NUS National University of Singapore

urban analytics lab

Urban Visual Intelligence:

Street View Imagery in Urban Analytics

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Sharing at HKUST(GZ)

Background



(a) Aerial perspective.

(b) Street-level point of view.

Biljecki, F., Ito, K., 2021. Street view imagery in urban analytics and GIS: A review. Landscape and Urban Planning 215, 104217.



Mehta, H., & Baldridge, J. (2020, February 25). Enhancing the research community's access to Street View panoramas for language grounding tasks.

Clarity or confusion: A review of computer vision street attributes

Liu, L., Sevtsuk, A., 2024. *Cities*

Object Detection

Image Classification

- usually categorical
- sometimes continuous



Category Name	Prediction Score
cab,..., taxicab	0.9555
traffic light...	0.0137
school bus	0.0027
street sign	0.0010
police van, ...	0.0007

Semantic Segmentation

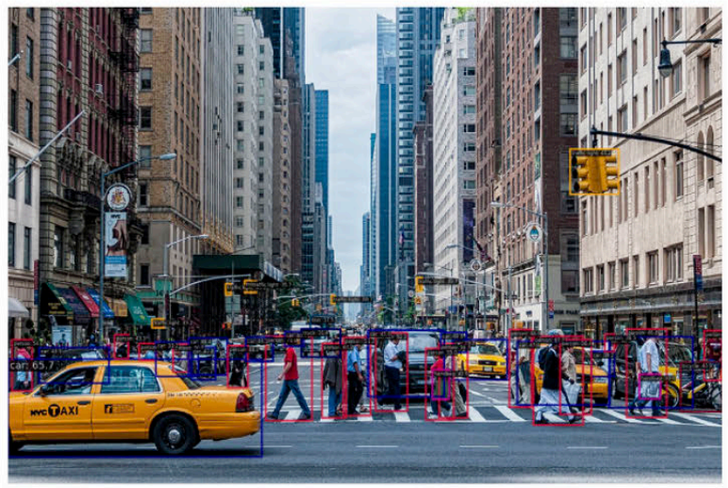
- usually continuous
- sometimes categorical



Category Name	Pixel Ratio
building	61.48%
road	14.10%
car	10.45%
person	5.96%
sky	3.83%

Semantic Segmentation

- discrete attributes

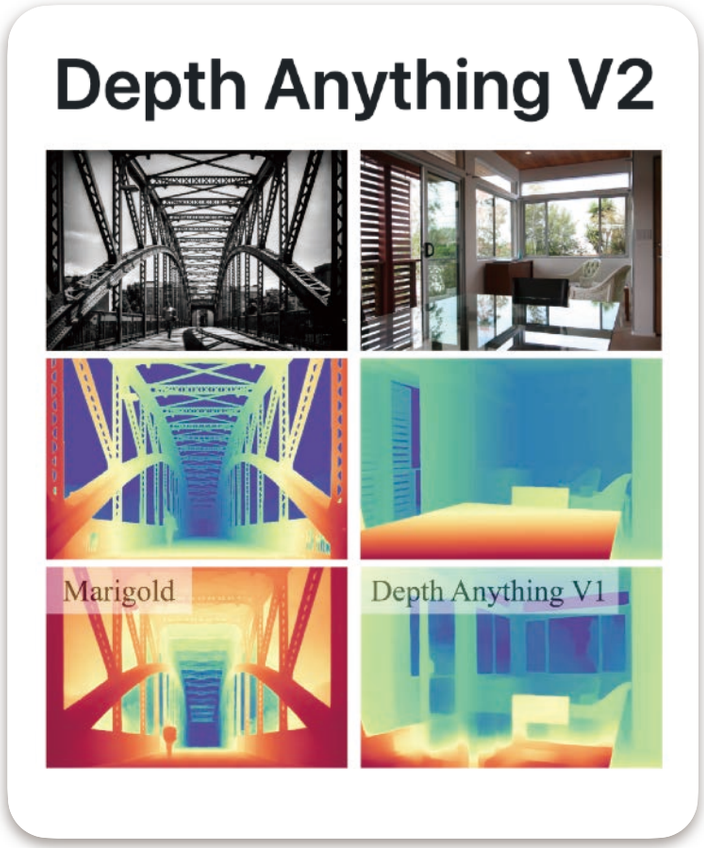


Label for each Bounding Box	Prediction score
car	0.7374
person	0.7106
person	0.6740
person	0.6718
...	...

