범죄 예상 지역 특성 분석

:강남구를 중심으로

2023.12.19

경희대학교

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   - research background
   - literature review

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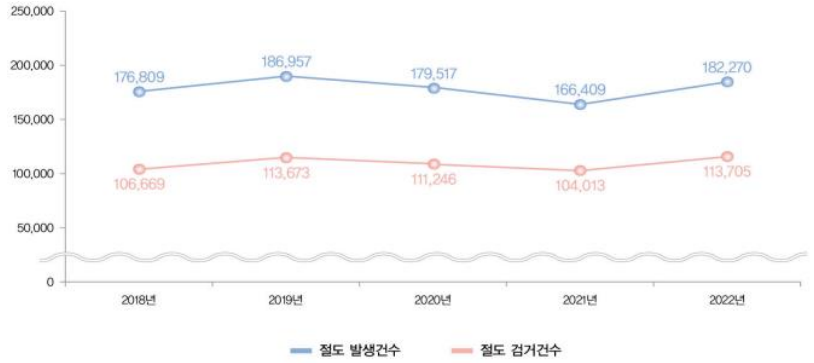
1. Research Background

Numerous and increasing recent crimes in Korea

- 2023.07.21 Stabbing rampage at Sillim station
- 2023.08.03 Unprovoked aggression at Seohyeon station AK plaza
- series of copycat crimes

Moreover, the main crimes show rapidly increasing trend from 2022

〈그림 - 15〉 강간 · 강제추행범죄 발생 및 검거건수 추이(2018년~2022년)



〈그림 - 16〉 절도범죄 발생 및 검거건수 추이(2018년~2022년)

〈그림 - 17〉 폭력범죄 발생 및 검거건수 추이(2018년~2022년)

1. Research Background

However, arrest count has been decreasing compared to crime ratio

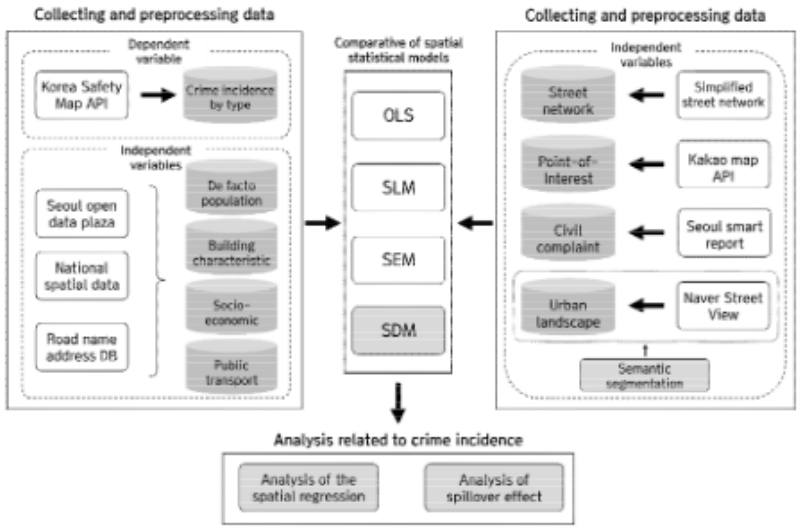
Preventive measures are needed rather than after crime response

2. Literature Review

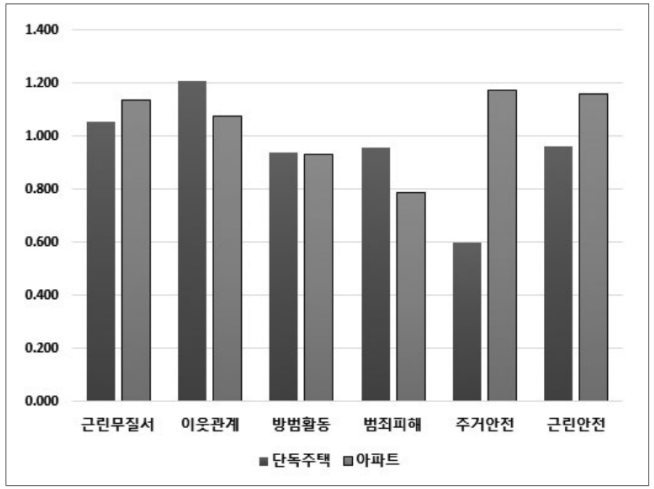
CPTED

- based on the theory that socio-physical environment effects to human behavior
- the most popular method to prevent crimes in urban environment

