Superpixel-based Refinement for Object Proposal Generation

**Motivation**

Object Proposal Generation:
- Class-agnostic localization and segmentation of all objects

**Problems**

- State-of-the-art systems segment proposals on coarse resolution feature maps (e.g., 10 × 10 pixels), object boundaries are not well captured
- Hundreds of proposals per image, CRFs etc. are not applicable

**Proposed Idea**

Superpixel refinement: Combine coarse DL-based proposals and fine-grained superpixels using superpixel pooling

**Evaluation on LVIS Dataset**

<table>
<thead>
<tr>
<th>Method</th>
<th>AR@10</th>
<th>AR@100</th>
<th>BR↑</th>
<th>UE↓</th>
</tr>
</thead>
<tbody>
<tr>
<td>DeepMask [4]</td>
<td>0.069</td>
<td>0.147</td>
<td>0.488</td>
<td>0.087</td>
</tr>
<tr>
<td>SharpMask [3]</td>
<td>0.073</td>
<td>0.154</td>
<td>0.561</td>
<td>0.080</td>
</tr>
<tr>
<td>FastMask [2]</td>
<td>0.069</td>
<td>0.161</td>
<td>0.510</td>
<td>0.084</td>
</tr>
<tr>
<td>AttentionMask [1]</td>
<td>0.073</td>
<td>0.189</td>
<td>0.568</td>
<td>0.070</td>
</tr>
<tr>
<td>Ours</td>
<td><strong>0.092</strong></td>
<td><strong>0.206</strong></td>
<td><strong>0.681</strong></td>
<td><strong>0.068</strong></td>
</tr>
</tbody>
</table>

**Results**

- Improved object proposal results
- Better adherence to object boundaries
- Superpixels can be helpful in combination with DL!

**Superpixel-based Refinement**

1. Input Image
2. Backbone Network
3. Superpixel Segmentation
4. Feature Extractor
5. Superpixel Refinement
6. Extracted Features
7. Superpixel Average Pooling
8. Concatenation
9. Classification
10. Foreground
11. Background
12. Result

**References**