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## BASNet (New Version May 2nd, 2021)

‘Boundary-Aware Segmentation Network for Mobile and Web Applications’, Xuebin Qin, Deng-Ping Fan, Chenyang Huang, Cyril Diagne, Zichen Zhang, Adria Cabeza Sant’Anna, Albert Suarez, Martin Jagersand, and Ling Shao.

### Salient Object Detection(SOD) Qualitative Comparison

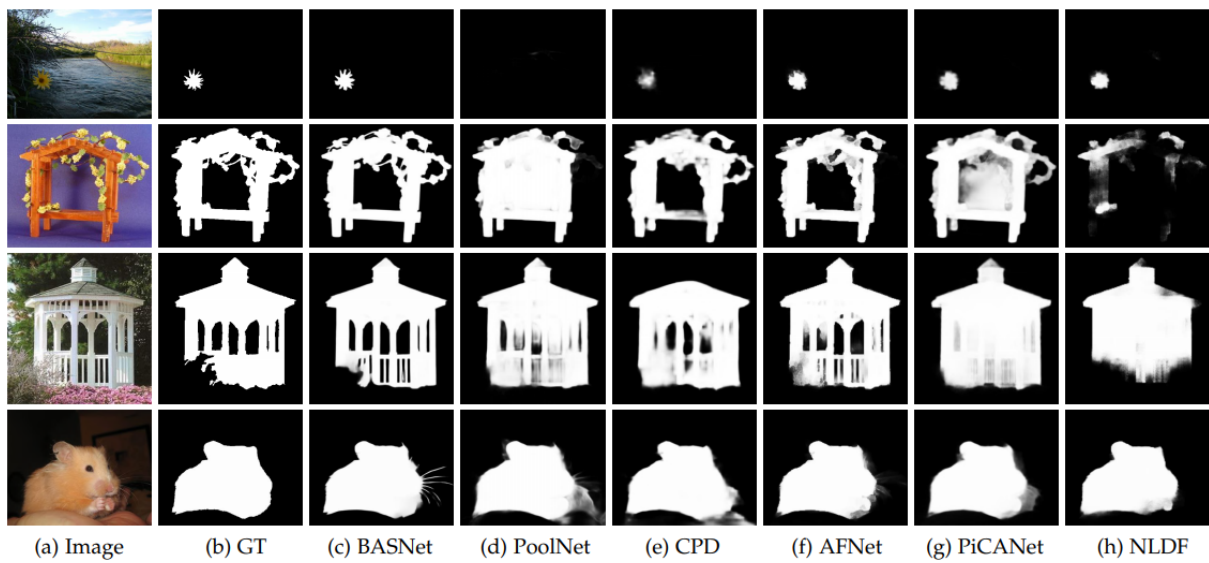


Fig. 7. Qualitative comparison on salient object segmentation datasets.