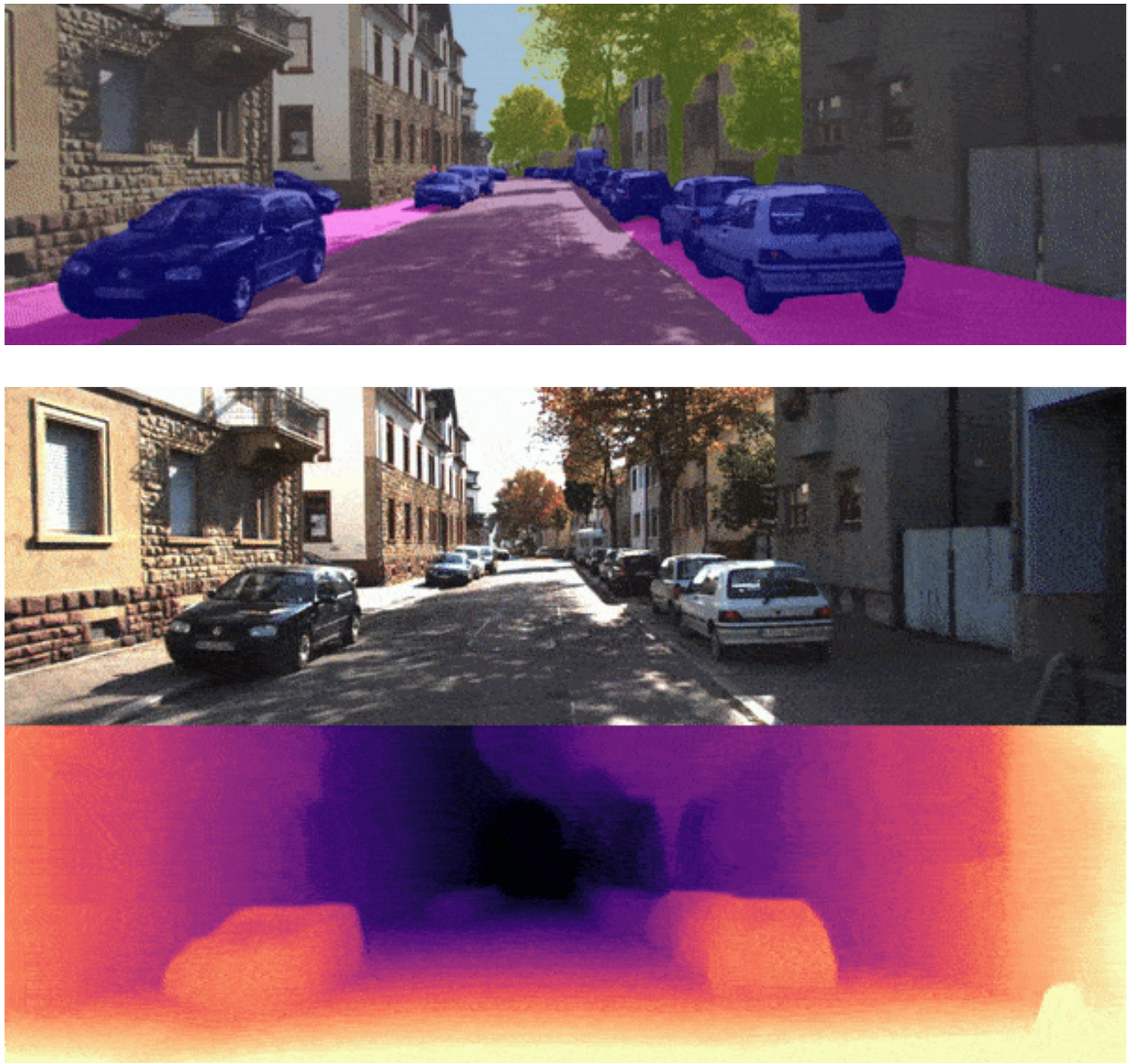
Liu, L., Sevtsuk, A., 2024. Clarity or confusion: A review of computer vision street attributes in urban studies and planning. Cities 150, 105022.

Quantifying depth information in SVI

Consistent depth map generated by pretrained model

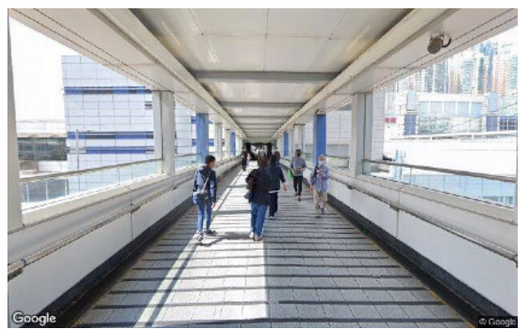
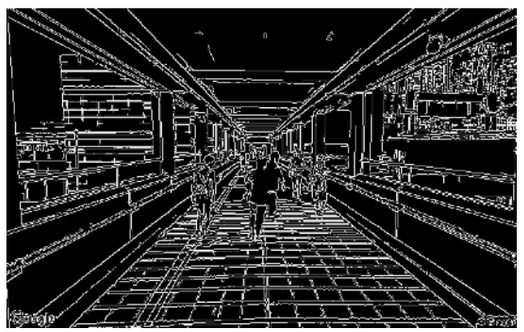
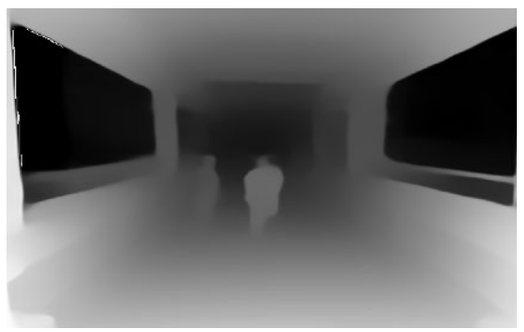


https://github.com/DepthAnything/Depth-Anything-V2



Analyze Driving Scenes with GluonCV 0.8
https://medium.com/apache-mxnet/analyze-driving-scenes-with-gluoncv-0-8-56ac37664977

