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DEPTH-AWARE SALIENCY DETECTION USING DISCRIMINATIVE SALIENCY FUSION

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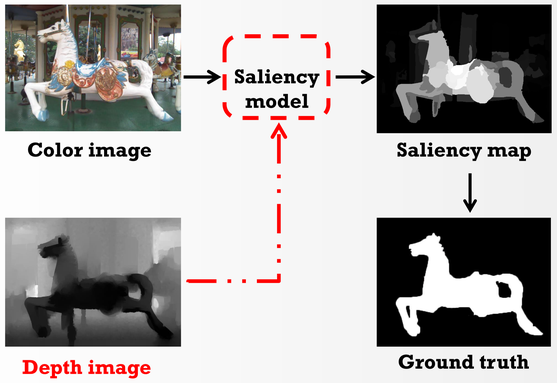
Problem



Abstract

Additional depth information from RGBD images is one of characteristics different from conventional 2D images. Saliency detection aims to detect the attractive objects to human viewers in an image. Generally, saliency cues from different features are measured and fused into a single saliency using a linear or experiential fusion formula. we introduce a multi-stage depth-aware saliency model to fuse multiple saliency maps in a discriminative method.

Core idea: Discriminative saliency fusion

Contributions

1. **A new multi-level discriminative saliency fusion approach for salient object detection.**
2. **Apply machine learning methods to fuse multiple bottom-up saliency detection results.**

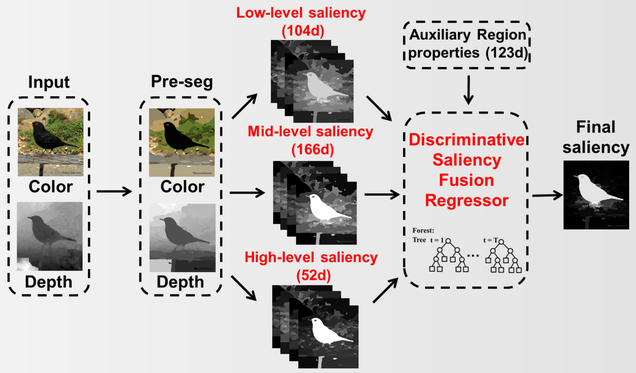


Figure 1. The framework of the proposed model

Multi-level saliency detection

Regional Features		Low-level saliency (104)	Middle-level saliency (166)	High-level saliency (52)	Total dim (312)
Color	Average RGB values	6	12	3	84
	RGB histogram	2	4	1	
	Average HSV values	6	12	3	
	HSV histogram	2	4	1	
	Average Lab values	6	12	3	
	Lab histogram	2	4	1	
Depth	Average Depth values	2	2	1	10
	Depth histogram	2	2	1	
Texture	Absolute LM filter response	60	90	20	216
	Max LM response histogram	4	6	2	
	LBP histogram	4	6	2	
	Hog feature	4	6	2	
GD	Average GD values	4	6	2	12

1. **Low-level saliency**

$$LS^k_{G/B}(R_i) = \sum_{R_j \in G/B} w_{i,j} \cdot D^k_{i,j} \qquad w_{i,j} = |R_j| \cdot \exp\left(-\|c_i - c_j\| / \alpha \cdot L\right)$$

2. **Mid-level saliency**

$$MS^k_{G/B,DP}(R_i) = \exp(-d_i) \cdot LS^k_{G/B}, \forall f^k \notin \Omega_D$$

$$MS^k_{G/B,DG}(R_i) = Geo_d(R_i) \cdot LS^k_{G/B}, \forall f^k \notin \Omega_D$$

$$MS^k_{G/B,CG}(R_i) = Geo_c(R_i) \cdot LS^k_{G/B}, \forall f^k \notin \Omega_C$$

3. **High-level saliency**

$$OP(R_i) = \left(1 - \left(\frac{NB_i}{NB_{\max}}\right)^{\beta}\right) \cdot \exp\left(\frac{-SDC_i}{L/2}\right)$$

$$HS^k_i = OP_i \cdot \frac{\sum_{j=1, j\neq i}^{n} OP_j \cdot \left(1 - ND^k_{i,j} / ND^k_{\max}\right)}{\sum_{j=1, j\neq i}^{n} \left(1 - ND^k_{i,j} / ND^k_{\max}\right)}$$