Crime has close relationship with urban environment and spatial characteristics



〈그림 1〉 범죄유발 주거환경 비교결과

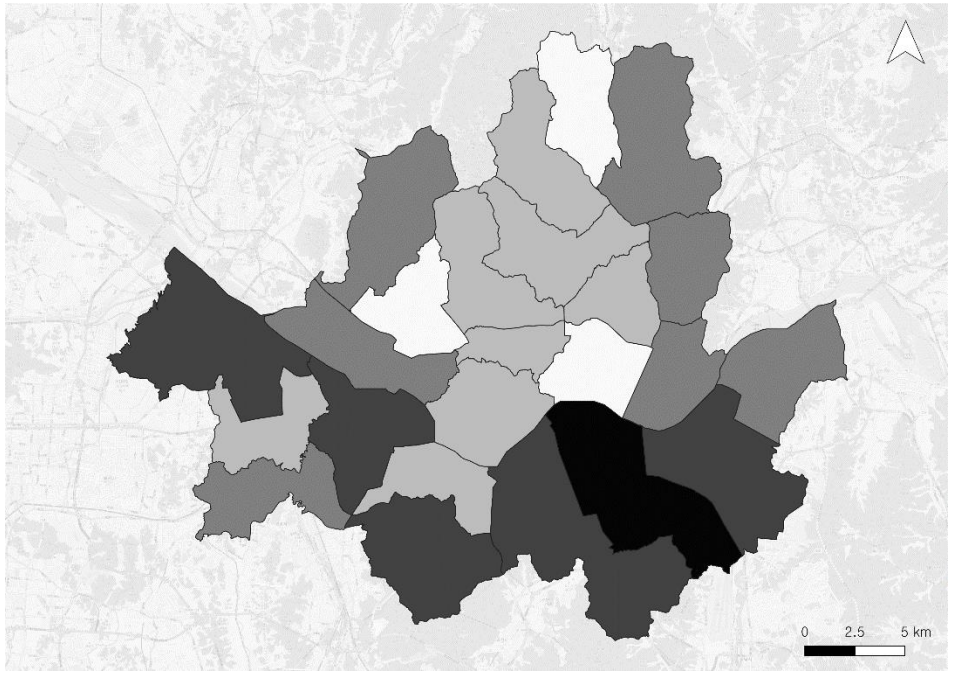


주: Y축은 승산비

3. Data

Available data

Safemap API WMS/WFS map
by Ministry of the Interior and Safety