Some examples…

SVI	Low-level feature	Segmentation	Depth
			
	Canny: 0.25	Vegetation: 0.56	Mean: 76.64
			
	Canny: 0.15	Vegetation: 0	Mean: 100.61

Measuring human perceptions of a large-scale urban region using machine learning

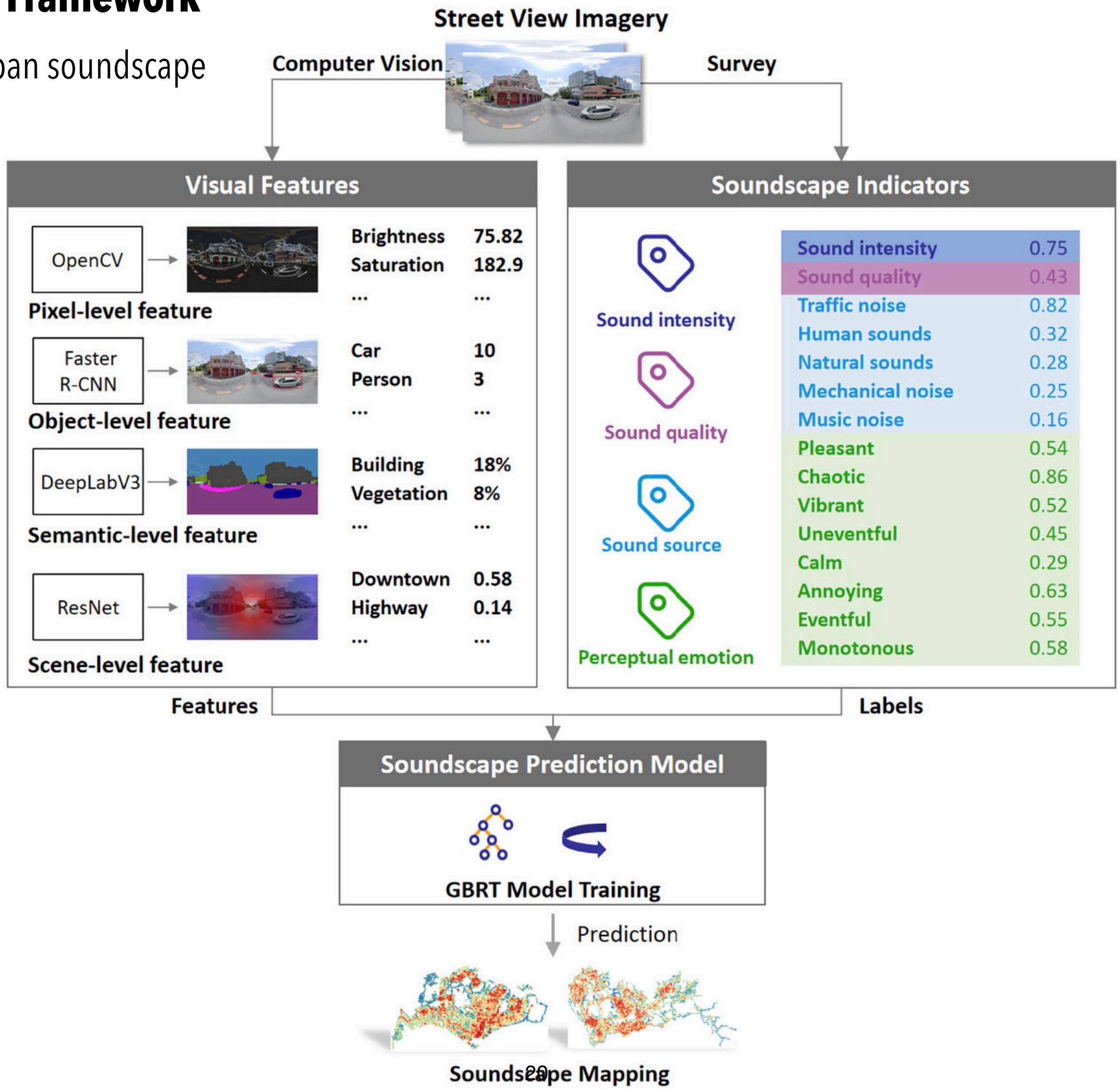
