Complexity-Adaptive Distance Metric for Object Proposals Generation

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1. Supplementary Experiments

In this document, all the comparison experiment results in terms of various set up are presented for evaluation.

1.1. Evaluation on PASCAL VOC 2012 Dataset

First we evaluate the performance on PASCAL VOC 2012 dataset. Figure 1 shows the recall versus IoU threshold curves with candidates number varying from 500-3000. The quantitative results of corresponding MABO and AUC are reported in Table 1. In Figure 2 the recall versus candidate number curves under IoU threshold ranged from 0.5 to 0.9 are displayed, as well as the area under "recall versus IoU threshold" curves for varying number of proposed windows.

To show the robustness and generality of the proposed complexity-adaptive distance measurement, we further compare the recall values for each of the 20 categories, as visualized in Figure 3. For details of the experiment set up please refer to Section 4 of the paper and the corresponding references.

	500 Candidates		1000 Candidates		1500 Candidates		2000 Candidates		2500 Candidates		3000 Candidates		
Methods	MABO	AUC	MABO	AUC	MABO	AUC	MABO	AUC	MABO	AUC	MABO	AUC	time
Selective Search [3]	0.771	0.517	0.799	0.562	0.808	0.578	0.812	0.585	0.840	0.642	0.843	0.647	5.4
MCG [1]	0.757	0.510	0.782	0.547	0.795	0.566	0.802	0.578	0.831	0.634	0.837	0.642	33.4
EdgeBox [4]	0.755	0.520	0.782	0.559	0.792	0.576	0.798	0.585	0.801	0.591	0.803	0.595	0.3
SPA [2]	0.736	0.487	0.776	0.545	0.796	0.577	0.800	0.583	0.800	0.583	0.800	0.583	16.7
CA1	0.768	0.517	0.809	0.585	0.828	0.620	0.836	0.631	0.838	0.634	0.843	0.641	7.3
CA2	**0.775**	**0.536**	**0.812**	**0.597**	**0.829**	**0.627**	**0.840**	**0.647**	**0.851**	**0.661**	**0.854**	**0.665**	15.6

Table 1. Comparison results of MABO and AUC on PASCAL VOC 2012 dataset, with candidates number varying from 500-3000; CA1 and CA2 respectively are the two parameter settings used in our method. Running time of all the methods are also shown.

1.2. Evaluation on BSDS Dataset

We further do comparisons on BSDS dataset, results are presented as follows. Figure 4 shows the recall versus IoU with candidates number varying from 500-2000. The quantitative results are reported in Table 2. In Figure 5 the recall versus candidate number curves under IoU threshold ranged from 0.5 to 0.9 are displayed, as well as the area under "recall versus IoU threshold" curves for varying number of proposed windows. From this comparisons we can see that our proposed method also achieves state-of-the art results.

	500 Candidates		1000 Candidates		1500 Candidates		2000 Candidates	
Methods	MABO	AUC	MABO	AUC	MABO	AUC	MABO	AUC
Selective Search [3]	0.731	0.512	0.766	0.564	0.781	0.584	0.784	0.586
MCG [1]	0.734	**0.531**	0.769	0.581	0.784	0.597	0.785	0.600
EdgeBox [4]	0.733	0.514	0.758	0.542	0.767	0.552	0.772	0.557
CA1	**0.737**	0.524	**0.771**	0.580	**0.786**	0.601	0.789	0.605
CA2	0.721	0.512	0.766	**0.583**	**0.786**	**0.610**	**0.801**	**0.631**

Table 2. Comparison results of MABO and AUC on BSDS dataset, with candidates number varying from 500-2000; CA1 and CA2 respectively are the two parameter settings used in our method. Running time of all the methods are also shown.

