ReLoD3 Workshop

Evaluating Human Perception of Building Exteriors Using Street View Imagery

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*— Xiucheng Liang, Jiat Hwee Chang, Song Gao, Tianhong Zhao, Filip Biljecki **

Research Framework

1. Dataset and Perception Models Establishment

Dataset Establishment

- Singapore
- Amsterdam
- San Francisco

Street View Imagery



Distortion Correction

Object Detection



Perspective View

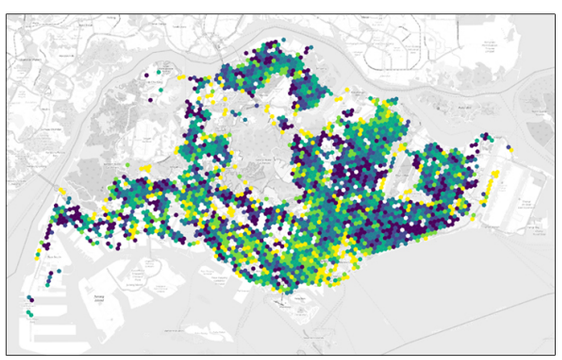
Streetscape Perception Assessment



Treatment Effect

- **Urban Perception Score**
- Image Features → PSM+ATE
- **Building Perception Score**

Building Perception Mapping



Subset

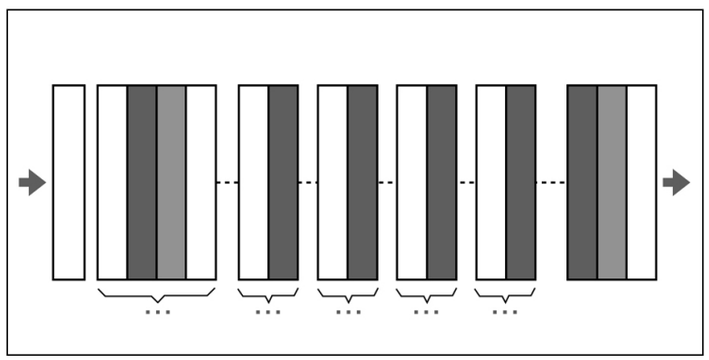
Full set

Human Perceptual Ratings

- Complexity
- Originality
- Order
- Pleasantness
- Excitement
- Style

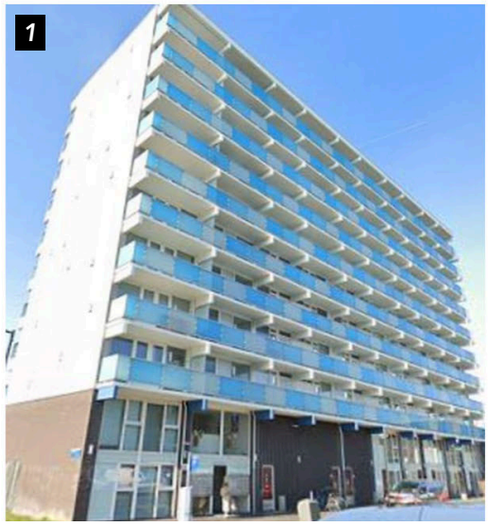
Training

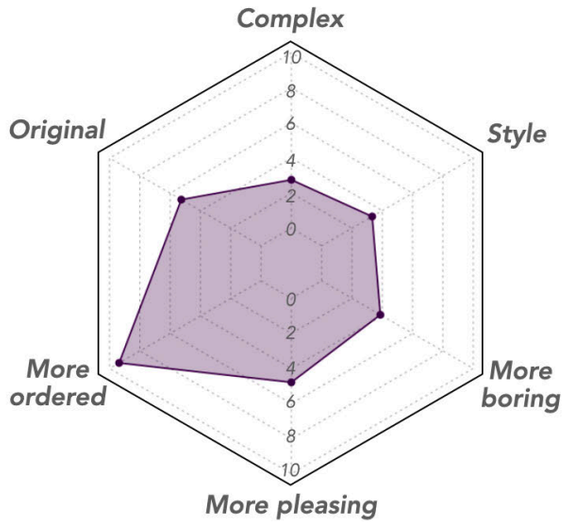
Model Training & Prediction



Prediction

Survey result

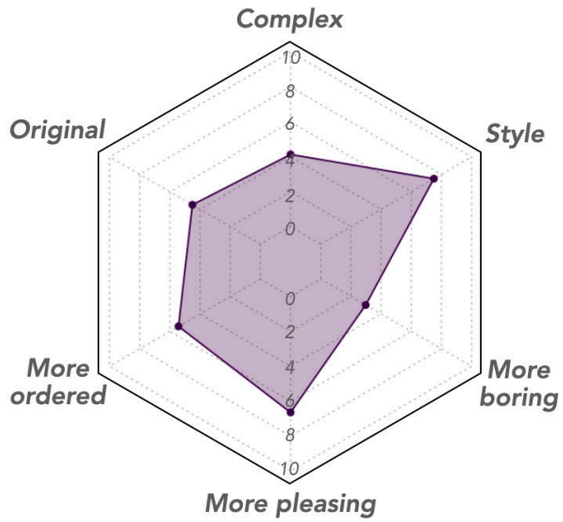




