

Semantic Segmentation Refinement Using Entropy and Boundary-guided Monte Carlo Sampling and Directed Regional Search

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Key words: Semantic Segmentation, Deep learning, Image Processing

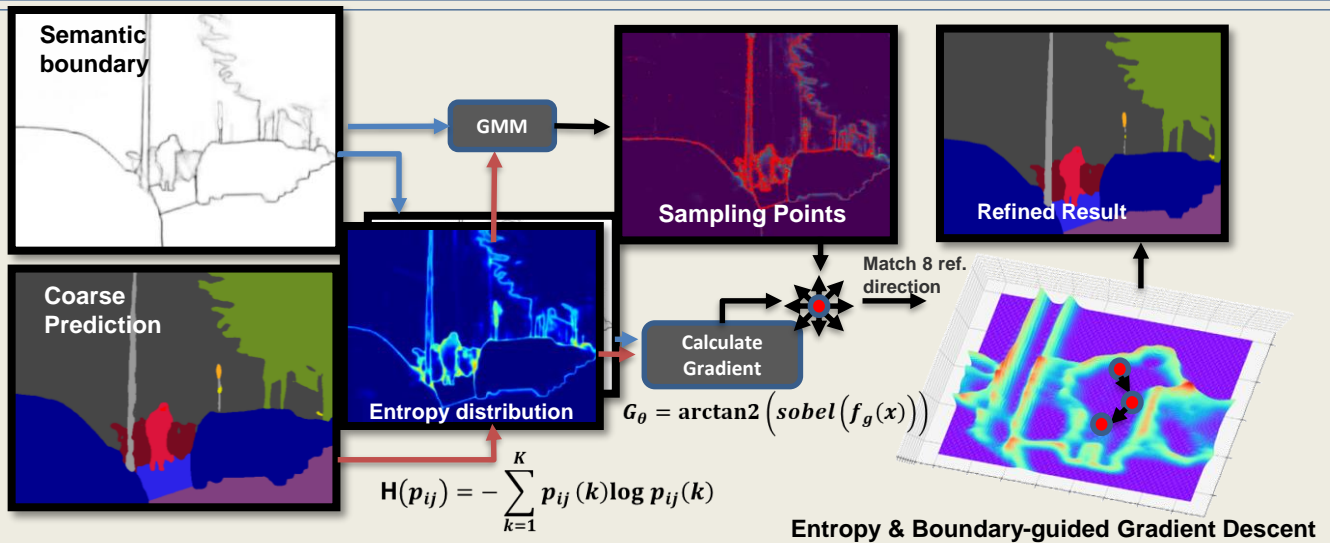


Motivation

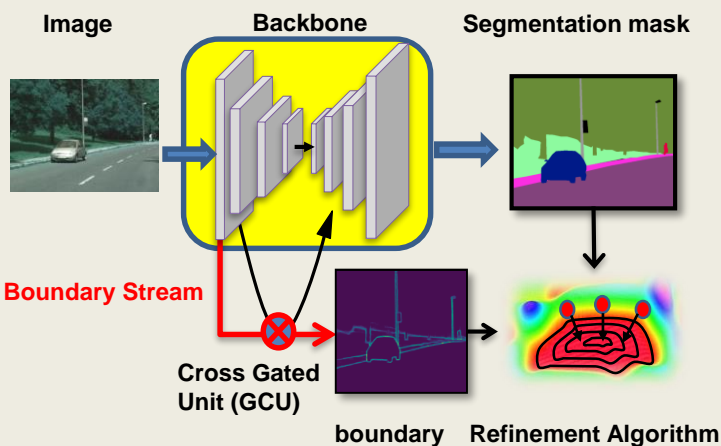
- **Situation in Semantic Segmentation:** Although existing methods based on a fully convolutional network have greatly improved the accuracy, the prediction results still do not show satisfactory on small objects and boundary regions.
- **CNN's Shortcoming:** Overdownsampling thus losing details
- **Proposal:** In this work, we propose an Information Entropy and Boundary-guided Refinement (EBR) algorithm to improve the coarse results generated by front CNN



Overview



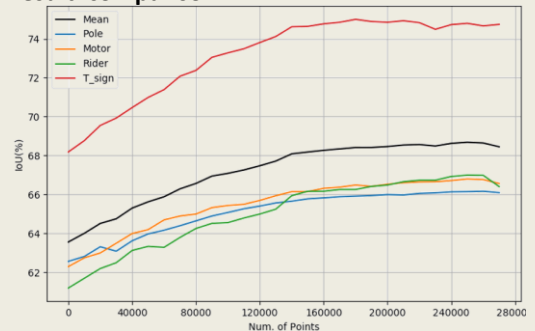
Cross Gated Network



Inspired by Gated-SCNN[4], we added an extra branch to the original backbone to get the semantic boundary in advance

Competition result

- **Dataset:** Cityscapes[2], PASCAL VOC 2012[1]
- **Evaluate metric:** Intersection over Union (IOU)
- **Result comparison**



Method	Cityscapes		PASCAL VOC 2012	
	Original	+EBR	Original	+EBR
DANet[6]	82.0	82.5	77.3	79.1
PSPNet[6]	80.9	82.0	79.1	78.9

Conclusion

- In this work, we analyze the information entropy of the final classification from the front network and propose an entropy and boundary-guided refinement (EBR) algorithm to improve the segmentation accuracy significantly on small objects.

Reference

[1] M. Everingham, L. Van Gool et al. The pascal visual object classes (voc) challenge. In IJCV, 2010. [2] M. Cordts, et al., "The cityscapes dataset for semantic urban scene understanding," abs/1604.01685, 2016. [3] H. Zhao, J. Shi, X. Qi, X. Wang et al. Pyramid scene parsing network, In CVPR, 2017. [4] Towaki Takikawa et al. Gated-SCNN: Gated Shape CNNs for Semantic Segmentation, in ICCV 2019. [5] Jun Fu, Jing Liu, et al., Dual Attention Network for Scene Segmentation, in CVPR 2019. [6] H. Zhao, J. Shi et al. Pyramid scene parsing network, in CVPR 2017.