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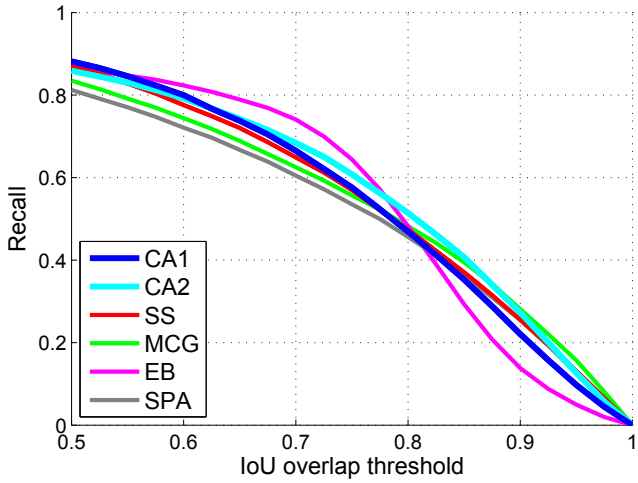
References

[1] P. Arbeláez, J. Pont-Tuset, J. T. Barron, F. Marques, and J. Malik. Multiscale combinatorial grouping. CVPR, 2014. 1

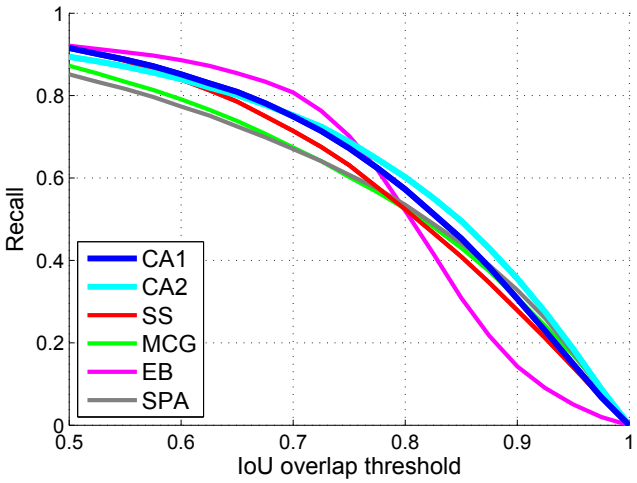
[2] P. Rantalankila, J. Kannala, and E. Rahtu. Generating object segmentation proposals using global and local search. *The IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, June 2014. 1

[3] J. R. Uijlings, K. E. van de Sande, T. Gevers, and A. W. Smeulders. Selective search for object recognition. *International journal of computer vision*, 104(2):154–171, 2013. 1

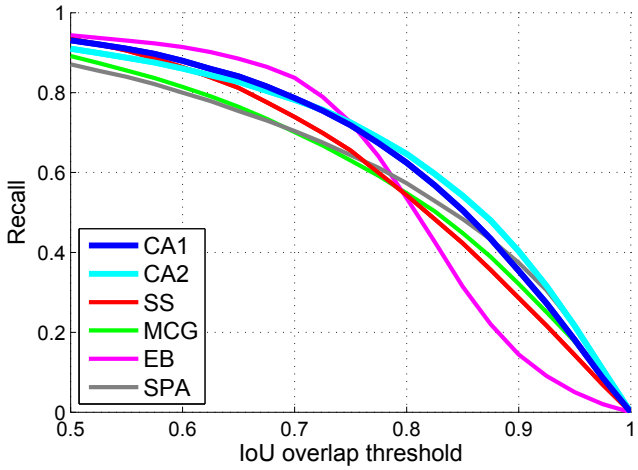
[4] C. L. Zitnick and P. Dollár. Edge boxes: Locating object proposals from edges. In *Computer Vision–ECCV 2014*, pages 391–405. Springer, 2014. 1



