Co-saliency Detection for RGBD Images

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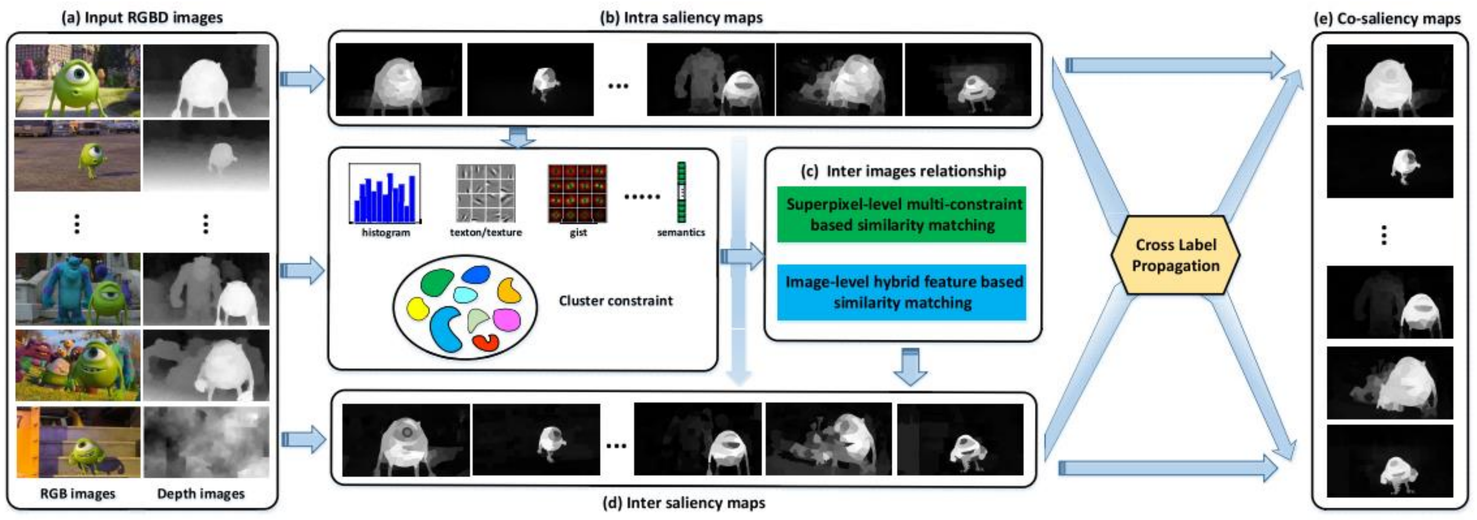
Work 1: Co-saliency detection for RGBD images based on multi-constraint feature matching and cross label propagation, *IEEE Transactions on Image Processing*, vol.27, no.2, pp.568-579, 2018.



- A **multi-constraint feature matching** method is introduced to constrain the inter saliency map generation.
- The **Cross Label Propagation (CLP)** method is proposed to optimize the co-saliency model in a cross manner.
- We construct a **new RGBD co-saliency dataset**, named RGBD Cosal150 dataset, for performance evaluation.

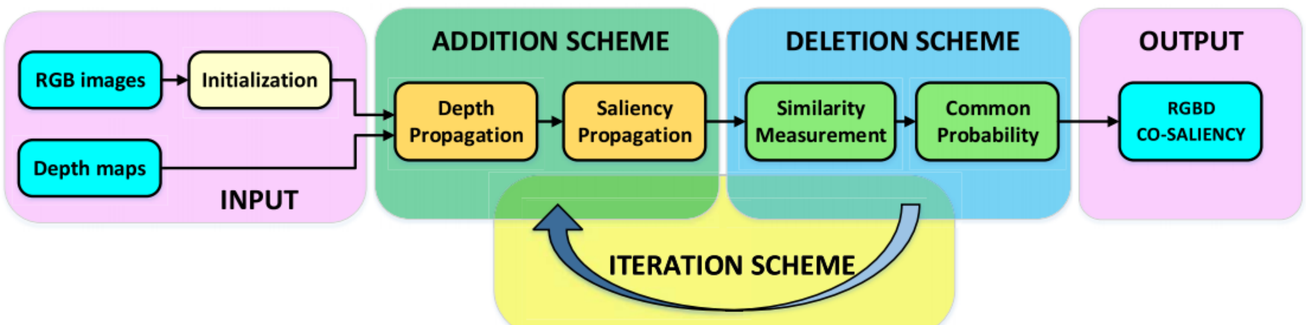
Inter Saliency Detection

- Superpixel-level similarity matching : determine the matching superpixel set for the current superpixel based on three constraints from other images.
- Image-level similarity measurement : provide a global relationship on the whole image scale.
- The inter saliency of a superpixel is defined as the weighted sum of the intra saliency of corresponding superpixels in other images.

Optimization and Propagation

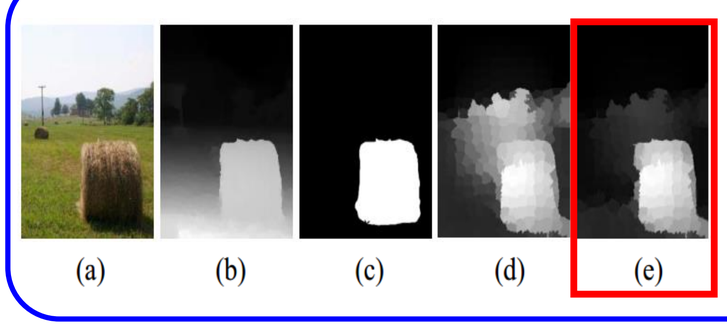
- The optimization of saliency map is casted as a "label propagation" problem.
- The proposed CLP method is used to optimize the intra and inter saliency maps in a cross way, which means the propagative seeds are crosswise interacted.

