

# Content-Sensitive Superpixels Based on Adaptive Regrowth



Xiaopeng Li, Junlin Xiong

## SUPERPIXEL

Superpixel method is a technique of higher information abstraction. In superpixels, image pixels are grouped into perceptually meaningful atomic regions that contain less redundant information. Therefore, the number of entities can be greatly reduced when superpixel methods are used as a preprocessing step in computer vision applications.

## CONTENT-SENSITIVE SUPERPIXELS

Content-sensitive superpixel method can produce small superpixels in content-dense regions and large superpixels in content-sparse regions. Thereby, content-sensitive superpixels can capture more details about objects with less number of superpixels.

## METHOD

Superpixels are produced by evolving boundaries from seeds. The boundary constraint encourages boundary adherence and content sensitivity. New superpixels are generated by the regrowth strategy.

1. Place the pixel seeds in unassigned regions (S1, S4).
2. Generate the region seeds (S2, S5).
3. Expand the boundaries of region seeds to form superpixels under the boundary constraint condition (S3).
4. Repeat the above steps until all pixels are assigned to superpixels.
5. Apply region merging method to reduce the number of superpixels to the desired one (S6).

## PROCEDURE



S1: Place pixel seeds

S2: Initialize seed

S3: Evolve boundaries

S4: Resample seed

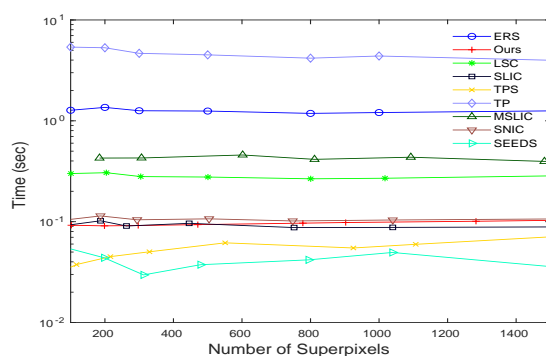
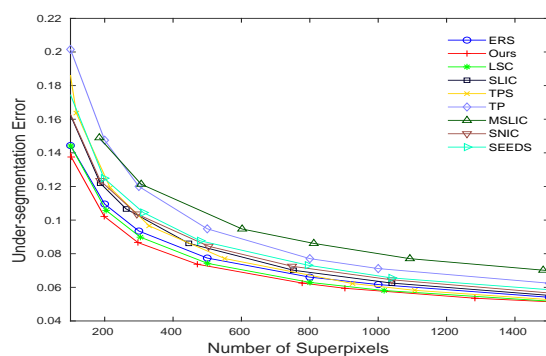
S5: Initialize new seeds

S6: Merge region

The procedure of our method: The region seeds are generated by expanding the pixel seeds. Then region seeds grow to form the superpixels under the boundary constraint condition. New region seeds are gener-

ated with high density in unassigned image regions and grow to new superpixels. Merging is applied to remove small superpixels.

## PERFORMANCE



## RESULTS



Our method captures the building and generates regular superpixels in relatively homogeneous regions.

## REFERENCES

- [1] Achanta et al, "SLIC Superpixels Compared to State-of-the-Art Superpixel Method," *PAMI* '2012
- [2] Liu et al, "Manifold SLIC: A Fast Method to Compute Content-Sensitive Superpixels," In *CVPR* '2016