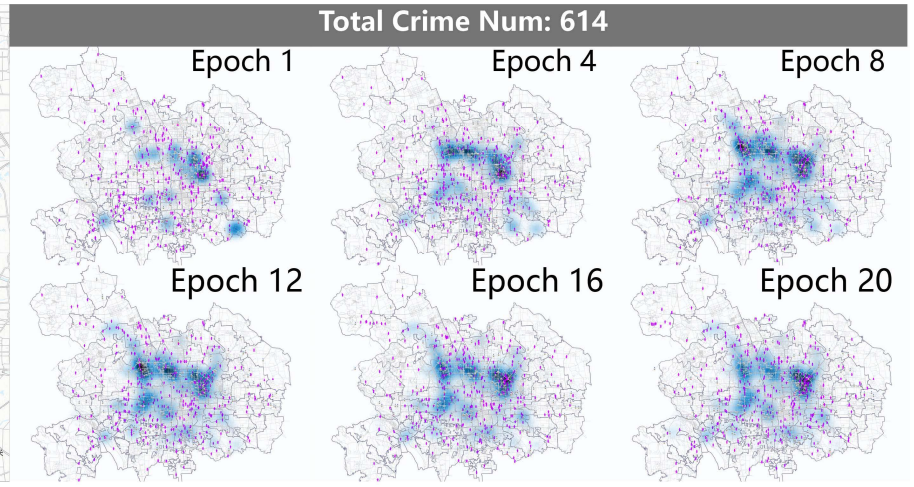
Methodology





All old urban areas:
park area per capita+5%, green visibility rate +10%, canopy cover +10%





Old urban areas with top 20% of nighttime lights:
population -1%, nighttime lights -15%, POI density -10%

Old urban areas with bottom 20% of nighttime lights:
population +1% , nighttime lights +15% , POI density +10% ,canopy cover -10%

Key findings and Limitation

Key finding 1 :

The urban environment can influence crime patterns, twelve features proposed in this study explain 33.3%-44.5% of the variation in outdoor crime distribution, but have weaker explanatory power for indoor crime.

Key finding 2:

Although the model does not prove direct causality, it reveals that canopy cover significantly affects the distribution patterns of certain crimes, providing a new perspective for the development of urban green spaces

Key finding 3:

The simulation results show that commercial and contraction development scenarios both lead to an increase in total urban crime. Contraction development also disperses crime clusters, making urban security management more challenging. In contrast, green renewal of the old urban area can mitigate these effects by reducing crime rates and preventing large-scale crime concentration.

Limitaion

This study did not compare crime patterns across different cities or account for significant urban characteristics such as topography and climate.

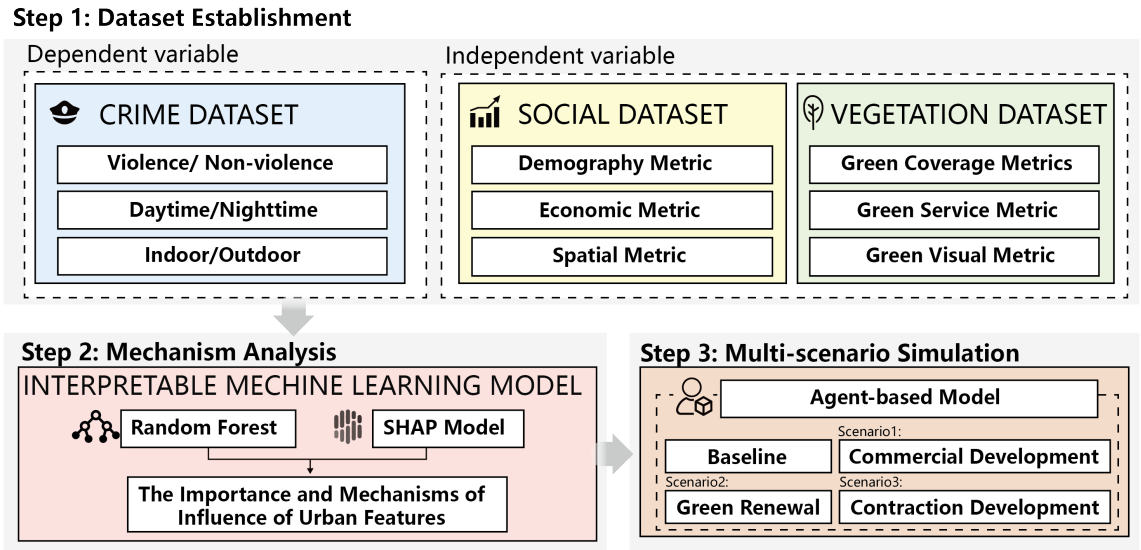


DigitalFUTURES 2025

04 Discussion

The 7h International Conference on Computational Design and Robotic Fabricaion (CDRF 2025)

Discussion



The research is supported by two key technologies: large language models(LLMs) and agent-based modeling(ABM).