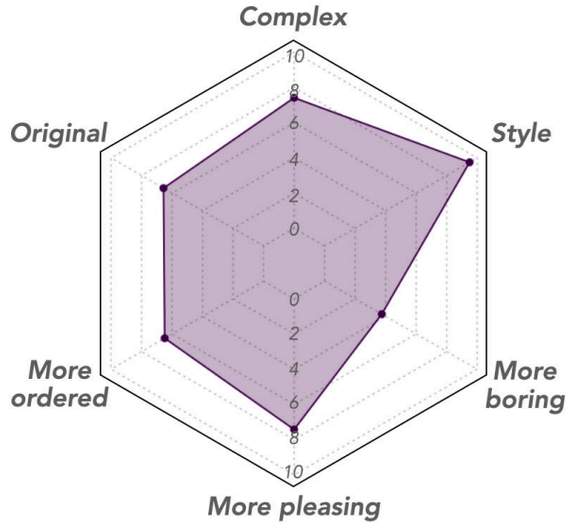




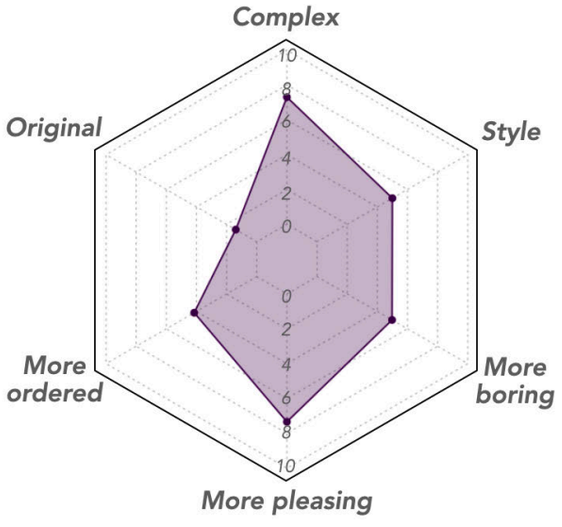


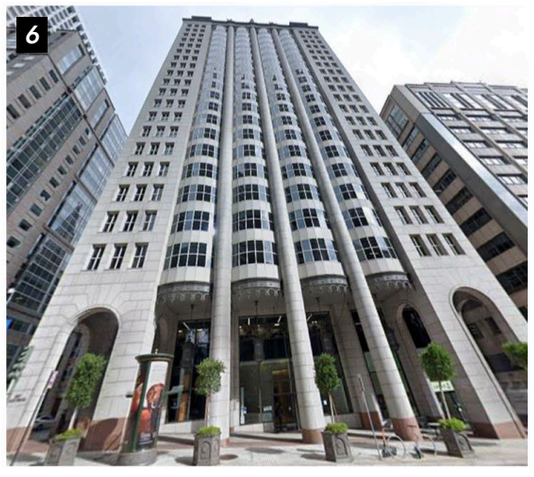


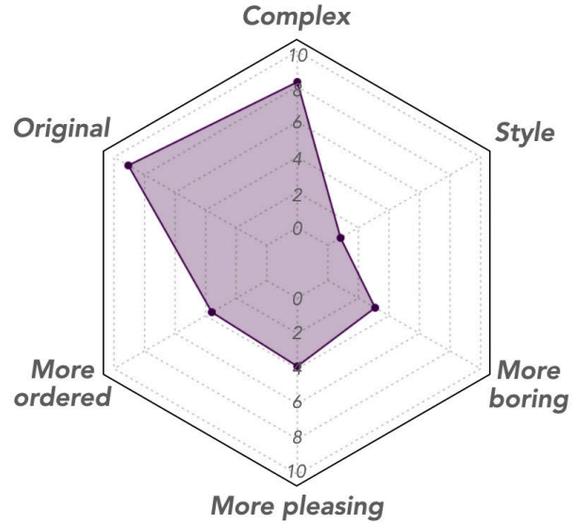












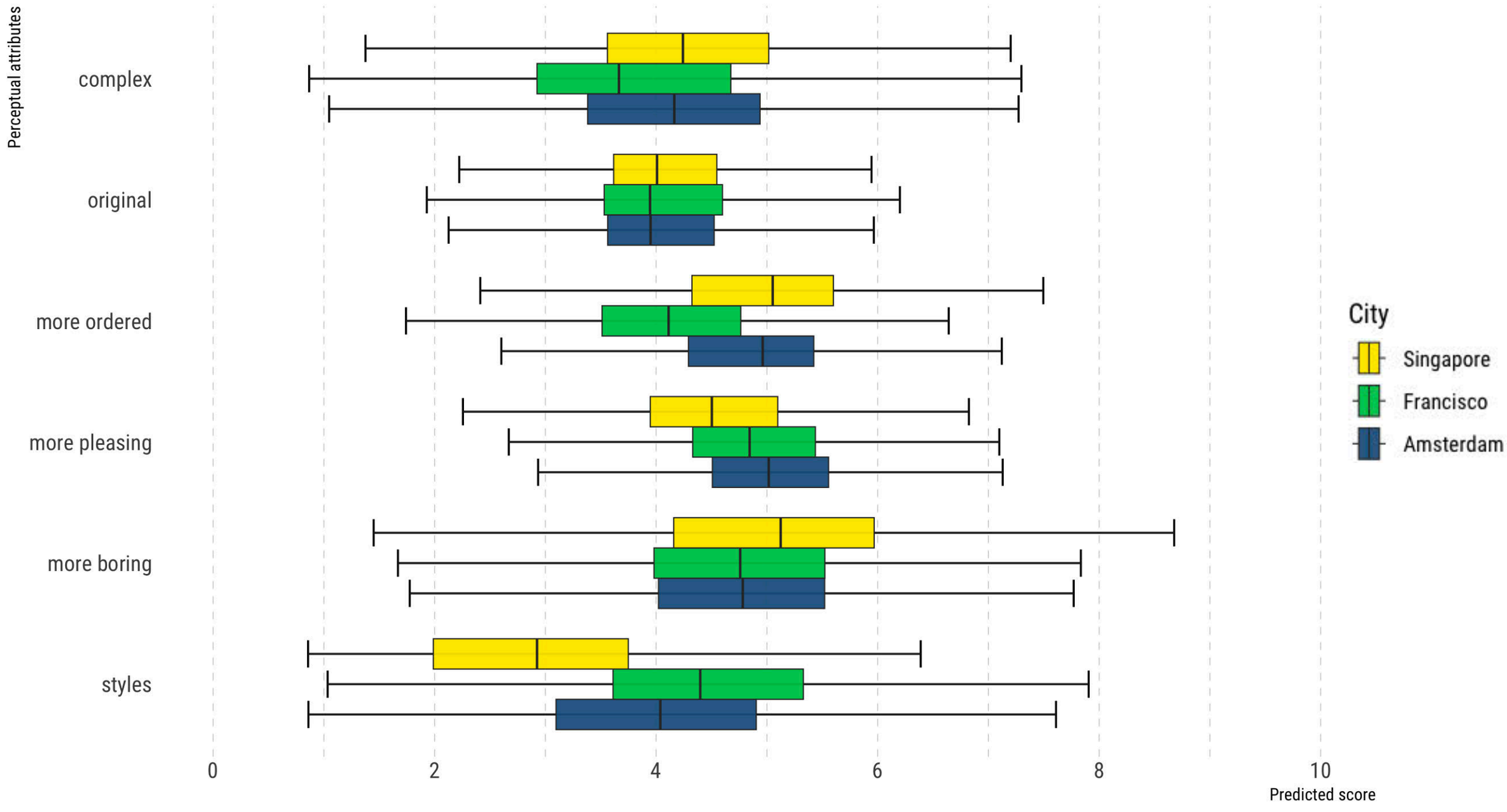
Prediction result

Train

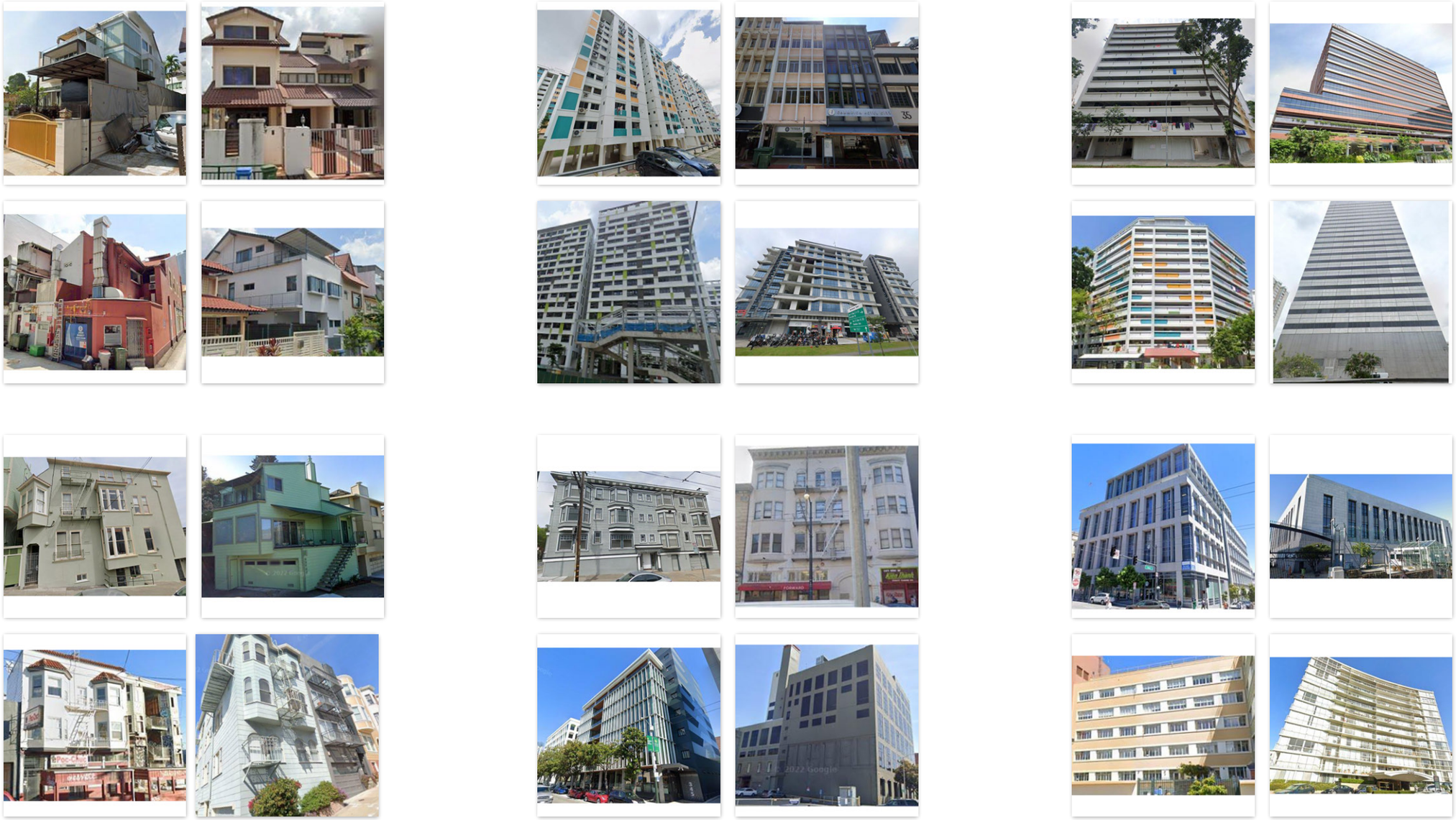
600 building images

Predict

250,417 building images



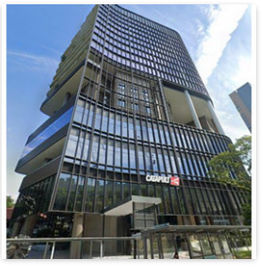
Prediction Result Distribution by City


Singapore
San Francisco
Amsterdam
COSTER
GIFTSHOP
Low ordered score (≤ 3)