### Salient Objects in Clutter(SOC) Qualitative Comparison

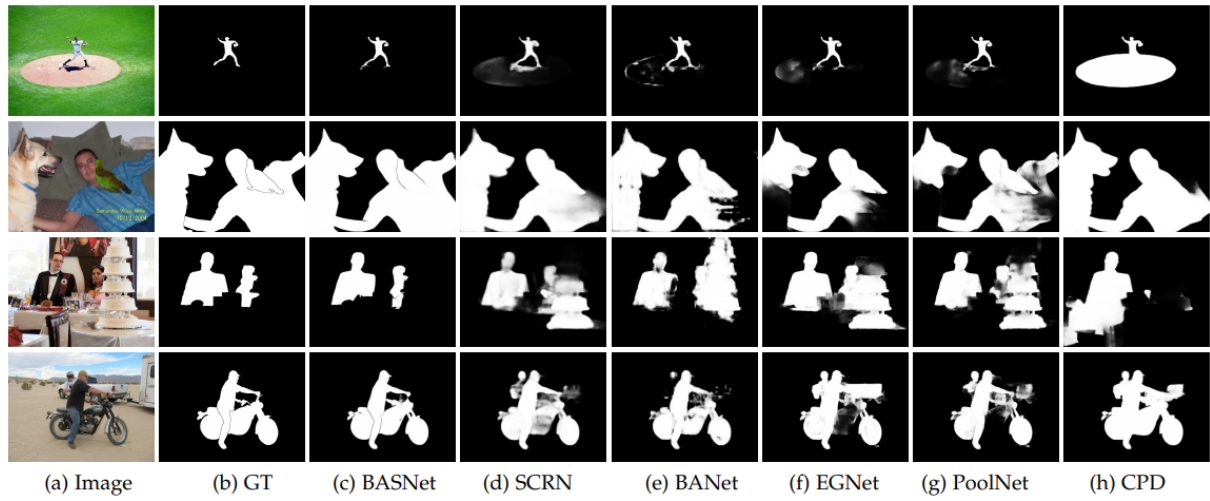


Fig. 8. Qualitative comparison on typical samples from the SOC dataset. Images from top to bottom are from attributes SO (Small Object), OV(Out-of-View), OC (Occlusion) and SC (Shape Complexity) respectively.

### Camouflaged Object Detection(COD) Qualitative Comparison

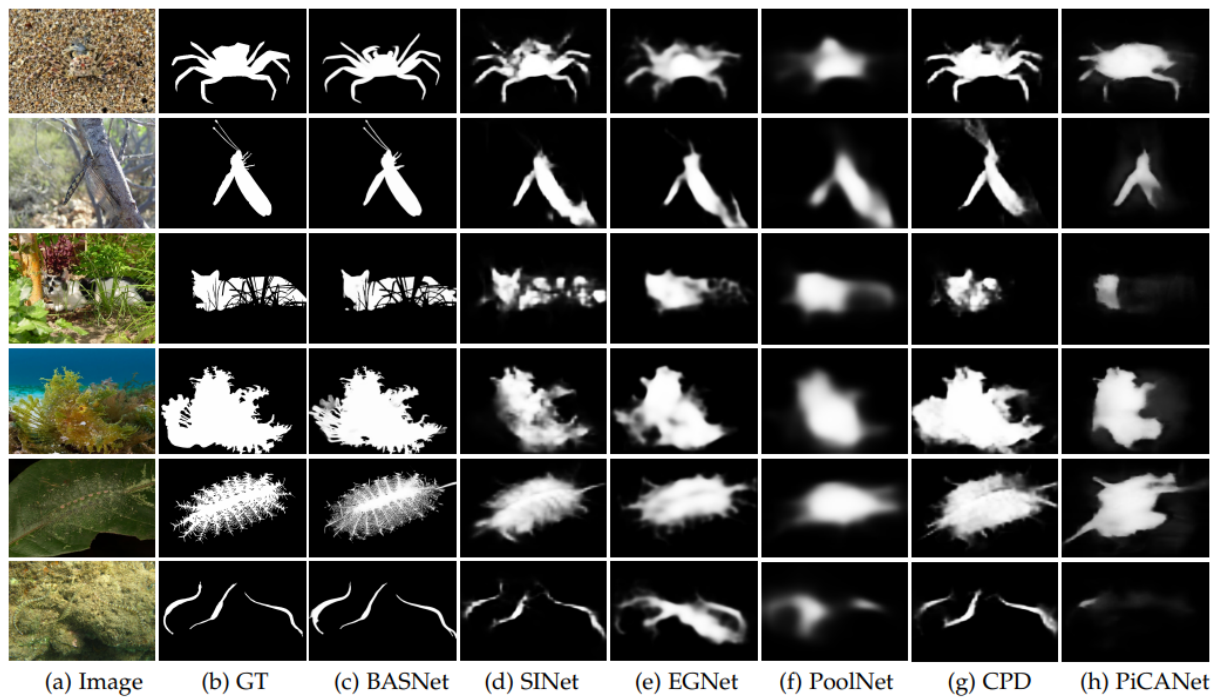


Fig. 11. Qualitative comparison on camouflaged object segmentation datasets. See § 4.4.2 for details.

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## Predicted maps of SOD, SOC and COD datasets

SOD Results will come soon!