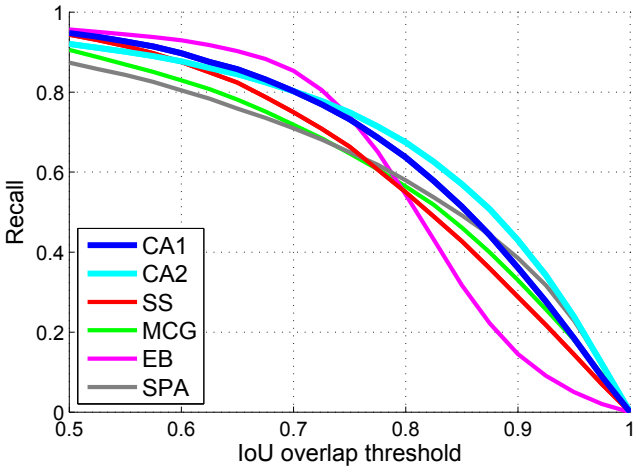
(a) 500 proposals per image.



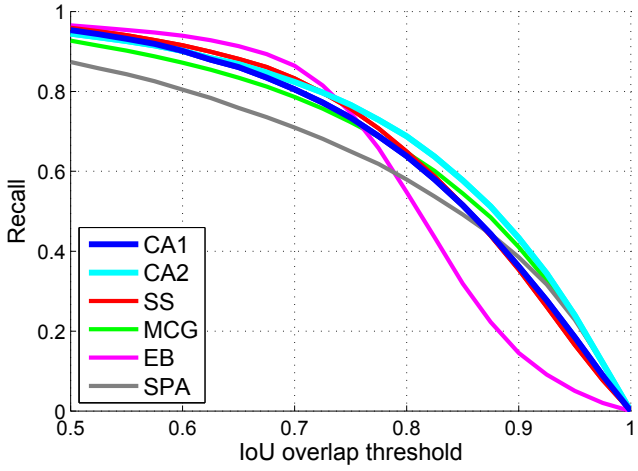
(b) 1000 proposals per image.



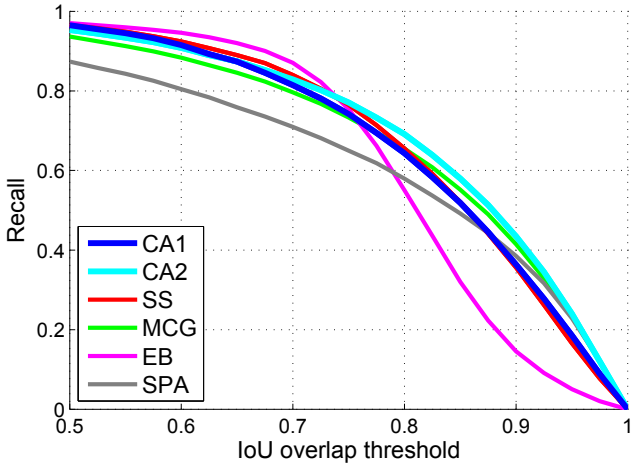
(c) 1500 proposals per image.



(d) 2000 proposals per image.

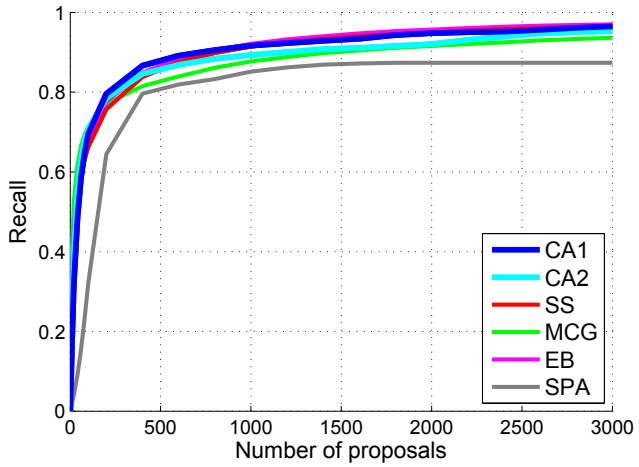


(e) 2500 proposals per image.