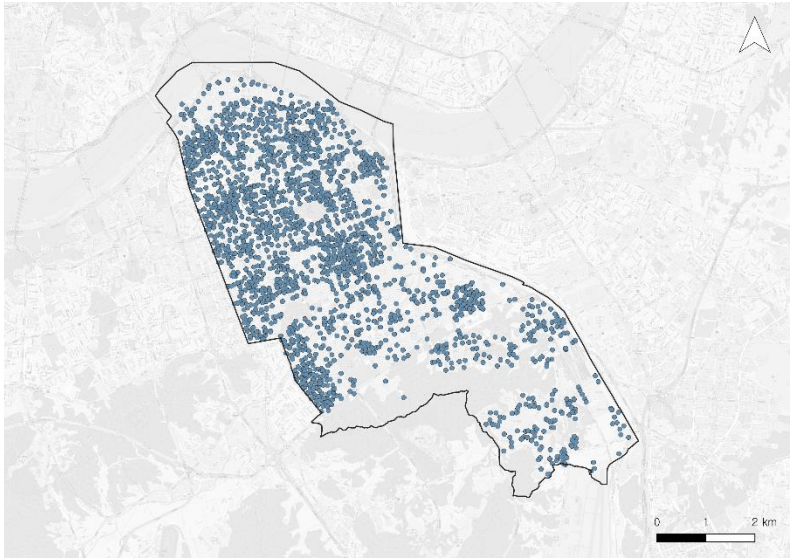


Administrative district

3. Data

installed in a place where a crime occurs frequently or is expected to occur

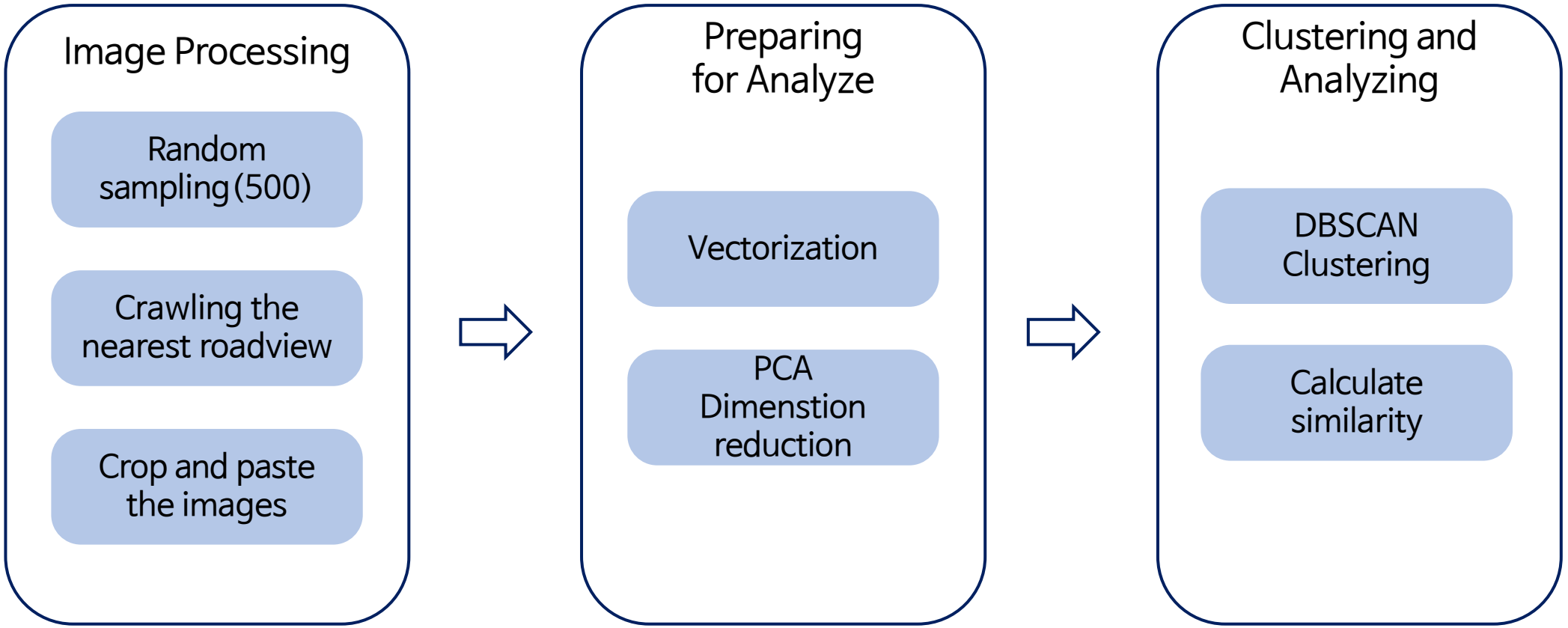
Already estimated crime vulnerable site



CCTV for crime prevention

