Structured Forests for Fast Edge Detection

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1. Accuracy
2. Speed

I. Data driven edge detection
edge detection as classification

\[ \{0, 1\} \]

edge have \textit{structure}

sketch tokens

random forests
upgrading the output space

\[
\{0, 1\} \mapsto 2 \\
\{\ldots\} \mapsto 151 \\
\mapsto 2^{256}
\]

II. structured edge learning

structured forests

tree training

node training

how to train?

clusterize entropy

III. structured edge detection
structured forests

sliding window detector

multiscale detection
multiscale detection

IV. results

<table>
<thead>
<tr>
<th>Human</th>
<th>ODS</th>
<th>OIS</th>
<th>AP</th>
<th>FPS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Canny</td>
<td>.60</td>
<td>.64</td>
<td>.58</td>
<td>15</td>
</tr>
<tr>
<td>Felz-Hutt [11]</td>
<td>.61</td>
<td>.64</td>
<td>.56</td>
<td>10</td>
</tr>
<tr>
<td>Hidayat-Green [10]</td>
<td>.62</td>
<td>-</td>
<td>-</td>
<td>20</td>
</tr>
<tr>
<td>BEL [9]</td>
<td>.66</td>
<td>-</td>
<td>-</td>
<td>1/10</td>
</tr>
<tr>
<td>gPb + GPU [6]</td>
<td>.70</td>
<td>-</td>
<td>-</td>
<td>1/2</td>
</tr>
<tr>
<td>gPb [1]</td>
<td>.71</td>
<td>.74</td>
<td>.65</td>
<td>1/240</td>
</tr>
<tr>
<td>gPb-owt-ucm [1]</td>
<td>.73</td>
<td>.76</td>
<td>.73</td>
<td>1/240</td>
</tr>
<tr>
<td>Sketch tokens [21]</td>
<td>.73</td>
<td>.75</td>
<td>.78</td>
<td>1</td>
</tr>
<tr>
<td>SCG [31]</td>
<td>.74</td>
<td>.76</td>
<td>.77</td>
<td>1/280</td>
</tr>
</tbody>
</table>

SE-SS, T=1  | .72 | .74 | .77 | 60  |
SE-SS, T=4  | .73 | .75 | .77 | 30  |
SE-MS, T=4  | .74 | .76 | .78 | 6   |

gPb ODS=.73  FPS = 1/240 Hz
thanks!  source code available online