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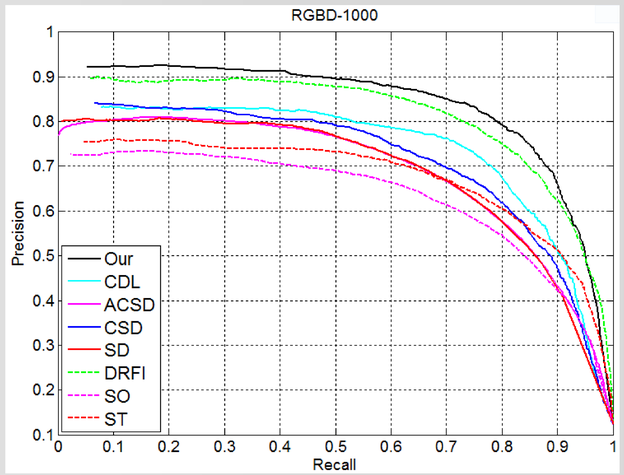
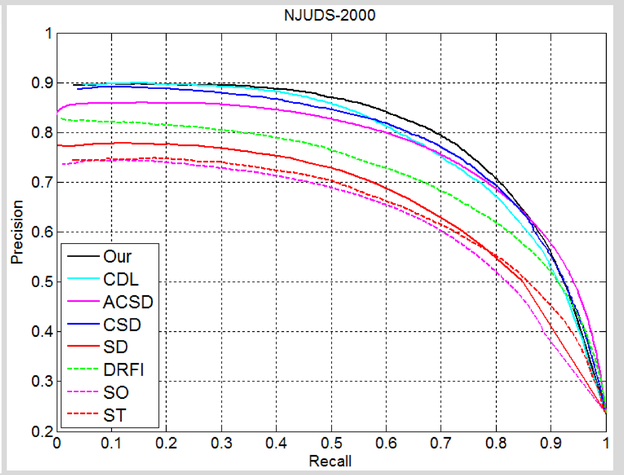
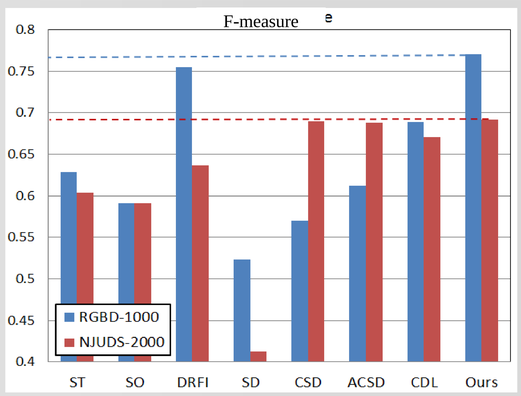
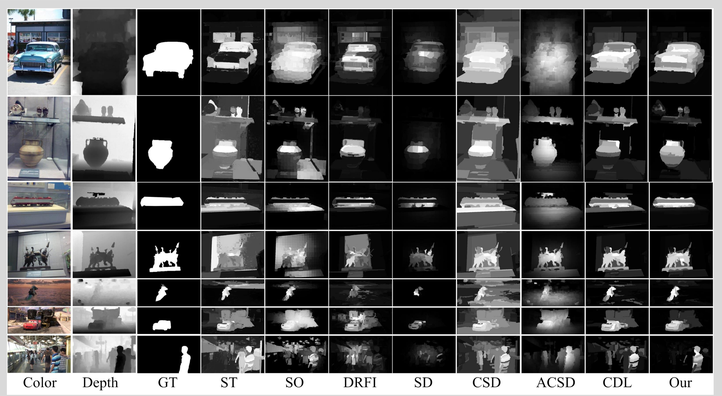
Evaluation on RGBD1000 and NJUD2000

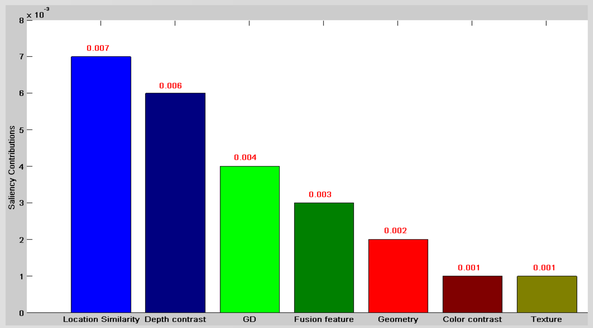








Contributions Analysis



Conclusions

- **We introduce a new multi-level discriminative saliency fusion framework for RGBD salient object detection.**
- **Both subjective and objective evaluations indicate a satisfactory overall saliency detection performance of our DSF model.**

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