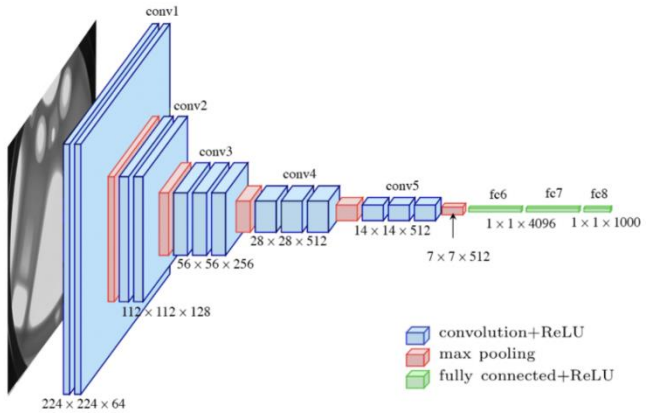
Kakao Roadview

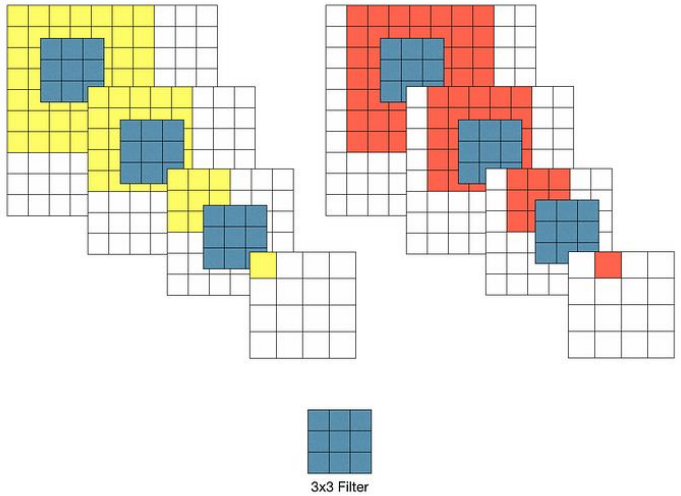
4. Analyzing Flow



5. Model

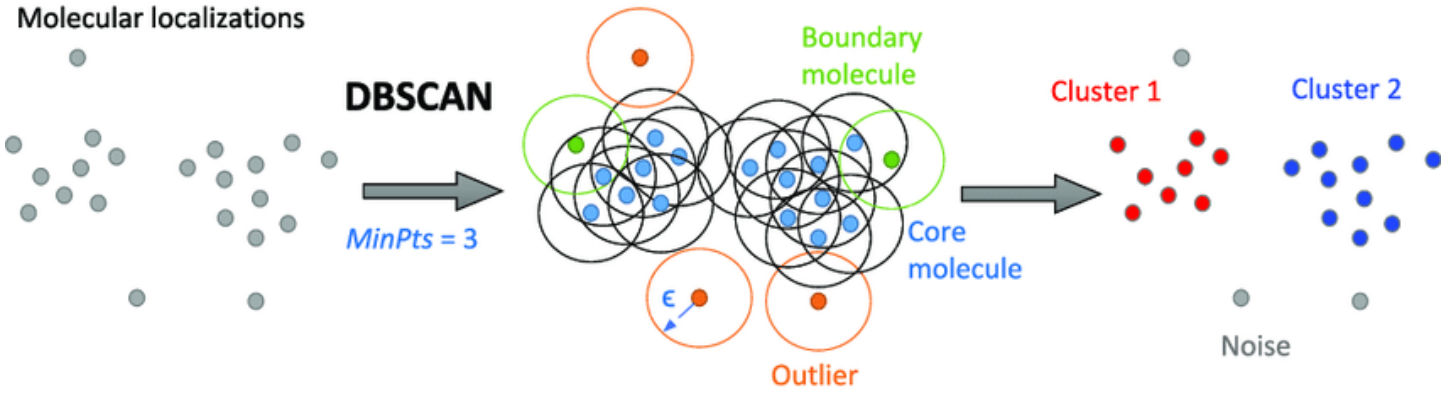
VGG16





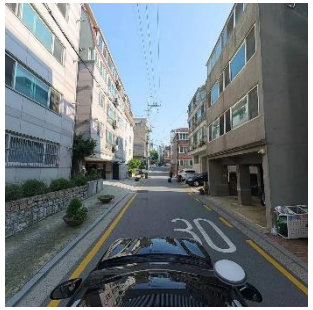
- very deep CNN model
- 16 layers
- using 3X3 filter