SOC Results will come soon!

COD Results

## BASNet (CVPR 2019)

Code for CVPR 2019 paper '*BASNet: Boundary-Aware Salient Object Detection* code', Xuebin Qin, Zichen Zhang, Chenyang Huang, Chao Gao, Masood Dehghan and Martin Jagersand.

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**(2020-May-09) NEWS! Our new Salient Object Detection model (U^2-Net), which is just accepted by Pattern Recognition, is available now!**

U^2-Net: Going Deeper with Nested U-Structure for Salient Object Detection

## Evaluation

Evaluation Code

## Required libraries

Python 3.6

numpy 1.15.2

scikit-image 0.14.0

PIL 5.2.0

PyTorch 0.4.0

torchvision 0.2.1

glob

The SSIM loss is adapted from pytorch-ssim.

## Usage

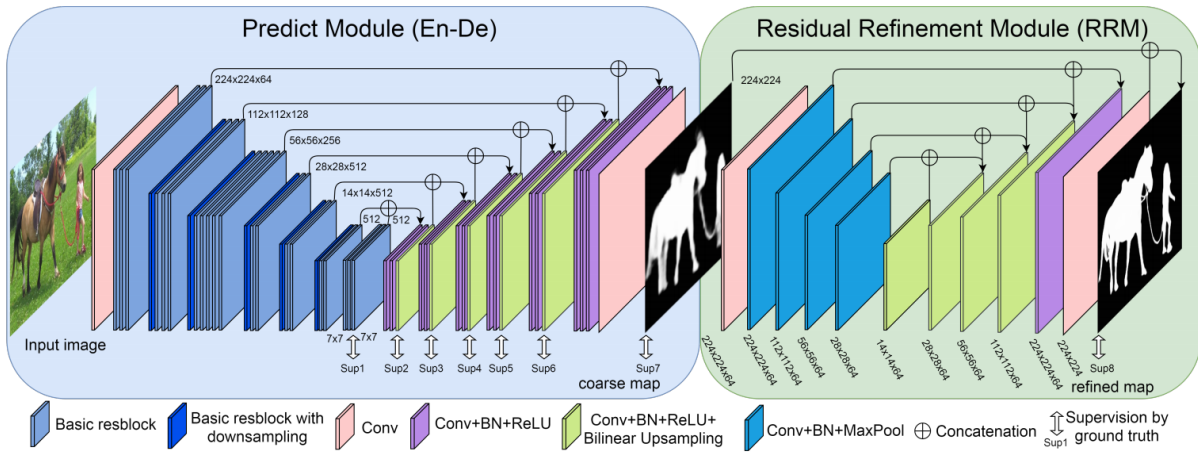
1. Clone this repo

```
1 git clone https://github.com/NathanUA/BASNet.git
```

2. Download the pre-trained model basnet.pth from GoogleDrive or baidu extraction code: 6phq, and put it into the directory 'saved\_models/basnet\_bsi/'
3. Cd to the directory 'BASNet', run the training or inference process by command: `python basnet_train.py` or `python basnet_test.py` respectively.

We also provide the predicted saliency maps (GoogleDrive,Baidu) for datasets SOD, ECSSD, DUT-OMRON, PASCAL-S, HKU-IS and DUTS-TE.

