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

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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

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

![Image of Cross Gated Network](image)

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

### Competition result

<table>
<thead>
<tr>
<th>Method</th>
<th>Cityscapes</th>
<th>PASCAL VOC 2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>Original</td>
<td>82.0</td>
<td>77.3</td>
</tr>
<tr>
<td>Original +EBR</td>
<td>82.5</td>
<td>79.1</td>
</tr>
<tr>
<td>DANet[6]</td>
<td>89.0</td>
<td>82.0</td>
</tr>
<tr>
<td>PSPNet[6]</td>
<td>80.9</td>
<td>79.1</td>
</tr>
<tr>
<td>PSPNet +EBR</td>
<td>82.0</td>
<td>78.9</td>
</tr>
</tbody>
</table>

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