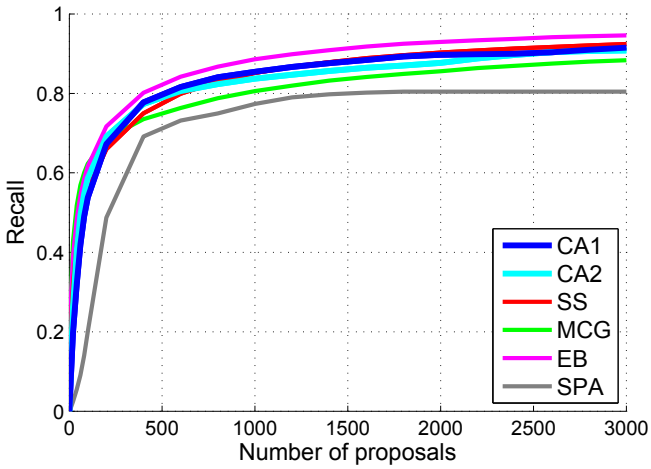


(f) 3000 proposals per image.

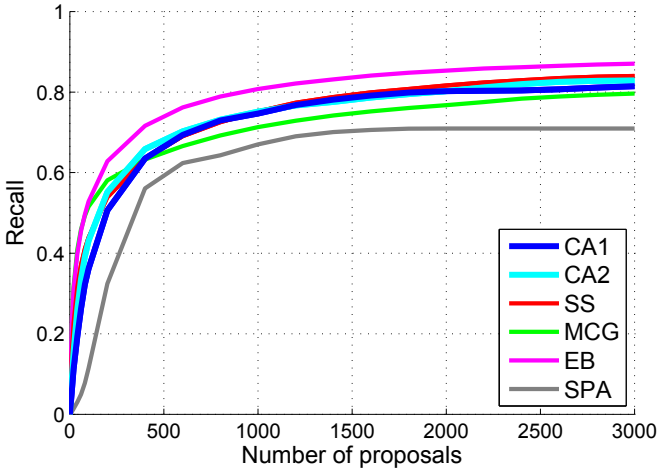
Figure 1. Recall versus IoU threshold on PASCAL VOC 2012.



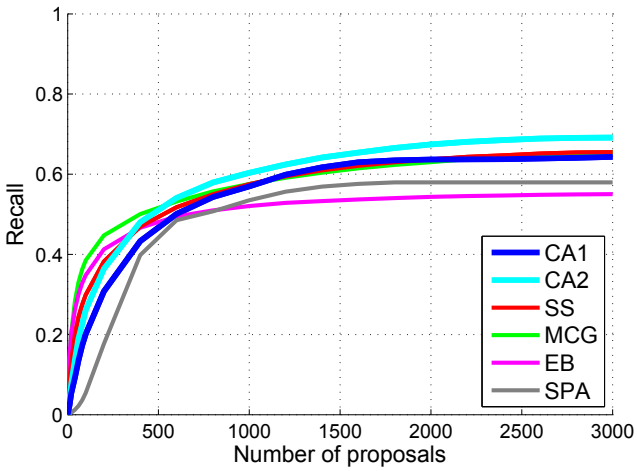
(a) IoU = 0.5.



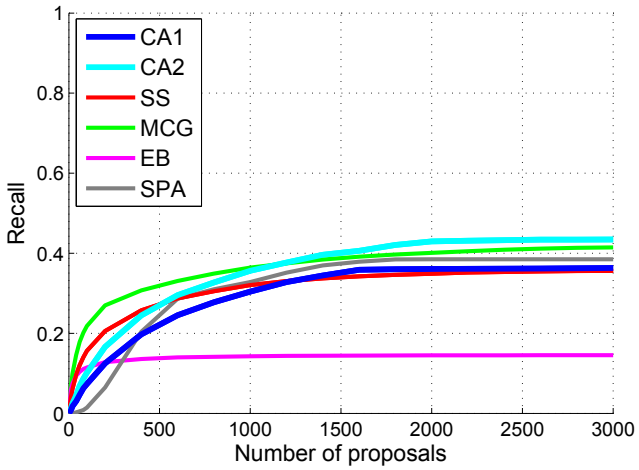
(b) IoU = 0.6.