LLMs facilitate structured data extraction from textual sources, enabling **efficient parsing of crime locations and integration with GIS-based socio-economic and environmental datasets**, thereby minimizing manual processing.

ABM, on the other hand, simulates micro-level individual behaviors to predict macro-level system changes.

The key to hindering the potential of ABM lies in the setting of agent rules. **The countermeasure in this study is to build an IML model based on the multi-dimensional data and use the predictive results as the parameters of ABM multi-scenario simulation.**
This innovative combination method compensates for the inadequacy of the IML in dealing with the the spatial vector information on the one hand, and improves the accuracy and credibility of the ABM output results on the other hand.

Discussion

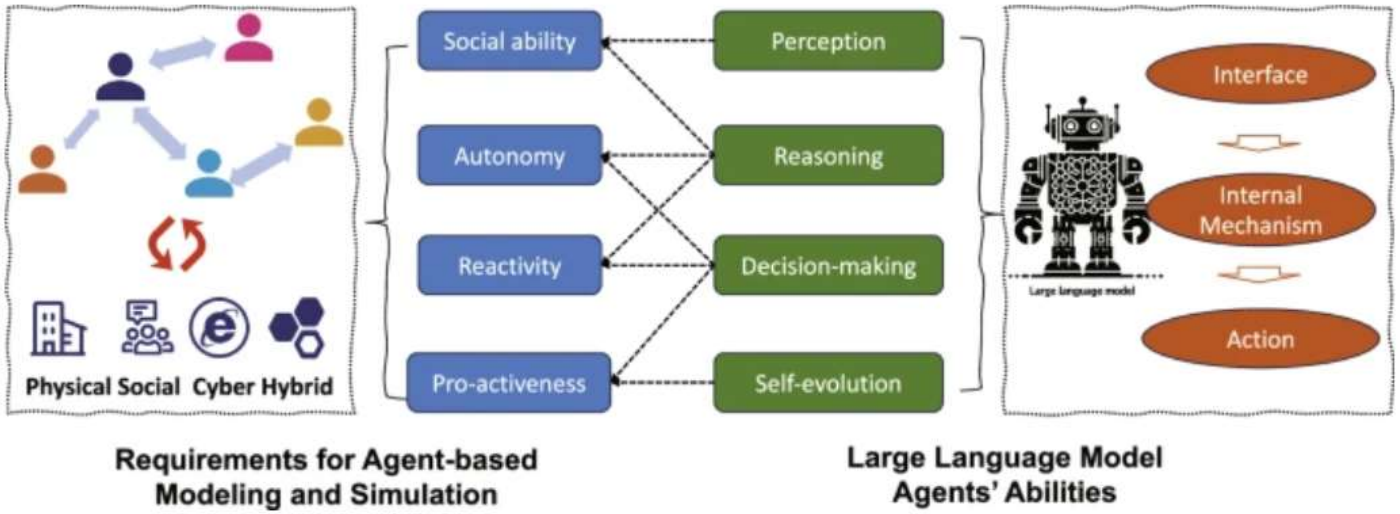
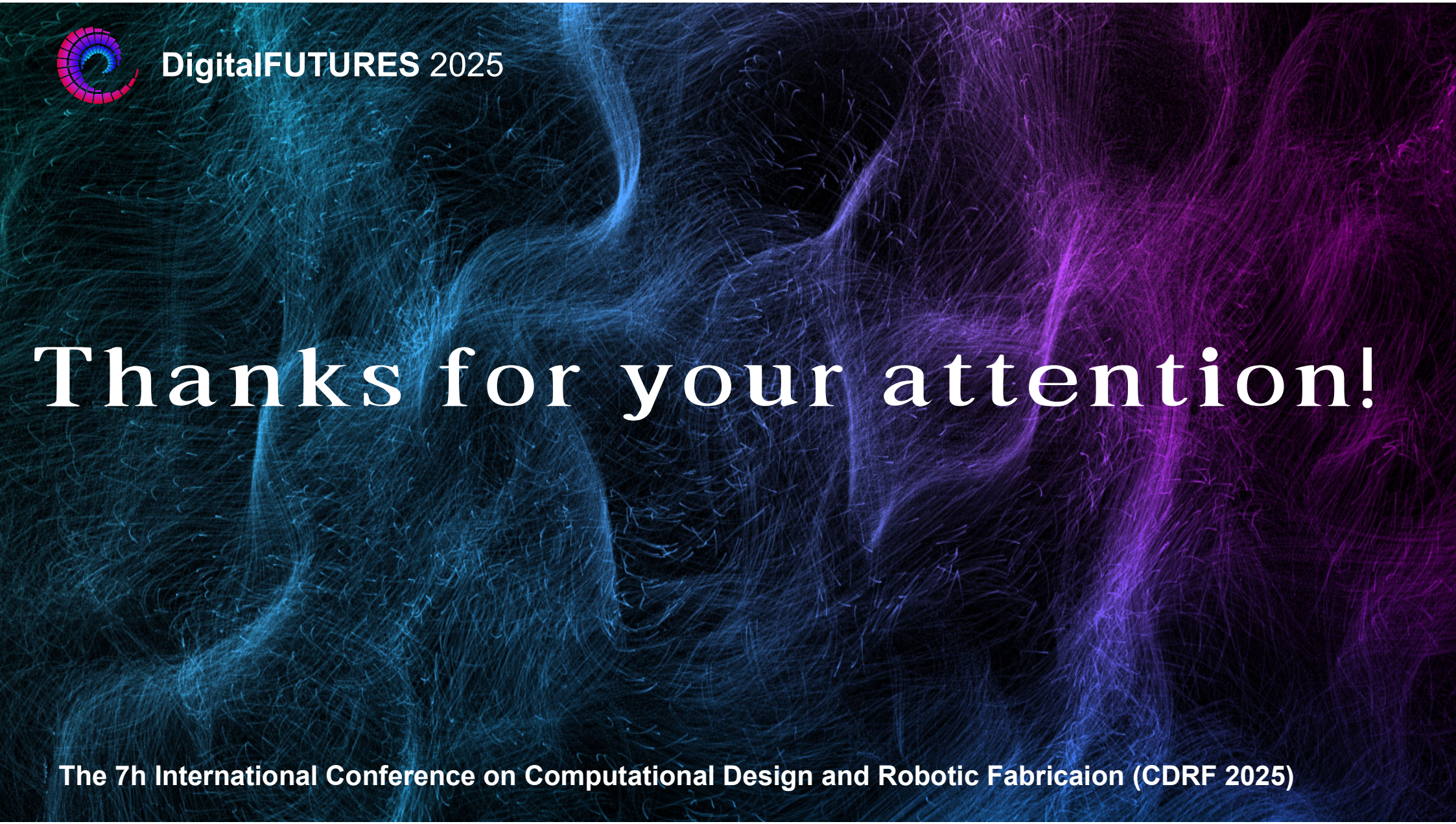


Illustration of how large language model agents meet the requirements of agent-based modeling and simulation.

Gao, C., Lan, X., Li, N., Yuan, Y., Ding, J., Zhou, Z., ... & Li, Y. (2024). Large language models empowered agent-based modeling and simulation: A survey and perspectives. *Humanities and Social Sciences Communications*, *11*(1), 1-24.

Kambeitz, J., & Meyer-Lindenberg, A. (2025). Modelling the impact of environmental and social determinants on mental health using generative agents. *npj Digital Medicine*, *8*(1), 36.

It is worth noting that, along with the enhancement of LLM's in-depth analysis ability, whether it is possible to directly interpret crime mechanisms and define agent rules and parameters through the analysis of extensive PCJs is a direction worthy of further exploration. However, it is also necessary to be alert to the uncontrollability and limited interpretability of LLM outputs, so further excavation of urban crime mechanisms and causality is still very critical.


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Thanks for your attention!
The 7h International Conference on Computational Design and Robotic Fabricaion (CDRF 2025)