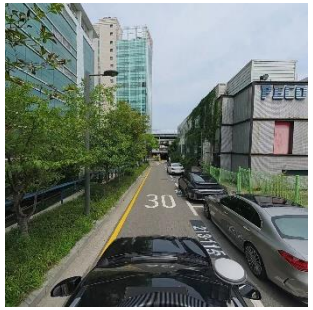
DBSCAN

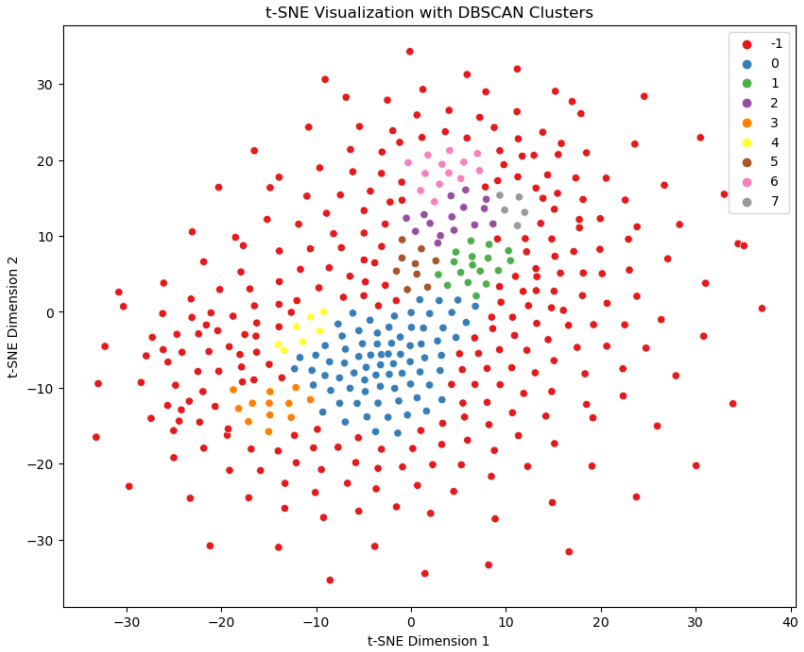


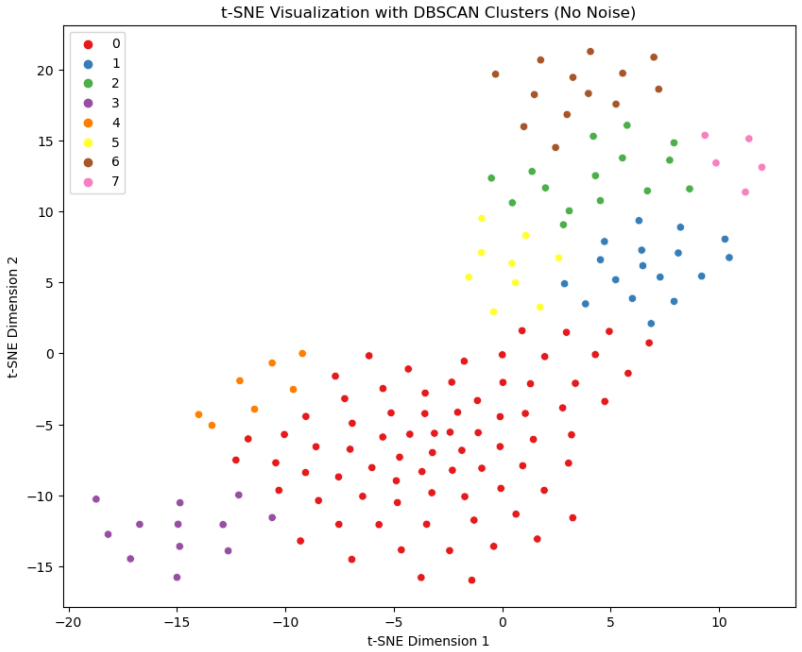
- density based
- No need to set the number of clusters
- good for distributions with geometric shapes

5. Result

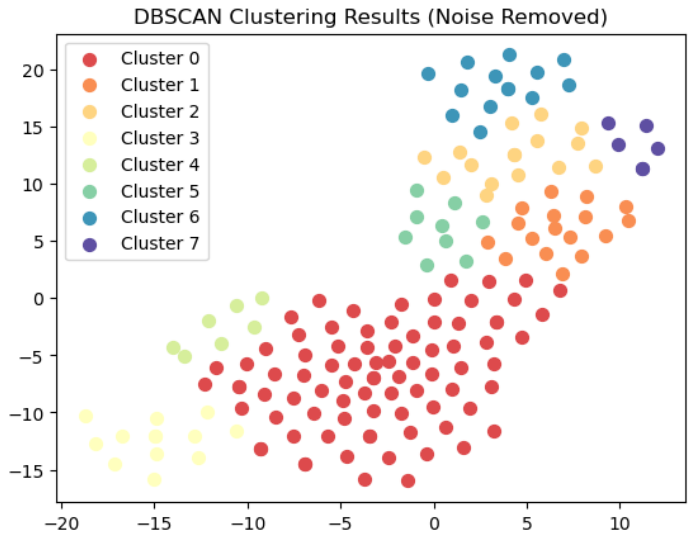





t-SNE Visualization with DBSCAN Clusters
t-SNE Dimension 1
t-SNE Dimension 2
-1
0
1
2
3
4
5
6
7