Medium ordered score (> 3 & ≤7)
High ordered score (> 7)

Singapore

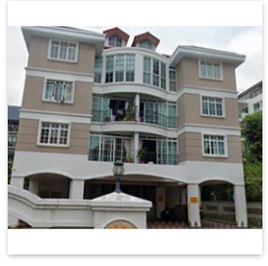






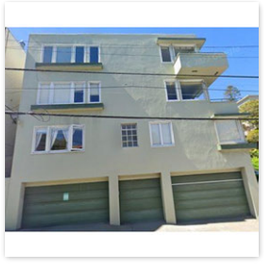


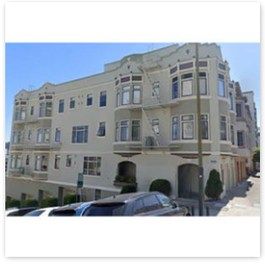
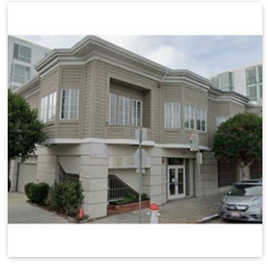


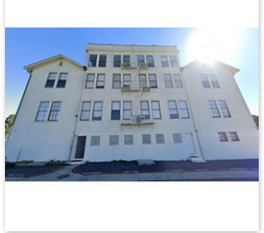


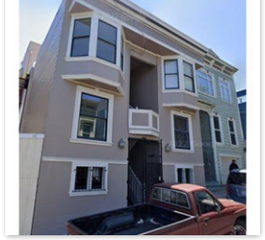
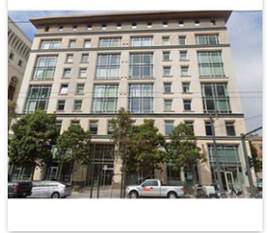


San Francisco



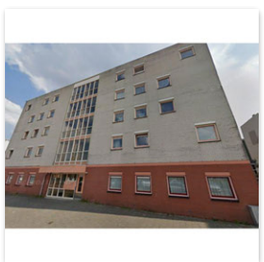



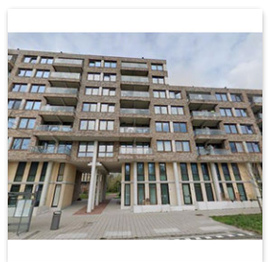
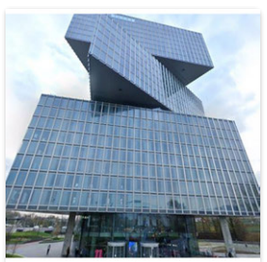