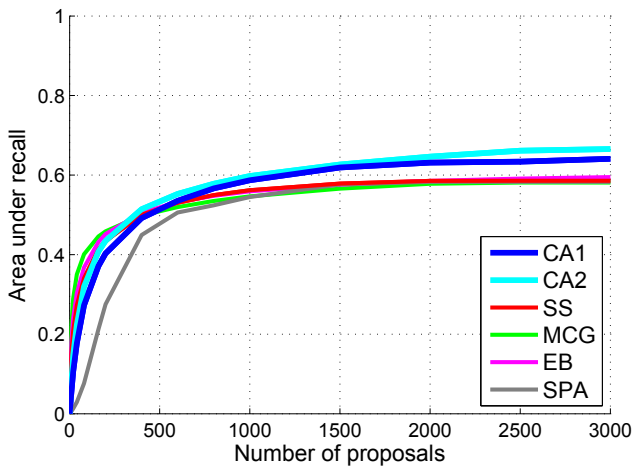
(c) IoU = 0.7.



(d) IoU = 0.8.

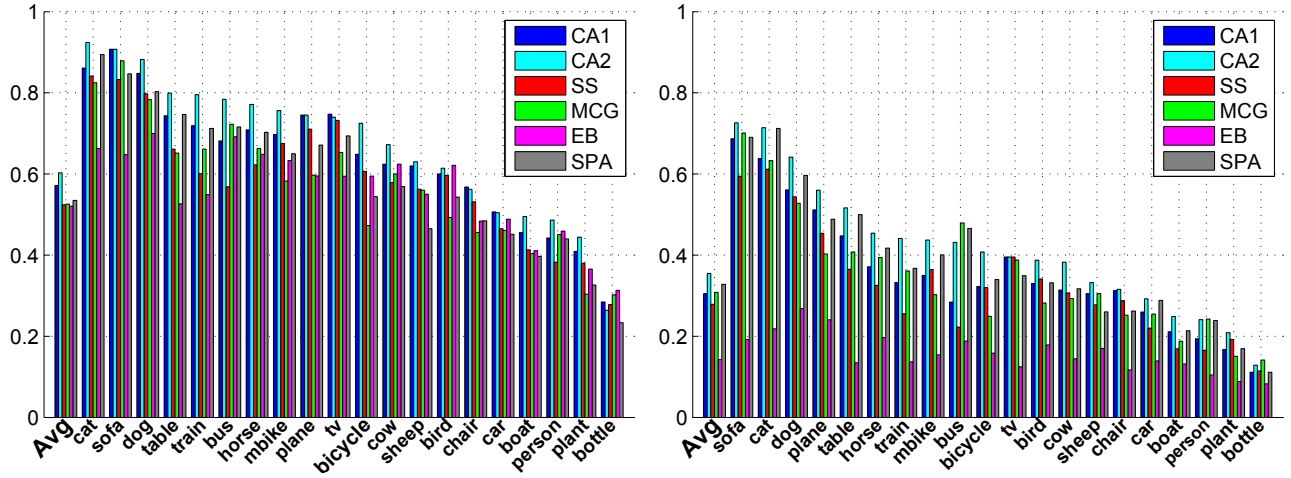


(e) IoU = 0.9.