|| Fan Zhang et al. 2018



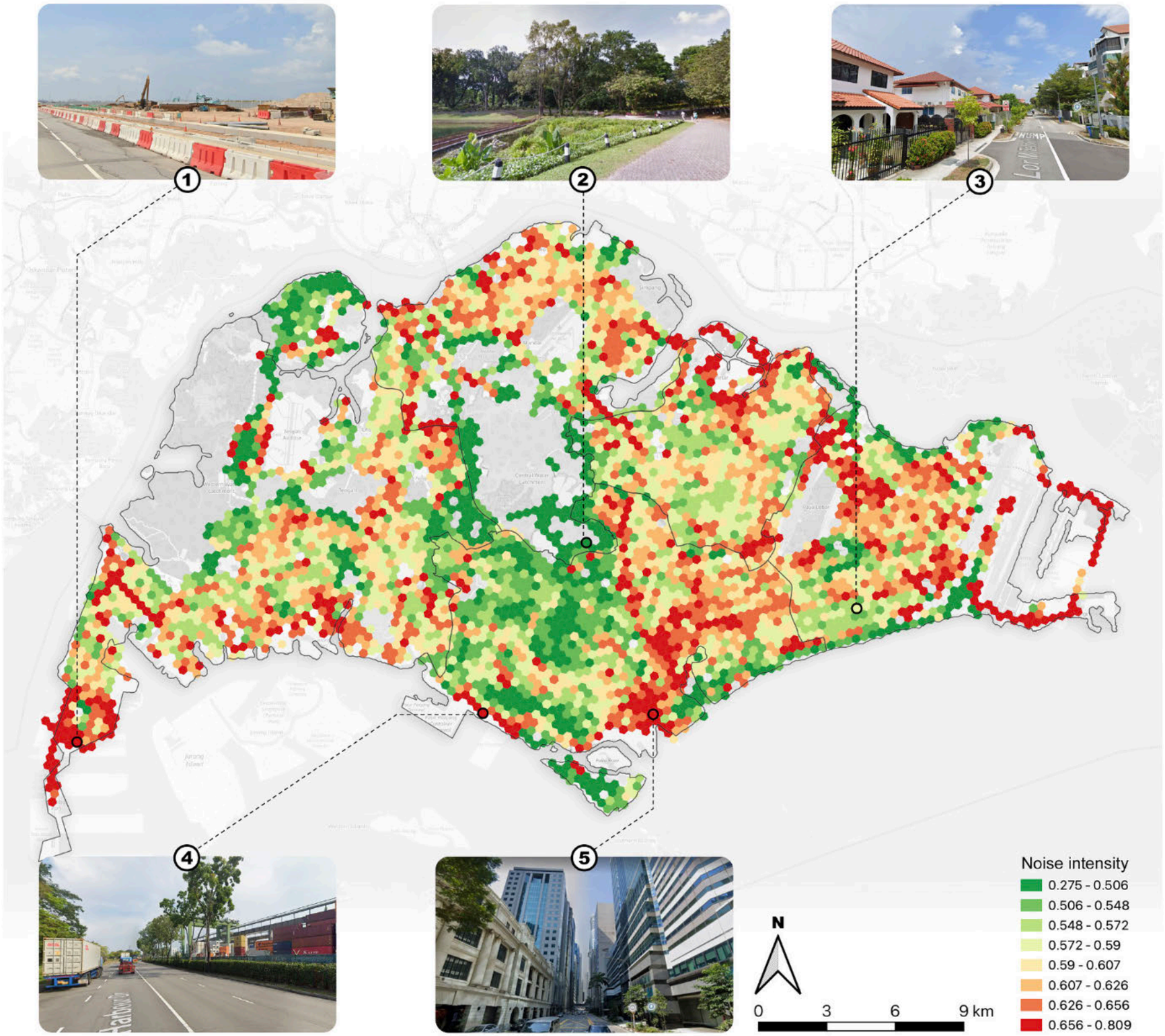
Zhang, F., Zhou, B., Liu, L., Liu, Y., Fung, H.H., Lin, H., Ratti, C., 2018. Measuring human perceptions of a large-scale urban region using machine learning. Landscape and Urban Planning 180, 148–160.

