**Seq-NMS and Rescoring**

We find proposal sequences like so:
- Calculate IoU of proposals from adjacent frames
- Select sequence with the highest sum of scores.
- For each item in a sequence suppress overlapping proposals in the same image.

Afterward, we rescore proposals with the sequence avg/max.

Algorithm: Seq-NMS

```plaintext
function FIND_BEST_SEQ(proposals)
    best_seq = arg.max \[ \sum_{i=t}^{t+seq_thresh} \text{IoU}(\text{proposals}[i], \text{proposals}[i+1]) \]
    subject to 0 \leq s < len(proposals)
    subject to 0 \leq t < len(proposals)
    if IoU(proposals[t], proposals[t+1]) > seq_thresh
        return best_seq
end function

for proposals of each class do
    while proposals \neq 0 do
        seq = FIND_BEST_SEQ(proposals)
        for each i, t in seq do
            result_i = \text{proposals}[i]
            for each box in proposals[i] do
                if IoU(box, box) > threshold then
                    Suppress box
                end if
            end for
        end for
    end while
end for
```

**Results**

**Qualitative comparison: NMS vs Seq-NMS**

<table>
<thead>
<tr>
<th>Frame</th>
<th>NMS boxes</th>
<th>Seq-NMS boxes</th>
</tr>
</thead>
<tbody>
<tr>
<td>276</td>
<td><img src="image" alt="NMS example" /></td>
<td><img src="image" alt="Seq-NMS example" /></td>
</tr>
<tr>
<td>277</td>
<td><img src="image" alt="NMS example" /></td>
<td><img src="image" alt="Seq-NMS example" /></td>
</tr>
<tr>
<td>278</td>
<td><img src="image" alt="NMS example" /></td>
<td><img src="image" alt="Seq-NMS example" /></td>
</tr>
</tbody>
</table>

**Performance on Initial Validation Set (64k samples)**

<table>
<thead>
<tr>
<th>Method</th>
<th>mAP</th>
</tr>
</thead>
<tbody>
<tr>
<td>ZF net 3 + NMS</td>
<td>0.322 ± 0.256</td>
</tr>
<tr>
<td>ZF net + Seq-NMS (max)</td>
<td>0.363 ± 0.275</td>
</tr>
<tr>
<td>ZF net + Seq-NMS (avg)</td>
<td>0.383 ± 0.275</td>
</tr>
<tr>
<td>VGG net 4 + NMS</td>
<td>0.444 ± 0.242</td>
</tr>
<tr>
<td>VGG net + Seq-NMS (max)</td>
<td>0.501 ± 0.258</td>
</tr>
<tr>
<td>VGG net + Seq-NMS (avg)</td>
<td>0.515 ± 0.255</td>
</tr>
<tr>
<td>VGG net + Seq-NMS (best)</td>
<td>0.536 ± 0.261</td>
</tr>
</tbody>
</table>

**References**