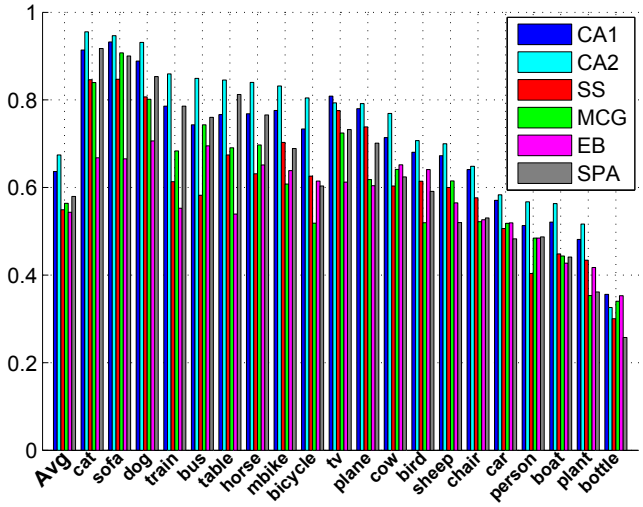
(f) Area under "recall versus IoU threshold" curves.

Figure 2. (a)-(e) Recall versus candidate number curves on PASCAL VOC 2012, with IoU threshold ranged from 0.5 to 0.9. (f) Area under "recall versus IoU threshold" curves which are shown in Figure 1, for varying number of proposed windows.

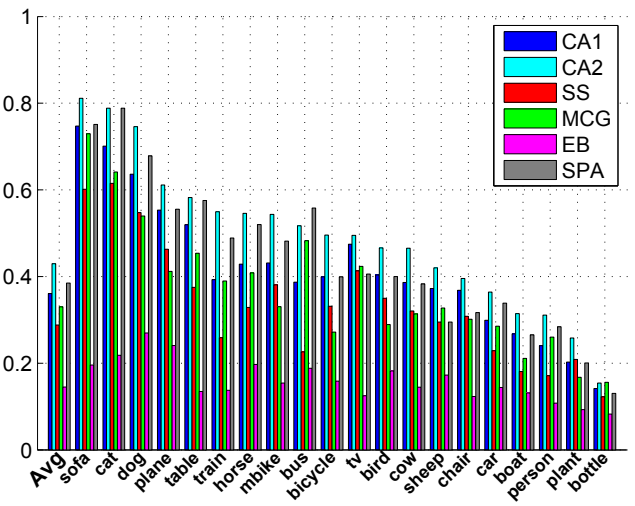


(a) 1000 proposals, IoU = 0.8.

(b) 1000 proposals, IoU = 0.9.

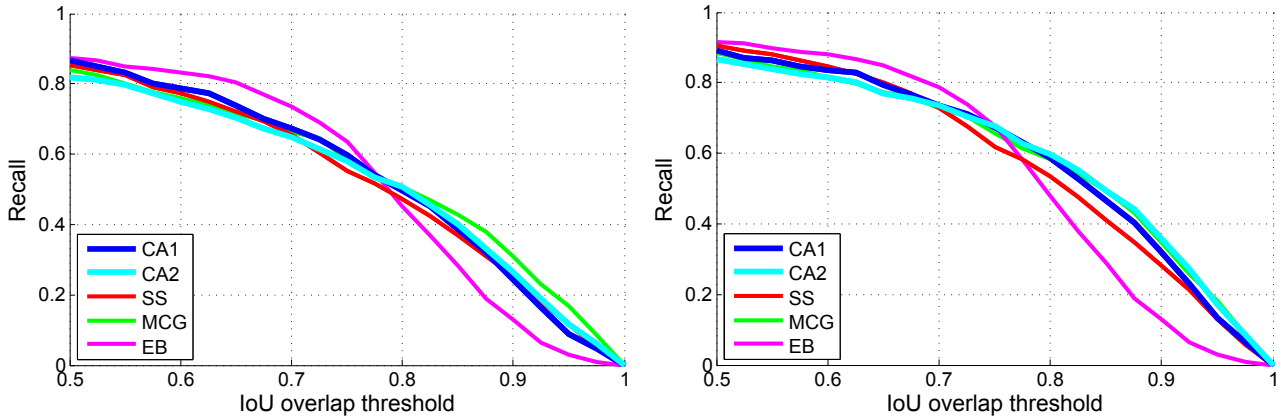


(c) 2000 proposals, IoU = 0.8.