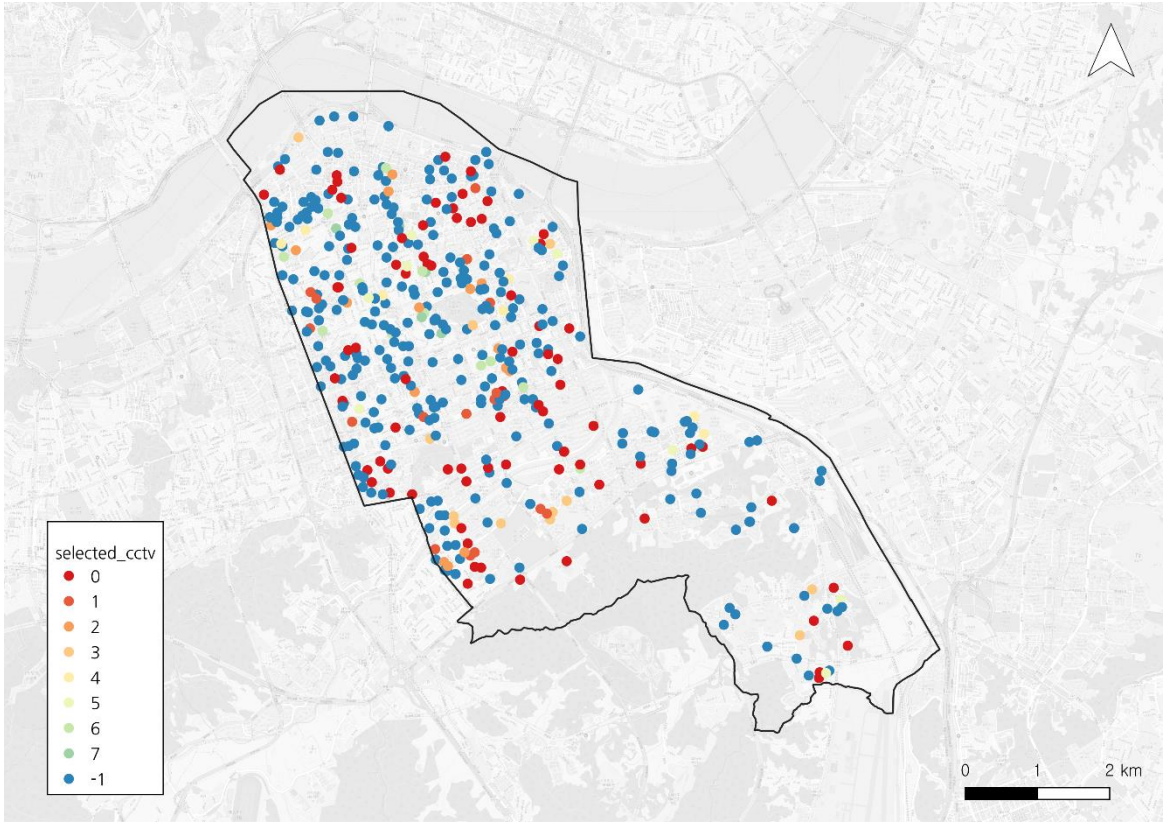

t-SNE Visualization with DBSCAN Clusters (No Noise)
t-SNE Dimension 1
t-SNE Dimension 2
0
1
2
3
4
5
6
7

5. Result



Similarity within each clusters

Cluster	Similarity	Cluster	Similarity
Cluster0	0.7402	Cluster4	0.7654
Cluster1	0.8165	Cluster5	0.8394
Cluster2	0.8154	Cluster6	0.8330
Cluster3	0.7354	Cluster7	0.8380



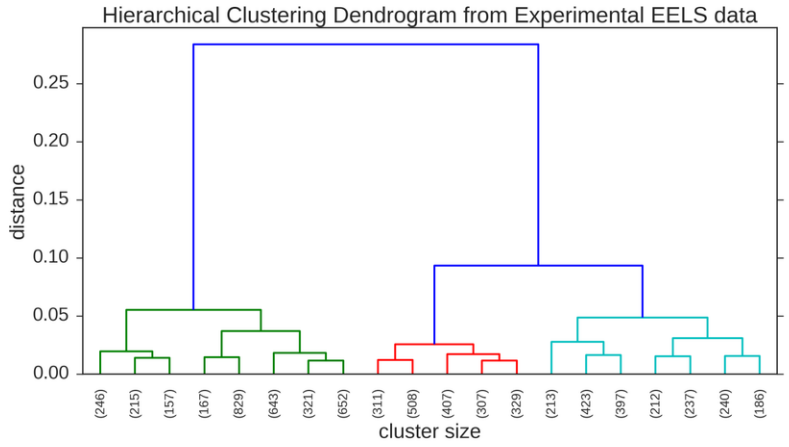
6. Conclusion

Limitation

- Logical error → Is the place where the CCTV is really vulnerable to crime? , the number of CCTV
- Parameter optimization of DBSCAN
- Hard to explain the clustering result

Future Research Plan

- Parameter adjustment
- Explainable clustering → using HDBSCAN
- Combining with social and spatial variables
(ex. Land use, building use, age groups etc.)



Implication

- Urban landscape using unstructured big data
- Training clustering result

THANK YOU