Object Discovery and Segmentation

Goal: Automatically segment the common object in a set of images, without additional info on the images or the object.

Challenges in Internet datasets:
(a) Extreme variation in appearance (color, texture, shape, pose, size, location, …)
(b) Many noise images (image not containing the common object)

Basic Idea:
- We jointly discover and segment the object in all the images.
- Pixels (features) belonging to the common object should be:
  - Salient - dissimilar to other pixels (features) in the same image.
  - Sparse - similar to other pixels (features) in other images.

Object Discovery and Segmentation

This paper: An unsupervised algorithm that can segment the common visual category(ies) in a set of images. Performs considerably better than previous co-segmentation methods on Internet datasets.

Output: binary masks
- Foreground (the common object)
- Background (the common object)

Unsupervised Joint Object Discovery and Segmentation in Internet Images

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A Small Test Case

Results on Standard Co-segmentation Datasets

- Standard co-segmentation datasets are too simple!
- Can get good (state-of-the-art) accuracy without co-segmentation: $\lambda_{\text{corr}} = 0, \lambda_{\text{nec}} = 0$

Results on Internet Datasets

- Can get good accuracy on Internet Images:
  - Accuracy: 87.66\%
  - Comparison with recent co-seg methods (100 randomly selected images from each dataset):
    - Baseline 1: 89.24\%
    - Baseline 2: 89.76\%
    - Our method: 89.84\%