Research Framework

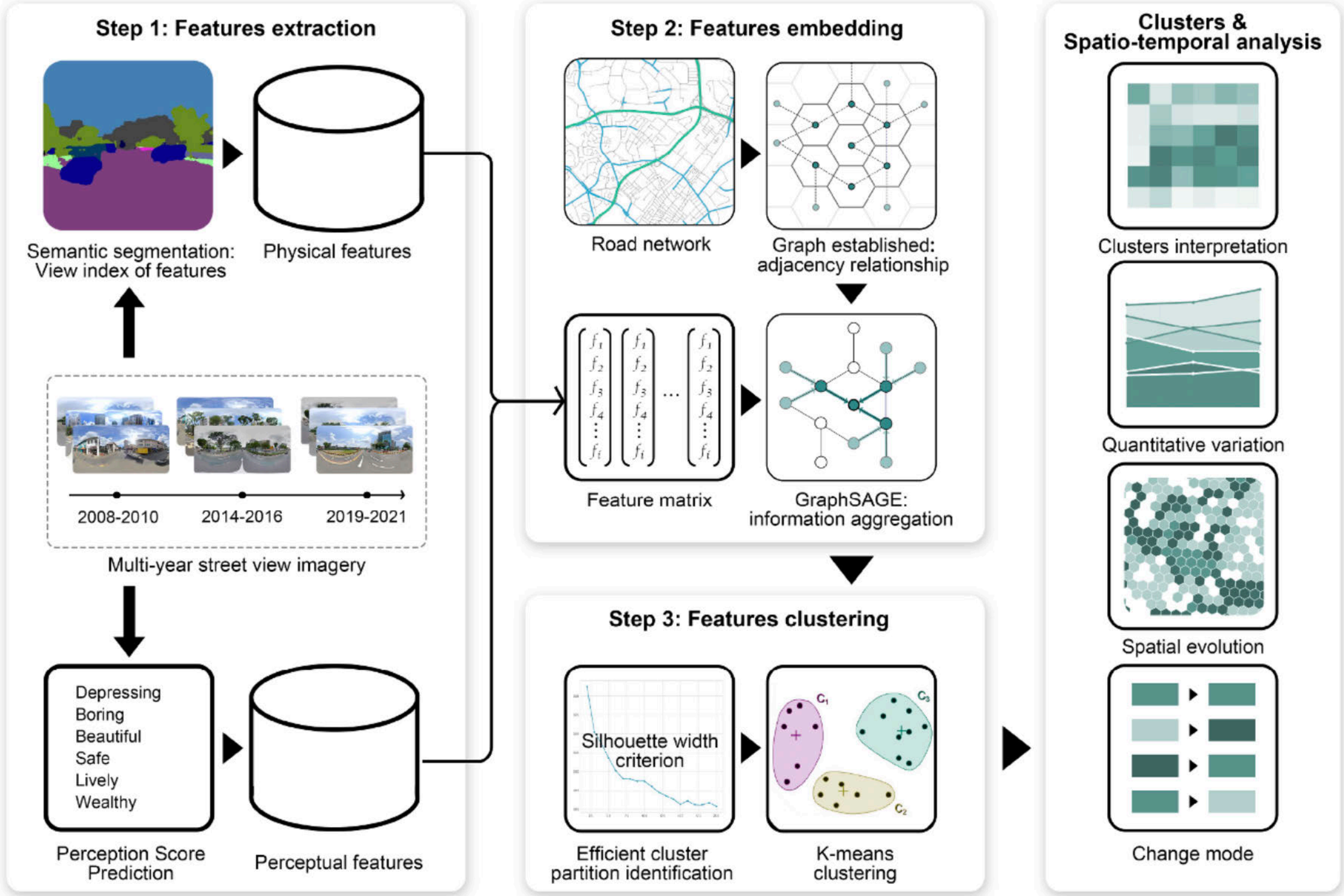
|| Sensing urban soundscape



Soundscape Mapping - Singapore

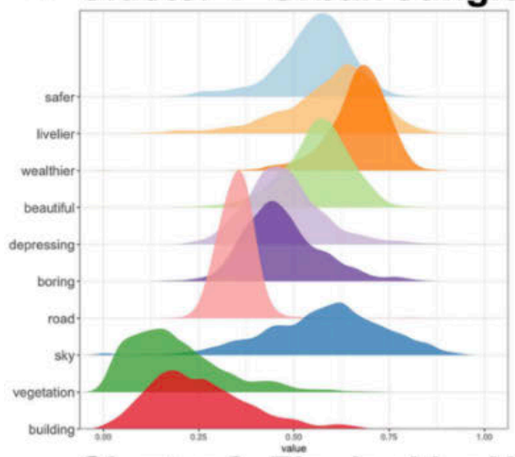


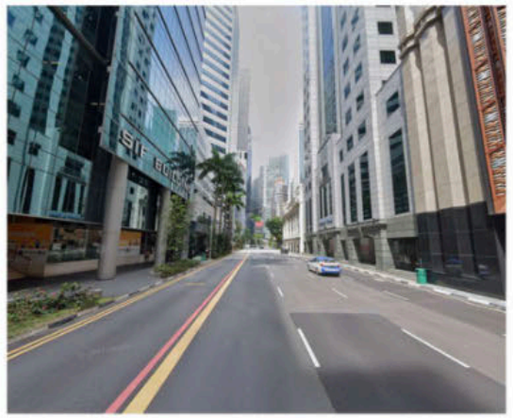
Research Framework



Clustering results

■ Cluster 1 Urban Jungle

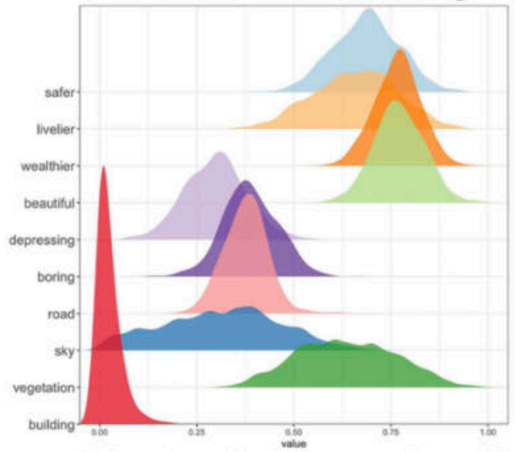




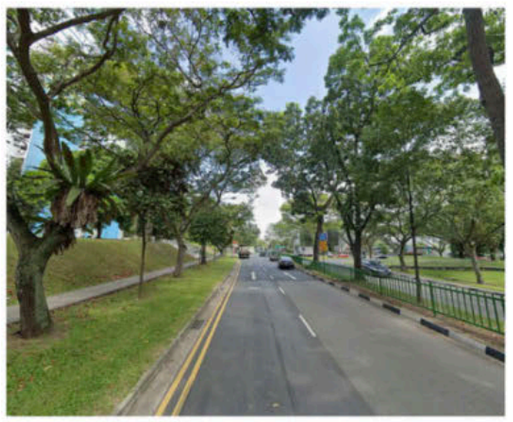




■ Cluster 2 Flanked by Nature