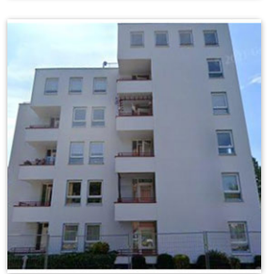
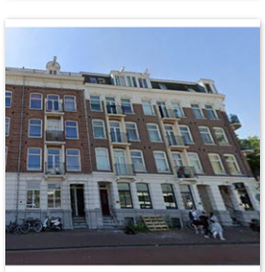



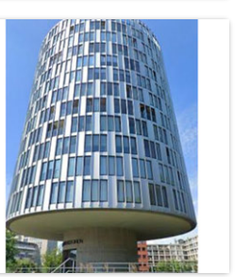


Amsterdam



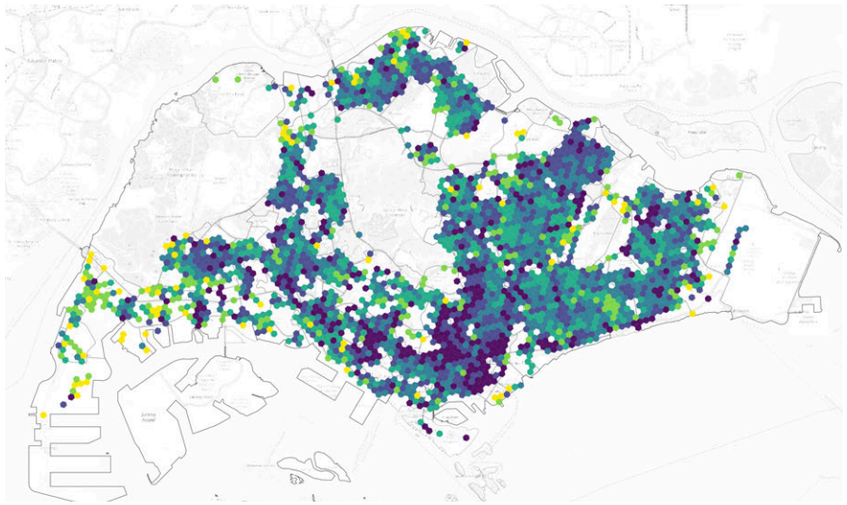


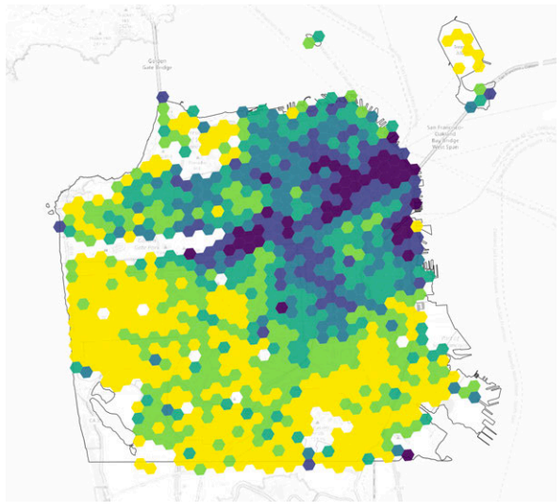

Low original score (≤ 3) *Medium original score (> 3 & ≤7)* *High original score (> 7)*

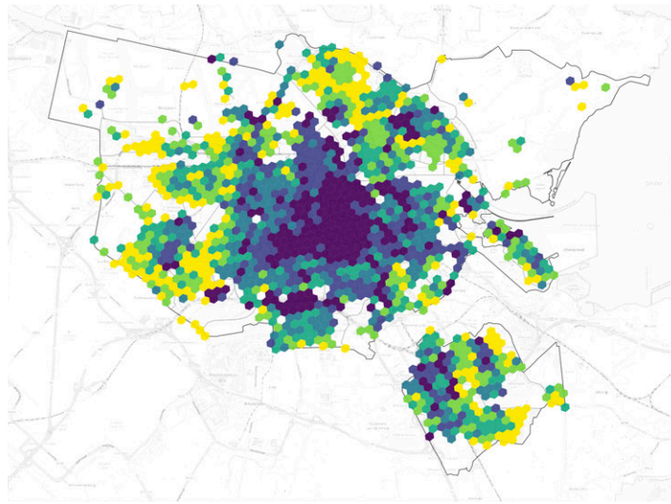
Building Perception Mapping

Complex

- 2.24 - 3.31
- 3.31 - 3.69
- 3.69 - 4.04
- 4.04 - 4.35
- 4.35 - 4.72
- 4.72 - 5.97

