

Salient object detection

Advisor

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Student

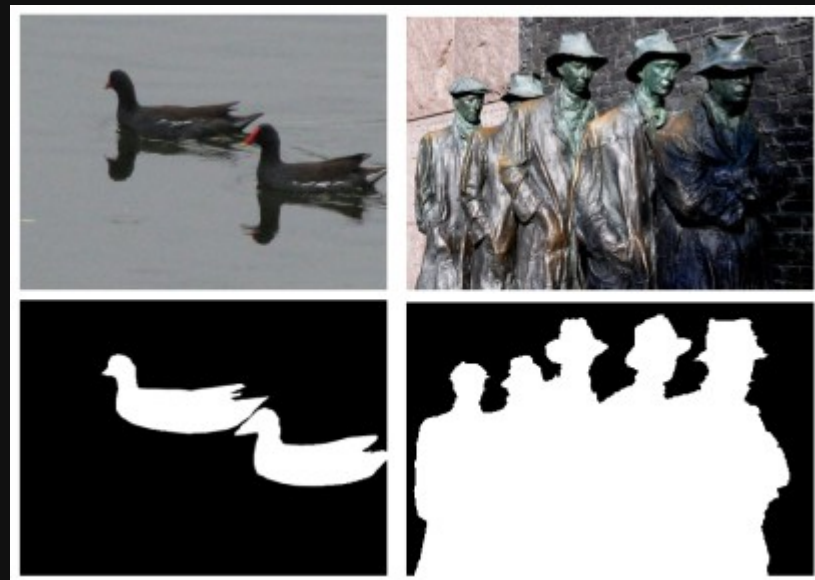
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What is salient object detection?

- Salient object detection or salient object segmentation
- Detecting the most salient object
- Segmenting the accurate boundary of that object



- Gupta, A.K.; Seal, A.; Prasad, M.; Khanna, P. Salient Object Detection Techniques in Computer Vision—A Survey. Entropy 2020, 22, 1174. <https://doi.org/10.3390/e22101174>

Salient object detection models

- Block-based and region-based
 - Pixels
 - Blocks
 - Superpixels
 - Regions
- Intrinsic cues
 - Edge, blob, texture, corner
- Extrinsic cues
 - Ground-truth annotations of the training images
 - Similar images
 - The video sequence
 - A set of input images containing the common salient objects
 - Depth maps
 - Light field images

Applications of Salient Object Detection

- Object detection and recognition
- Image and video compression
- Video summarization
- Photo collage/media re-targeting/cropping/thumb-nailing
- Image quality assessment
- Image segmentation
- Content-based image retrieval and image collection browsing
- Image editing and manipulating
- Visual tracking
- Object discovery
- Human-robot interaction

Datasets for salient object detection

#	Dataset	Reference	Year	Images	Objects	Annotation	Resolution	Annotators	Eye data	Image/Video
1	MSRA-A	[7], [232]	2007	20K	~1	Bounding Box	400 × 300	3	-	I
2	MSRA-B	[7], [232]	2007	5K	~1	Bounding Box	400 × 300	9	-	I
3	SED1	[139], [233]	2007	100	1	Pixel-wise	~300 × 225	3	-	I
4	SED2	[139], [233]	2007	100	2	Pixel-wise	~300 × 225	3	-	I
5	ASD	[7], [81]	2009	1000	~1	Pixel-wise	400 × 300	1	-	I
6	SOD	[13], [234]	2010	300	~3	Pixel-wise	481 × 321	7	-	I
7	iCoSeg	[131]	2010	643	~1	Pixel-wise	~500 × 400	1	-	I
8	MSRA5K	[7], [97]	2011	5K	~1	Pixel-wise	400 × 300	1	-	I
9	Infrared	[235], [236]	2011	900	~5	Pixel-wise	1024 × 768	2	15	I
10	ImgSal	[223]	2013	235	~ 2	Pixel-wise	640 × 480	19	50	I
11	CSSD	[87]	2013	200	~1	Pixel-wise	~400 × 300	1	-	I
12	ECSSD	[87], [237]	2013	10K	~1	Pixel-wise	~400 × 300	1	-	I
13	MSRA10K	[7], [238]	2013	10K	~1	Pixel-wise	400 × 300	1	-	I
14	THUR15K	[7], [238]	2013	15K	~1	Pixel-wise	400 × 300	1	-	I
15	DUT-OMRON	[101]	2013	5,172	~5	Bounding Box	400 × 400	5	5	I
16	Bruce-A	[6], [45]	2013	120	~4	Pixel-wise	681 × 511	70	20	I
17	Judd-A	[53], [239]	2014	900	~5	Pixel-wise	1024 × 768	2	15	I
18	PASCAL-S	[52]	2014	850	~5	Pixel-wise	variable	12	8	I
19	UCSB	[46]	2014	700	~5	Point-wise Clicks	405 × 405	100	8	I
20	OSIE	[156]	2014	700	~5	Pixel-wise	800 × 600	1	15	I
21	RSD	[240]	2009	62,356	variable	Bounding Box	variable	23	-	V
22	STC	[241]	2011	4,870	~1	Bounding Box	variable	1	-	V

Evaluation Measures

- Precision-recall (PR)
- F-measure
- Receiver operating characteristics (ROC) curve
- Area under ROC curve (AUC)
- Mean absolute error (MAE)

Reference

- Borji, A., Cheng, MM., Hou, Q. et al. Salient object detection: A survey. *Comp. Visual Media* 5, 117–150 (2019).
<https://doi.org/10.1007/s41095-019-0149-9>

Thank you