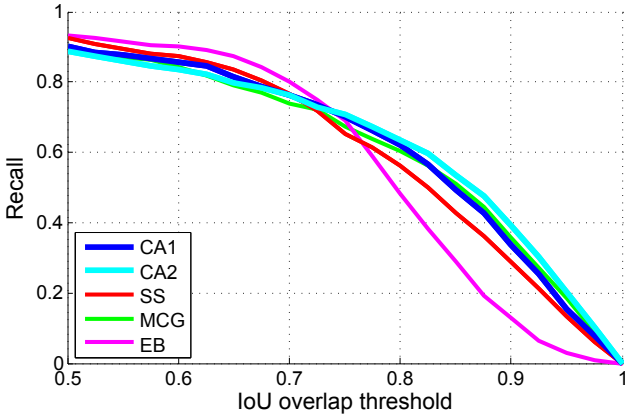
(d) 2000 proposals, IoU = 0.9.

Figure 3. Comparisons of recall values for each of the 20 categories on PASCAL VOC 2012. The leftmost bars show the overall recalls.

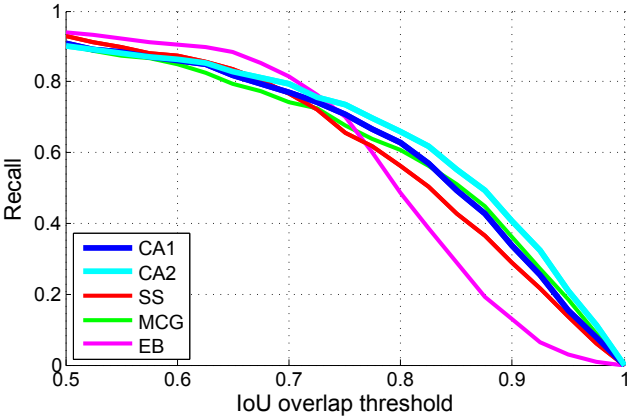


(a) 500 proposals per image.

(b) 1000 proposals per image.

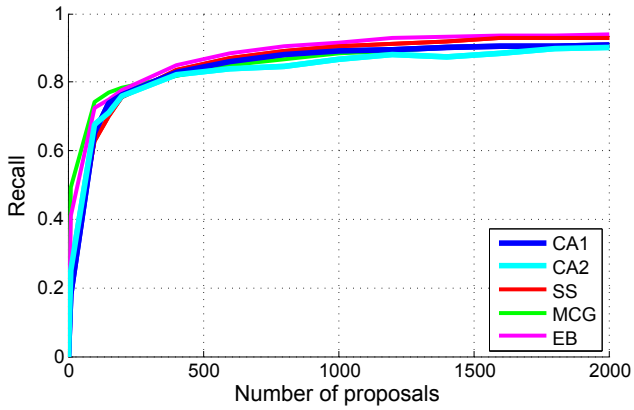


(c) 1500 proposals per image.

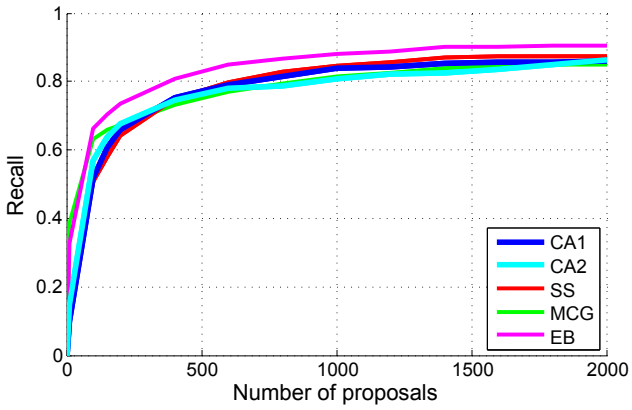


(d) 2000 proposals per image.