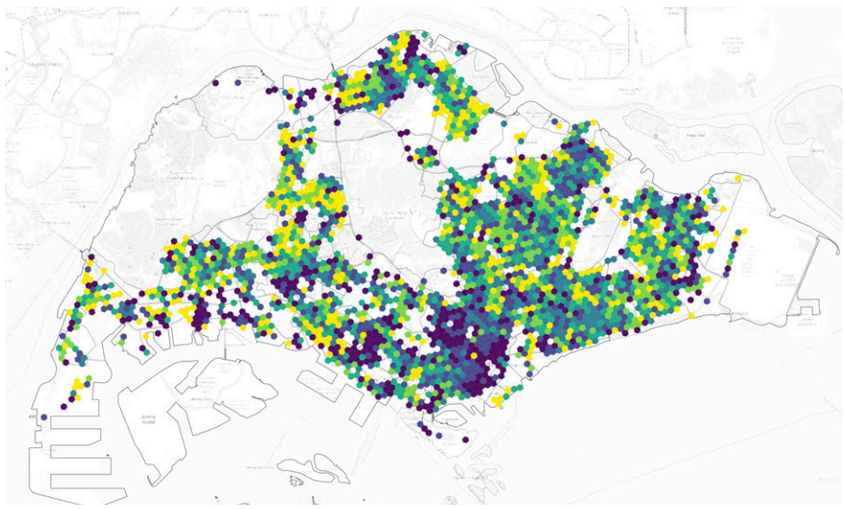


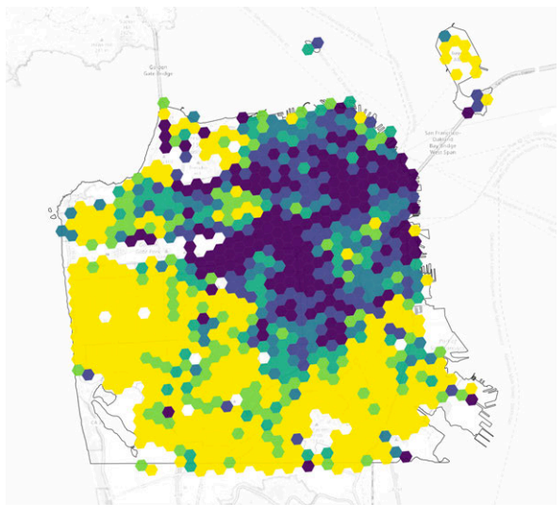


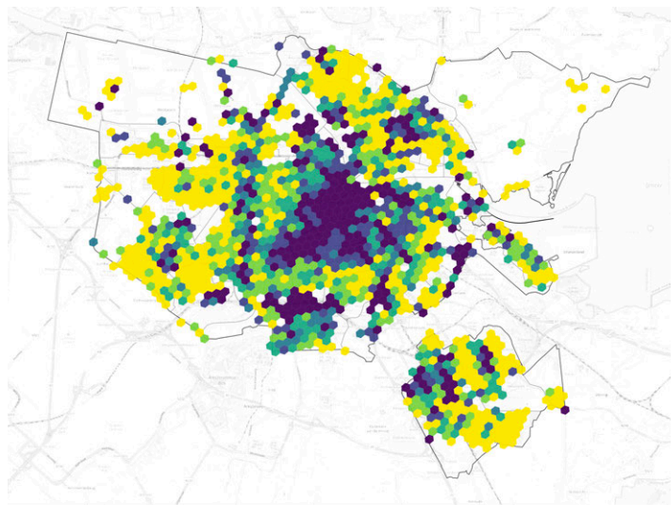


Original

- 2.58 - 3.89
- 3.89 - 4.02
- 4.02 - 4.13
- 4.13 - 4.23
- 4.23 - 4.39
- 4.39 - 7

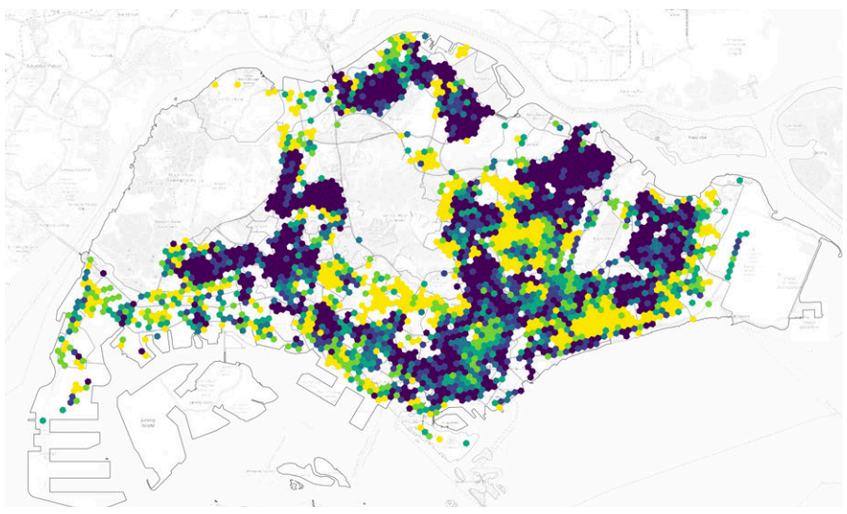


