Urban Pattern Recognition In Huston Using a Graph Based Method

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1.Introduction

- Many urban structure types describe as characteristic spatial expressions.

Industry

Residential single family

City center

Residential block building

- The assemblages of land cover parcels which have similar structure pattern, morphology and spatial properties identify as a UST

2.Literature Review

- To extract high order information ,researchers encoding and analyzing the morphological properties and spatial relation on the base of spatial patterns in land cover(Barnsley et al, 1993).
- These properties sometimes were regarded as intrinsic and extrinsic properties of the objects (Gurney and Townshend, 1983).
- Barsenly used adjacency graph and graph recognition system to represent spatial relation of objects.

3.Methodology

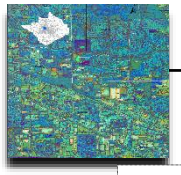


Image Segmentation

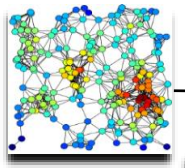
Detect centroids of polygon

Trace building boundary

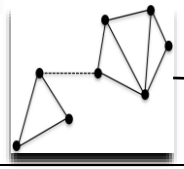
Construct adjacent matrix

Graph Generation

Random Forest Classifier



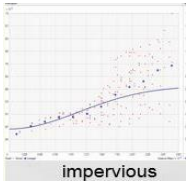
Centrality

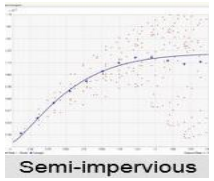


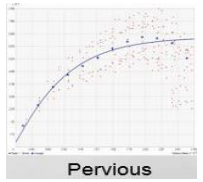
Connectivity

UST	Height	Imperviousness
City center	Multi-stories	High imperviousness
Industrial	>3 stories	Semi impervious
Residential block building	Single story	High imperviousness
Residential single familiy	Low built-up	Low imperviousness

4. Analysis and Discussion







- Impervious and semi-impervious semi-variogram reach a clear sill
- Human activities impact the landscape, sill at a lag distance. Spatial surface cluster significantly.
- Comparatively, the vegetation land cover region, spatial cluster reduces.
- If the cluster significantly when generate graph, the hot spot should be arranged to sub-graph, such remove extremely value.

5.Conclusion

- Comparing to traditional pixel-based and object-based method, graph- based method included information besides spectral and morphology properties.
- Effective graph data structure adapt to urban pattern analysis and enhance information storage probability.
- Ensemble learning method is effective to classify urban structure type.