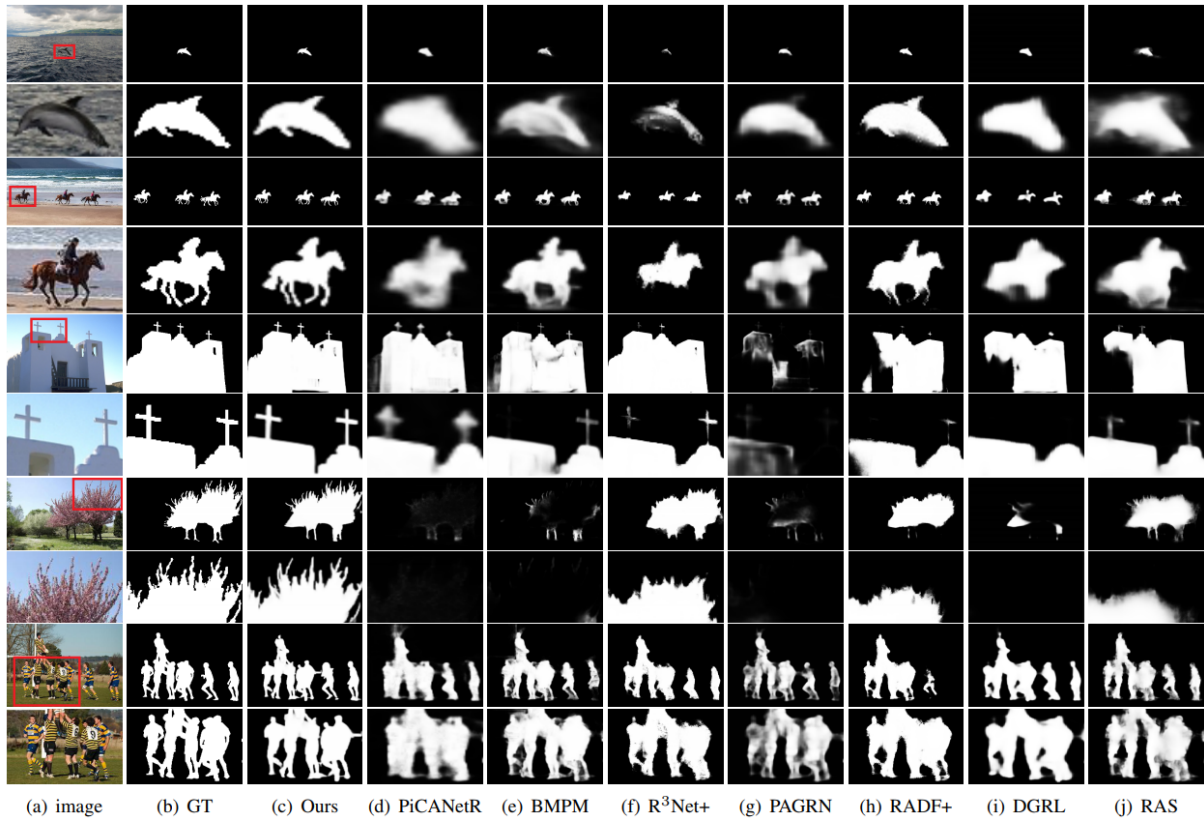
## Architecture



## Quantitative Comparison

Method	Backbone	Training data		SOD [45]			ECSSD [68]			DUT-OMRON [69]			PASCAL-S [37]			HKU-IS [33]			DUTS-TE [62]		
				$maxF_{\beta}$	$relaxF_{\beta}^{\%}$	MAE	$maxF_{\beta}$	$relaxF_{\beta}^{\%}$	MAE	$maxF_{\beta}$	$relaxF_{\beta}^{\%}$	MAE	$maxF_{\beta}$	$relaxF_{\beta}^{\%}$	MAE	$maxF_{\beta}$	$relaxF_{\beta}^{\%}$	MAE	$maxF_{\beta}$	$relaxF_{\beta}^{\%}$	MAE
Ours	ResNet-34	DT	10553	0.851	0.603	0.114	0.942	0.826	0.037	0.805	0.694	0.056	0.854	0.660	0.076	0.928	0.807	0.032	0.860	0.758	0.047
PiCANetR [39]	ResNet-50	DT	10553	0.856	0.528	0.104	0.935	0.775	0.046	0.803	0.632	0.065	0.857	0.598	0.076	0.918	0.765	0.043	0.860	0.696	0.050
BMPM [72]	VGG-16	DT	10553	0.856	0.562	0.108	0.928	0.770	0.045	0.774	0.612	0.064	0.850	0.617	0.074	0.921	0.773	0.039	0.852	0.699	0.048
R <sup>3</sup> Net+ [6]	ResNeXt	MK	10000	0.850	0.431	0.125	0.934	0.759	0.040	0.795	0.599	0.063	0.834	0.538	0.092	0.915	0.740	0.036	0.828	0.601	0.058
PAGRN [76]	VGG-19	DT	10553	-	-	-	0.927	0.747	0.061	0.771	0.582	0.071	0.847	0.594	0.0895	0.918	0.762	0.048	0.854	0.692	0.055
RADF+ [19]	VGG-16	MK	10000	0.838	0.476	0.126	0.923	0.720	0.049	0.791	0.579	0.061	0.830	0.515	0.097	0.914	0.725	0.039	0.821	0.608	0.061
DGRL [65]	ResNet-50	DT	10553	0.848	0.502	0.106	0.925	0.753	0.042	0.779	0.584	0.063	0.848	0.569	0.074	0.913	0.744	0.037	0.834	0.656	0.051
RAS [4]	VGG-16	MB	2500	0.851	0.544	0.124	0.921	0.741	0.056	0.786	0.615	0.062	0.829	0.560	0.101	0.913	0.748	0.045	0.831	0.656	0.059
C2S [36]	VGG-16	M30K	30000	0.823	0.457	0.124	0.910	0.708	0.055	0.758	0.565	0.072	0.840	0.543	0.082	0.896	0.717	0.048	0.807	0.607	0.062
LF <sup>3</sup> [73]	VGG-16	MK	10000	0.828	0.479	0.123	0.911	0.694	0.052	0.740	0.508	0.103	0.801	0.499	0.107	0.911	0.731	0.040	0.778	0.556	0.083
DSS+ [17]	VGG-16	MB	2500	0.846	0.444	0.124	0.921	0.696	0.052	0.781	0.559	0.063	0.831	0.499	0.093	0.916	0.706	0.040	0.825	0.606	0.056