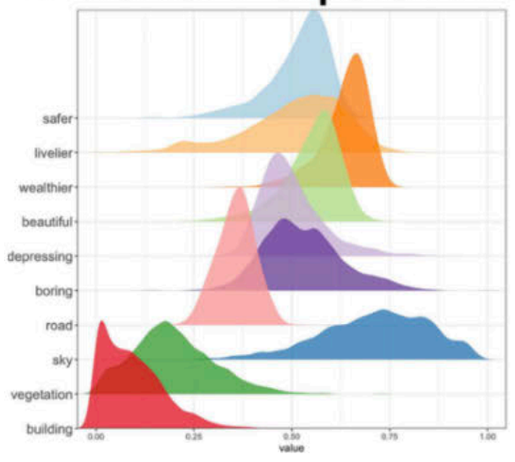








■ Cluster 3 Expansive Horizons









Temporal changes

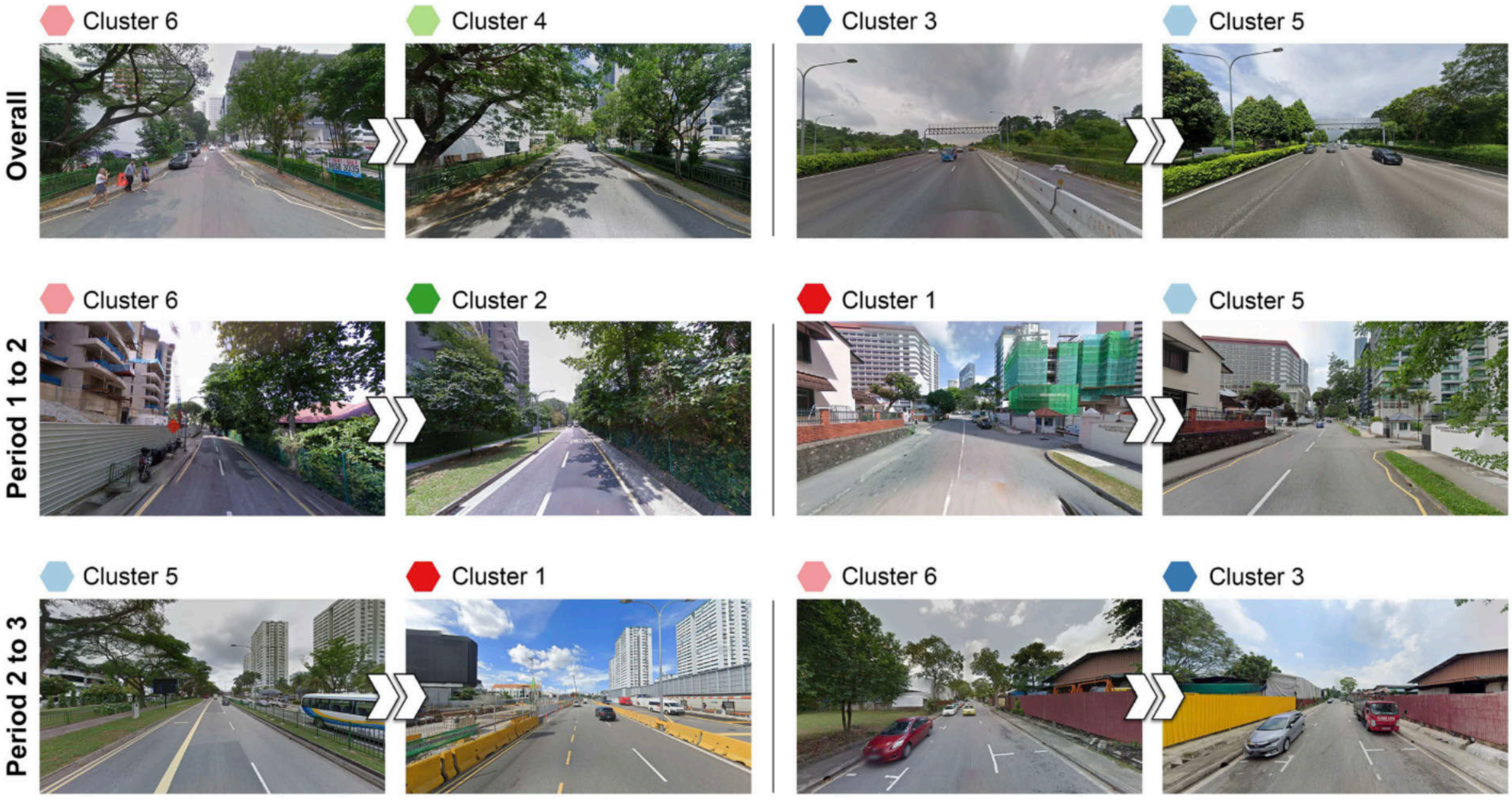


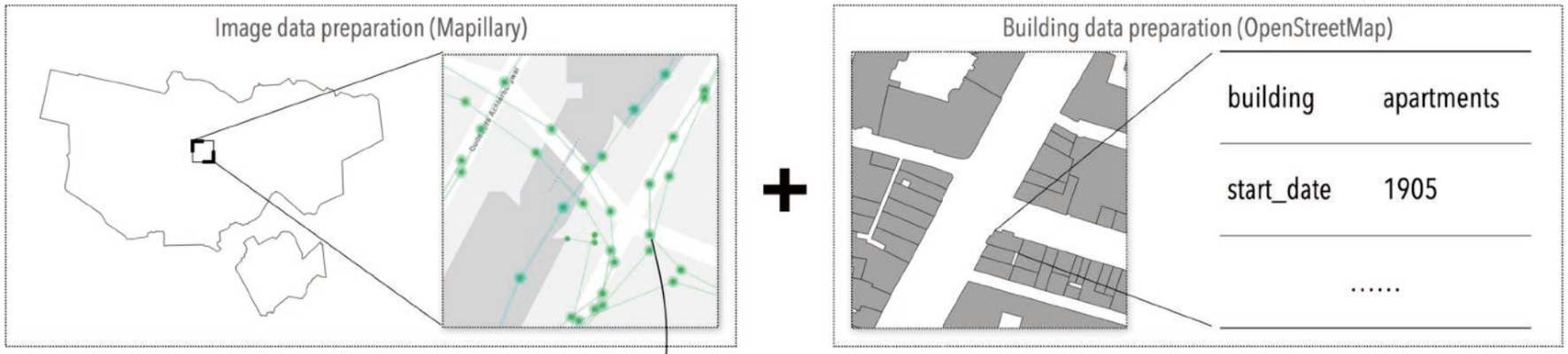
Fig. 13. Examples of change courses in different periods.

Project 1: OpenFACADES -

An **O**pen **F**ramework for **A**rchitectural **C**aption and **A**ttribute **D**ata **E**nrichment via **S**treet View Imagery