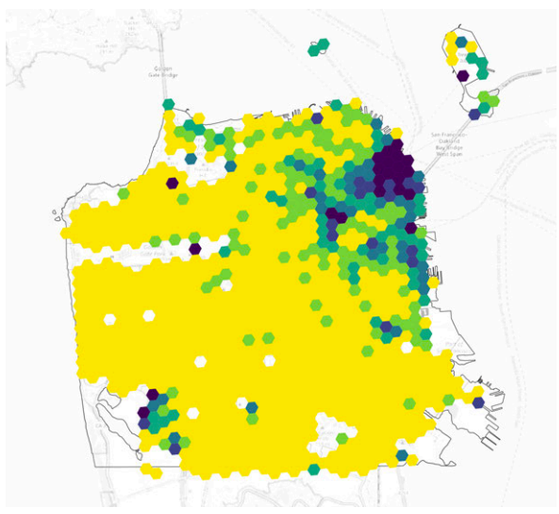


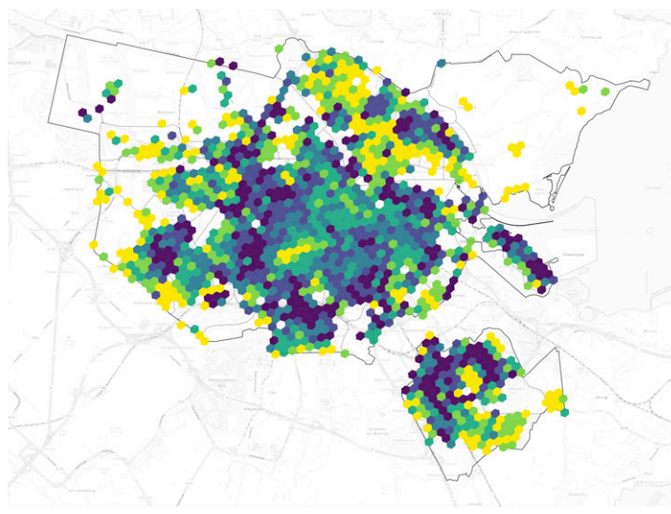


More Ordered

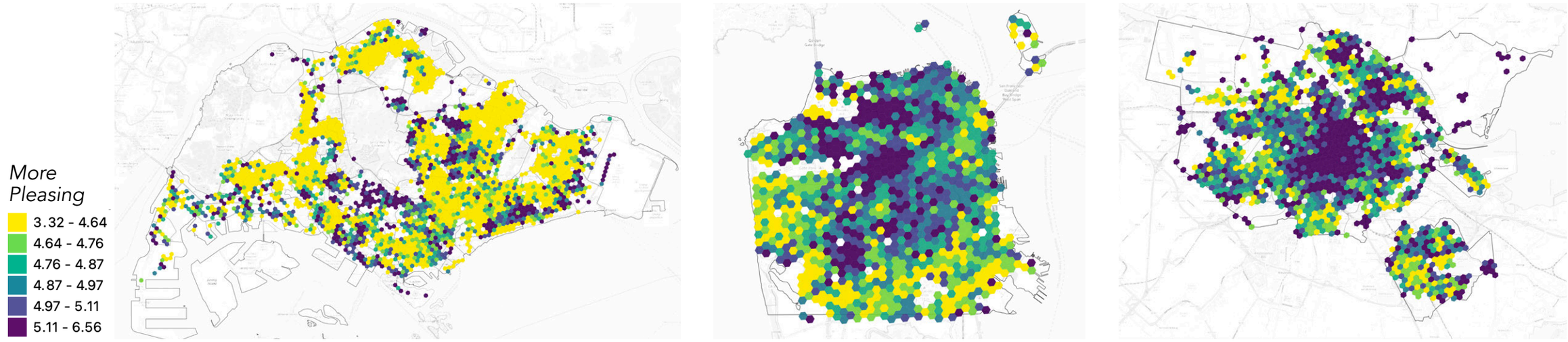
- 3.03 - 4.28
- 4.28 - 4.56
- 4.56 - 4.76
- 4.76 - 4.94
- 4.94 - 5.12
- 5.12 - 6.44