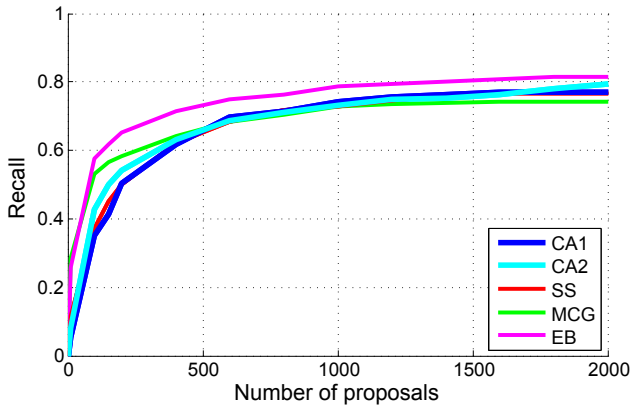
Figure 4. Recall versus IoU threshold on BSDS dataset.



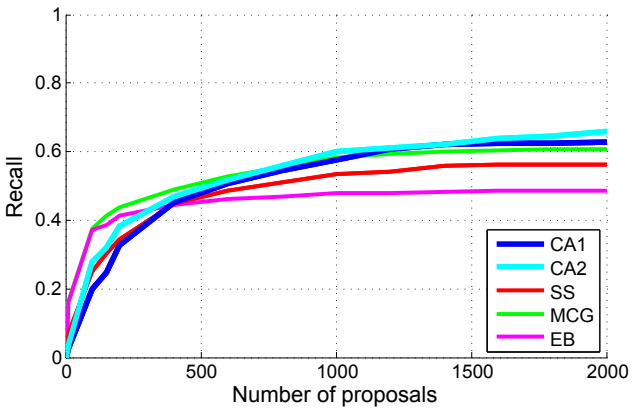
(a) IoU = 0.5.



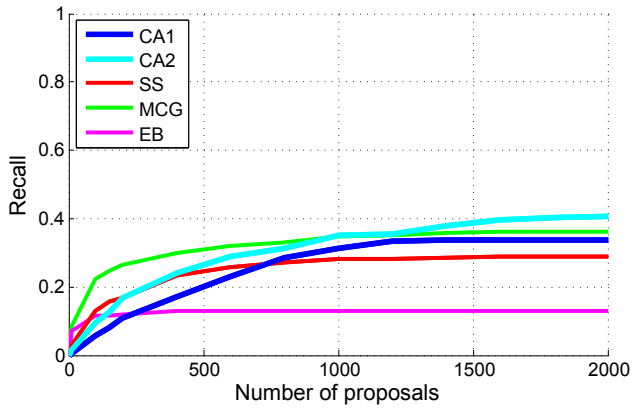
(b) IoU = 0.6.



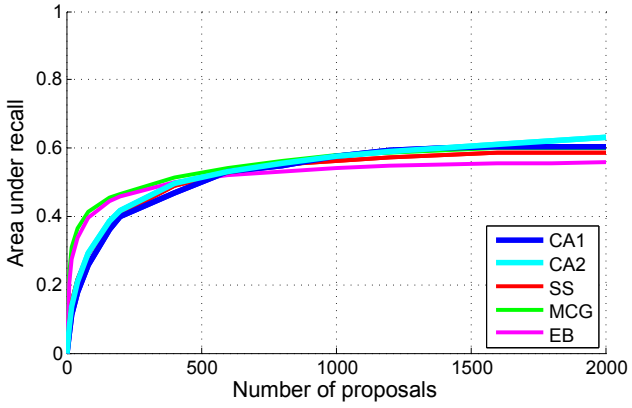
(c) IoU = 0.7.



(d) IoU = 0.8.



(e) IoU = 0.9.



(f) Area under "recall versus IoU threshold" curves.

Figure 5. (a)-(e) Recall versus candidate number curves on BSDS dataset, with IoU threshold ranged from 0.5 to 0.9. (f) Area under "recall versus IoU threshold" curves which are shown in Figure 4, for varying number of proposed windows.