Work 2: An iterative co-saliency framework for RGBD images, *IEEE Transactions on Cybernetics*, 2018. In Press.



Motivation:

- Use the existing single saliency maps as initialization, and generate the RGBD co-saliency map via a refinement-cycle model.
- The proposed method can effectively exploit any existing 2-D saliency model to work well in RGBD co-saliency scenarios.



Depth Shape Prior

$$\mathrm{DSP}_k^i\left(r_{cp}^i\right) = 1 - \min\left(\left|d_{cp,l}^i - d_{c,l-1}^i\right|, \left|d_{cp,l}^i - d_{rk}^i\right|\right)$$

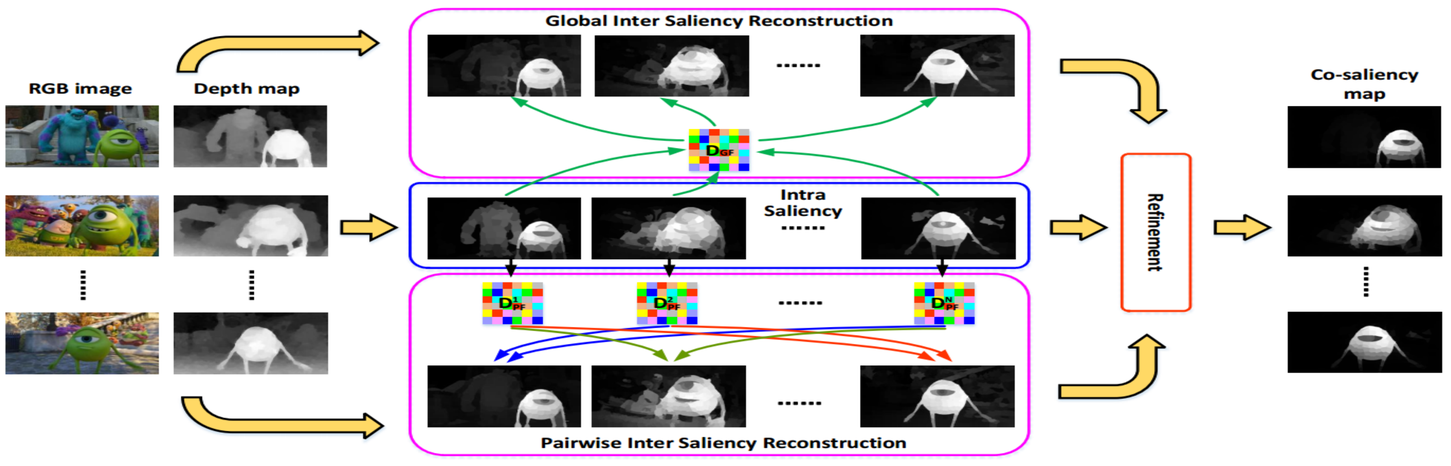
$$\mathrm{DSP}^i(r_m^i) = \frac{1}{K}\sum_{k=1}^{K}\mathrm{DSP}_k^i(r_m^i)$$

(a) RGB image. (b) Depth map. (c) Ground truth. (d) RGB saliency result. (e) RGBD saliency result with DSP descriptor.

Deletion Scheme

- A superpixel-level similarity measurement is constructed to represent the similarity relationship between two superpixels.
- A common probability function using the similarity measurement is used to calculate the likelihood of each superpixel belonging to the common regions.

Work 3: HSCS: Hierarchical sparsity based co-saliency detection for RGBD images, *IEEE Transactions on Multimedia*, 2018. In Press



- The global sparsity reconstruction model captures the global characteristic among the whole image group through a common foreground dictionary.
- The pairwise sparsity reconstruction model utilizes a set of foreground dictionaries produced by other images to explore local inter-image information.
- The energy function refinement model is designed to improve the intra-image smoothness and inter-image consistency, including the unary data term, spatial smooth term, and holistic consistency term.

	RGBD CoSal150 Dataset		RGBD CoSeg183 Dataset	
	F-measure	MAE	F-measure	MAE
DSR [9]	0.6956	0.1867	0.5496	0.1092
BSCA [10]	0.7318	0.1925	0.5678	0.1877
DCLC [12]	0.7385	0.1728	0.5994	0.1097
HDCT [14]	0.6753	0.2146	0.5447	0.1307
SMD [15]	0.7494	0.1774	0.5760	0.1229
DCL* [17]	0.8345	0.1056	0.5531	0.0967
DSS* [19]	0.8540	0.0869	0.5972	0.0782
R3Net* [22]	0.7812	0.1296	0.6190	0.0678
ACSD [36]	0.7788	0.1806	0.4787	0.1940
DF* [40]	0.6844	0.1945	0.4840	0.1077
CTMF* [41]	–	–	0.5316	0.1259
PCFN* [42]	–	–	0.6049	0.0782
CCS [49]	0.6311	0.2138	0.5383	0.1210
SCS [47]	0.6724	0.1966	0.5553	0.1616
LRMF [53]	0.6995	0.1813	–	–
ICS [67]	0.7915	0.1790	0.6011	0.1544
MCLP [68]	0.8403	0.1370	0.6365	0.0979
HSCS	0.8500	0.1030	0.6466	0.0787

Survey Paper: Review of visual saliency detection with comprehensive information, *IEEE Transactions on Circuits and Systems for Video Technology*, 2018. In Press