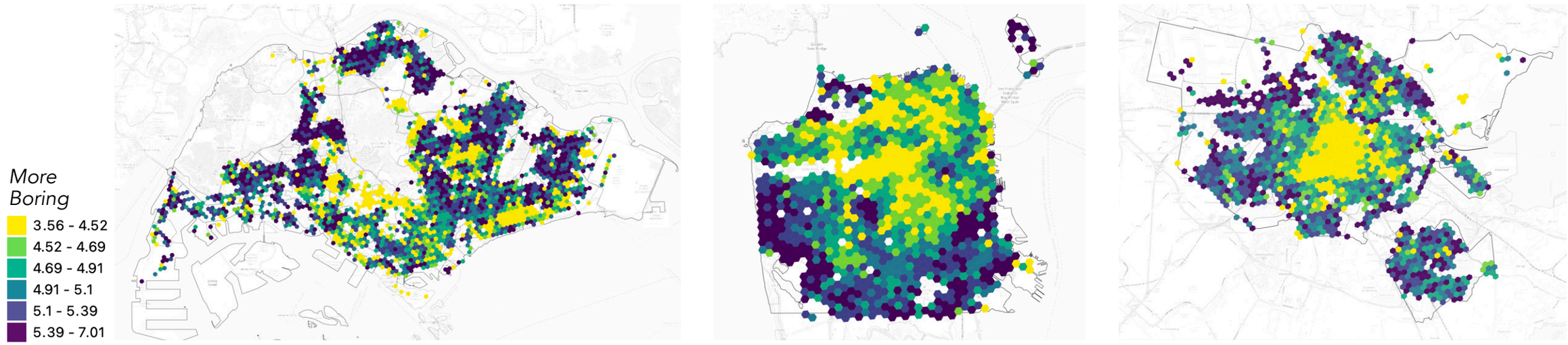


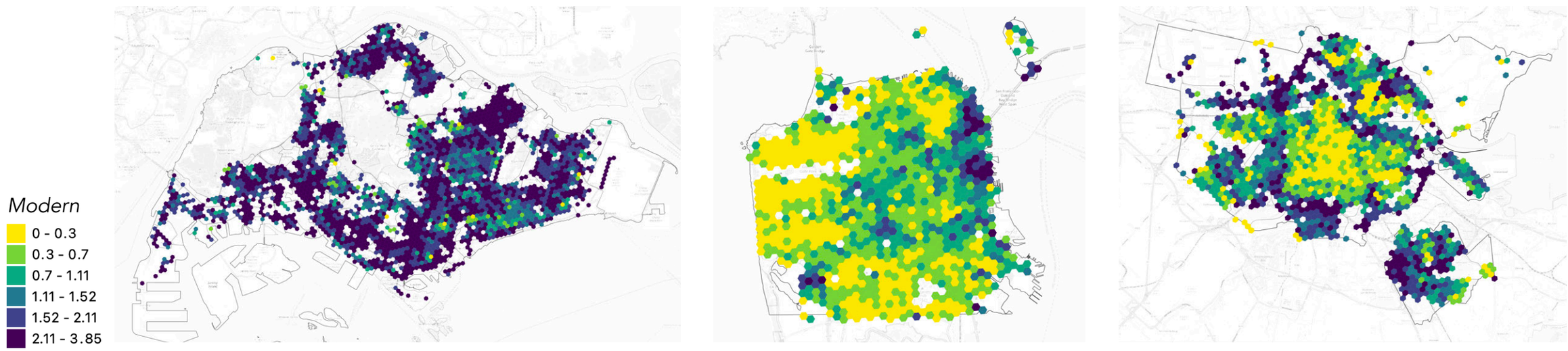




Building Perception Mapping







Relationship with contextual building attributes

Table 4: Pearson correlations between perceptual properties and contextual building attributes. The combinations with moderate or strong correlations are highlighted.

	Complex	Original	Ordered	Pleasing	Boring	Modern
City: Singapore						
Residential density	-0.0867 **	-0.0373	-0.3128 ***	0.1627 ***	-0.198 ***	-0.2621 ***
Commercial density	0.0808 **	0.1221 ***	-0.1914 ***	0.1217 ***	-0.1556 ***	-0.2539 ***
Industrial density	-0.0853 **	0.0542	-0.1757 ***	0.127 ***	-0.0419	0.0625 *
Public housing density	0.0201	-0.0739 *	0.3517 ***	-0.2759 ***	0.2535 ***	0.1757 ***
Distance to city centre	-0.1068 ***	-0.1416 ***	0.2242 ***	-0.2491 ***	0.2387 ***	0.1291 ***
City: San Francisco						
Residential density	0.0978 **	0.1263 ***	-0.2962 ***	0.1193 ***	-0.3502 ***	-0.3866 ***
Commercial density	0.3276 ***	0.2567 ***	0.3103 ***	0.004	-0.169 ***	0.037
Office density	0.2858 ***	0.1835 ***	0.4605 ***	-0.0751 *	-0.0252	0.3065 ***
Building age	0.2104 ***	0.2323 ***	-0.2038 ***	0.238 ***	-0.4407 ***	-0.3999 ***
Distance to city centre	-0.6951 ***	-0.6782 ***	-0.4784 ***	-0.3499 ***	0.5667 ***	-0.3036 ***
City: Amsterdam						
Residential density	0.3013 ***	0.0627 *	0.148 ***	0.1296 ***	-0.4355 ***	-0.5171 ***
Commercial density	0.2653 ***	0.234 ***	0.1249 ***	0.011	-0.1763 ***	0.0038
Office density	0.0204	0.0943 ***	0.0309	-0.1597 ***	0.1752 ***	0.2703 ***
Building age	0.3514 ***	0.1922 ***	-0.0427	0.315 ***	-0.4849 ***	-0.5317 ***
Distance to city centre	-0.5264 ***	-0.3951 ***	-0.2267 ***	-0.1497 ***	0.4831 ***	0.2679 ***

*Note: All correlations presented are Pearson correlation coefficients. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.