NLDF+ [41]	VGG-16	MB	2500	0.841	0.475	0.125	0.905	0.666	0.063	0.753	0.514	0.080	0.822	0.495	0.098	0.902	0.694	0.048	0.813	0.591	0.065
SRM [64]	ResNet-50	DT	10553	0.843	0.392	0.128	0.917	0.672	0.054	0.769	0.523	0.069	0.838	0.509	0.084	0.906	0.680	0.046	0.826	0.592	0.058
Amulet [74]	VGG-16	MK	10000	0.798	0.454	0.144	0.915	0.711	0.059	0.743	0.528	0.098	0.828	0.541	0.100	0.897	0.716	0.051	0.778	0.568	0.084
UCF [75]	VGG-16	MK	10000	0.808	0.471	0.148	0.903	0.669	0.069	0.730	0.480	0.120	0.814	0.493	0.115	0.888	0.679	0.062	0.773	0.518	0.112
MDF [35]	R-CNN [9]	MB	2500	0.746	0.311	0.192	0.832	0.472	0.105	0.694	0.406	0.092	0.759	0.343	0.142	0.860	0.594	0.129	0.729	0.447	0.099

## Qualitative Comparison



## Citation

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1 @article{DBLP:journals/corr/abs-2101-04704,
2   author    = {Xuebin Qin and
3               Deng{-}Ping Fan and
4               Chenyang Huang and
5               Cyril Diagne and
6               Zichen Zhang and
7               Adri{\`{a}} Cabeza Sant'Anna and
8               Albert Su{\`{a}}rez and
9               Martin J{\`{a}}gersand and
10              Ling Shao},
11   title     = {Boundary-Aware Segmentation Network for Mobile and Web
12               Applications},
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15   year      = {2021},
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17   archivePrefix = {arXiv},

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## Citation

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1 @InProceedings{Qin_2019_CVPR,  
2   author = {Qin, Xuebin and Zhang, Zichen and Huang, Chenyang and Gao,  
3     Chao and Dehghan, Masood and Jagersand, Martin},  
4   title = {BASNet: Boundary-Aware Salient Object Detection},  
5   booktitle = {The IEEE Conference on Computer Vision and Pattern  
6     Recognition (CVPR)},  
7   month = {June},  
8   year = {2019}  
9 }
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