Weakly-supervised Instance Co-segmentation via Tensor-based Salient Co-peak Search

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Frontiers of Computer Science, ID: 10.1007/s11704-022-2385-x

Problems & Ideas

- Problems:

  Instance co-segmentation with co-peaks are generally estimated by exhaustively exploiting all paired candidates in point-to-point patterns. Such patterns yield a high number of false-positive co-peaks, resulting in over-segmentation whenever there are mutual occlusions.

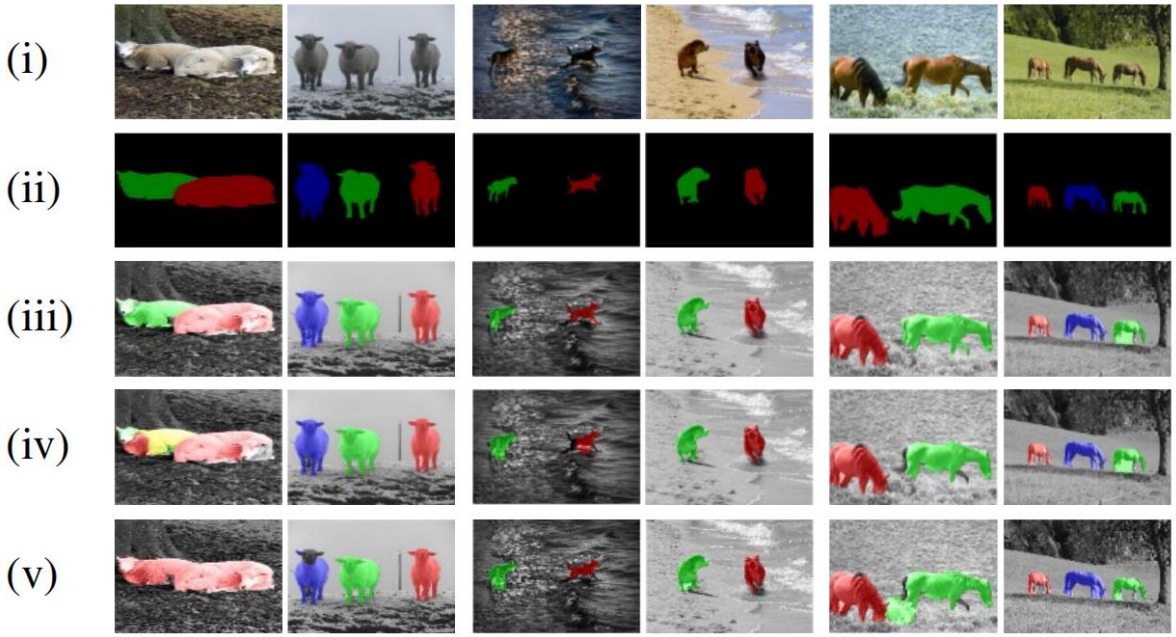
- Ideas:

  We explore high-order correlations via triple-to-triple matching among feature maps to find reliable co-peaks.

The visualization of co-peak response maps (CRMs). From left to right are (a) original image, (b) CRMs extracted from DeepCo3, (c) CRMS extracted from TSCPS-ICS. The identified false-positive (FP) and true-positive (TP) co-peaks are denoted by green and yellow stars, respectively. The FP CRMs suffer from over-segmentation in the scene of mutual occlusions. In comparison, the TP CRMs are shown to eliminate the false-positive co-peaks.

Main Contributions

- Contributions:
  - The deep feature maps are used to construct a rotational invariant matching potential via tensor matching that explores the inherent structures and the inter consistences to ease in seeking the co-peak and co-saliency cues. The high-order tensor matching potential alleviates the false-positive co-peaks, relieving the over-segmentation caused by noises;
  - A co-saliency map is estimated with the supervision of prior information and is used to learn accurate co-peaks and fine co-saliency maps. Instance co-segmentation is achieved by effective co-saliency and co-peak searching.



Experimental results of instance co-segmentation by (iii) TSCPS-ICS; (iv) DeepCo3; (v) PRM on three object categories, including sheep, dog, and horse. The first row is (i) original images, while the second row is the (ii) ground truth for quantifying the performances of each method. One can verify that the result of the proposed TSCPS-ICS achieved superior performance, with the segmentations nearly perfectly matched to the ground truth.