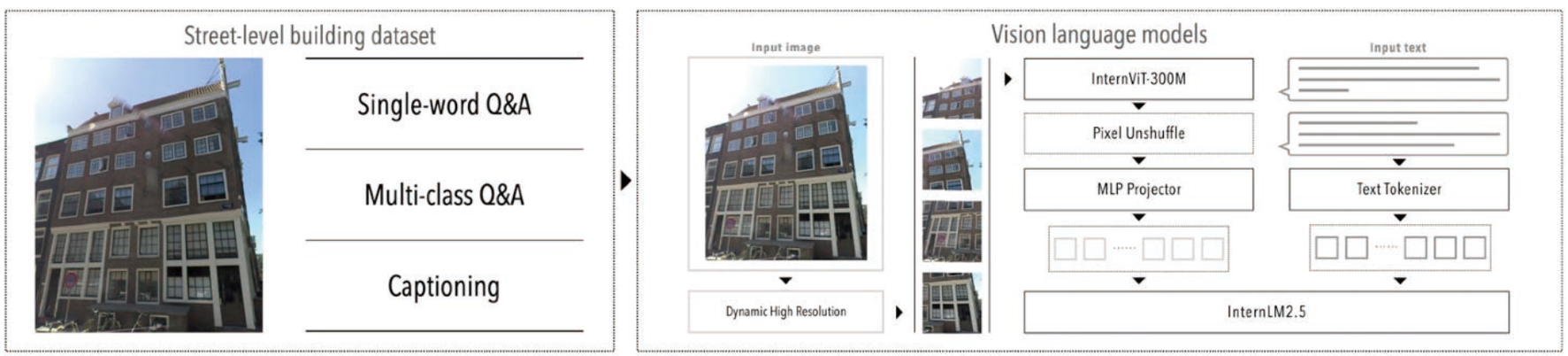
Research Framework

01. Align SVI with building footprint



02. Individual building image generation

03. Finetune MLLMs

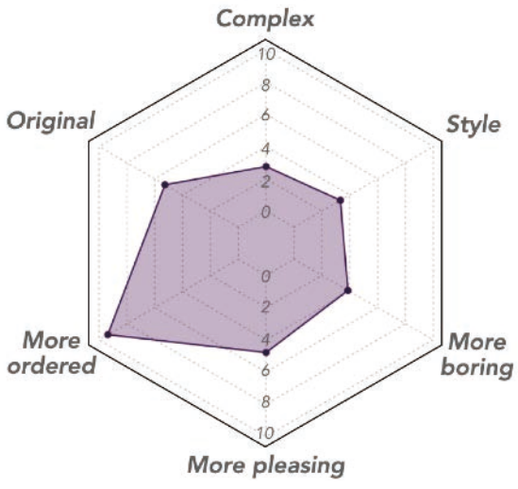


Project 2: Human perception on building facade

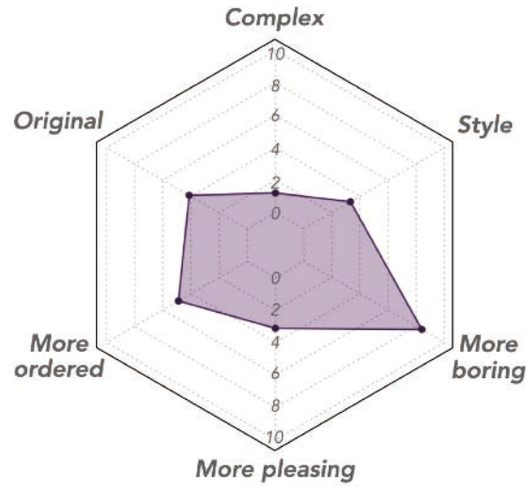
Building dataset

- Complex
- Original
- Ordered
- Pleasing
- Boring
- Style

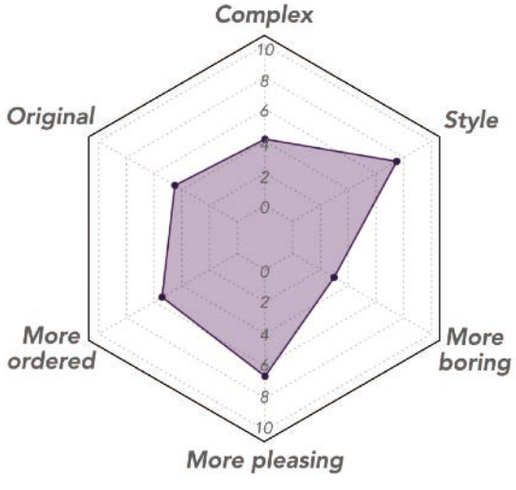




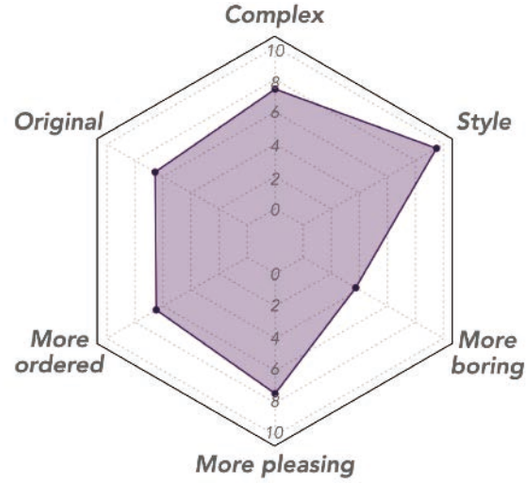






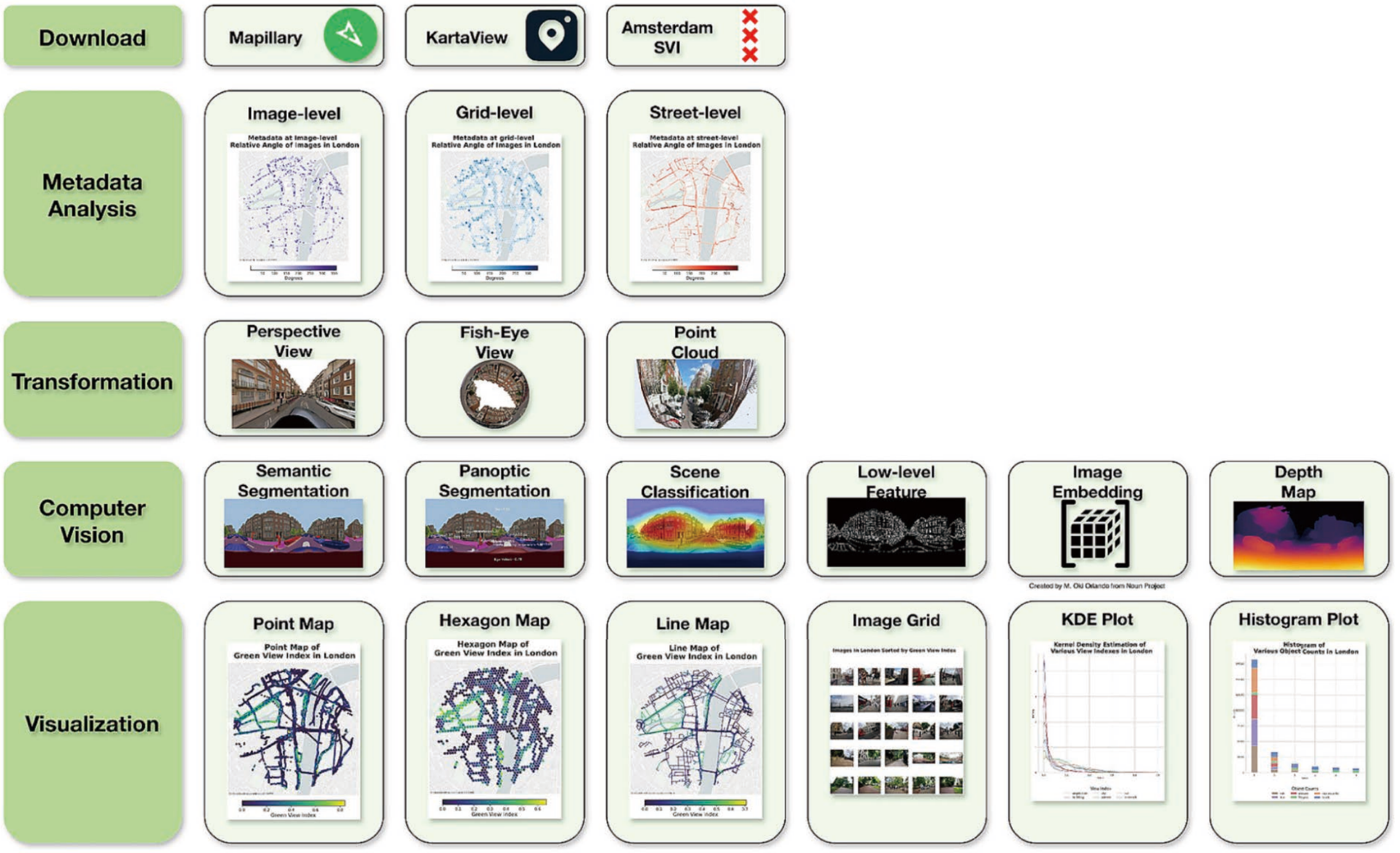




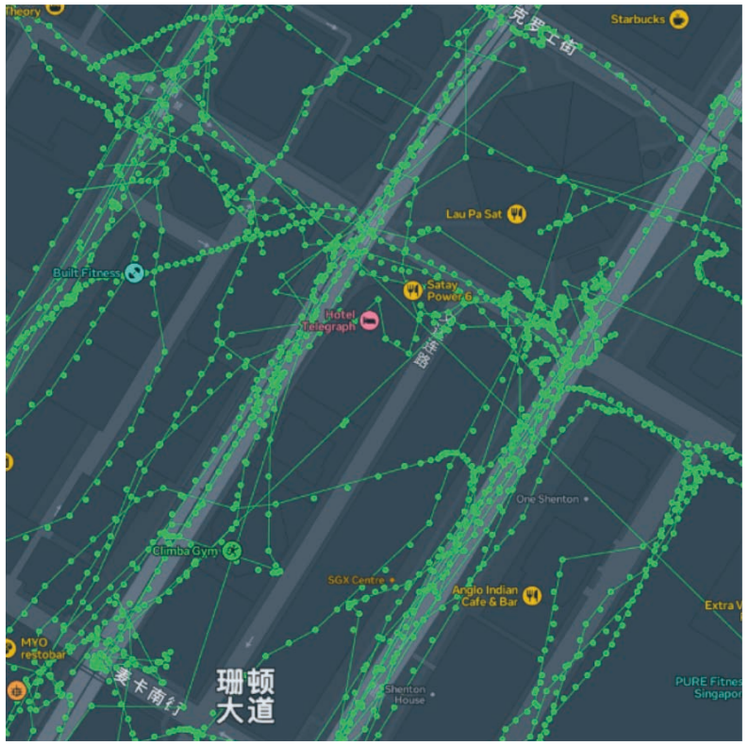


ZenSVI

An open-source software for the integrated acquisition, processing and analysis of street view imagery



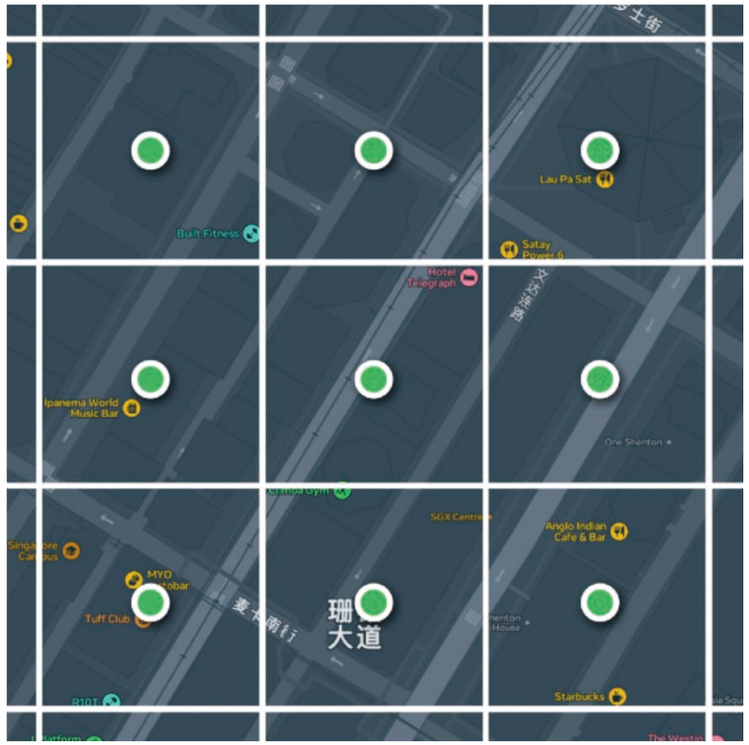
How to request data?



- Request based on area



- Request based on points created from road segments



- Request based on centroids of spatial units

ZenSVI

Panoptic segmentation

