Weblio Pre-re-ordering SMT System
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Overview

Our system implemented a simple syntactic pre-reordering model firstly described in (Zhu et al., 2014). The MT pipeline in this system builds HRCFG (Head-restructured CFG parse tree) for given input sentence, then reorders the parse tree to gain a new input in similar order of target-side language. Conventional Phrase-based MT is applied for the remaining phases in the pipeline.

In this system, we extended the pre-reordering model to output N-best reordering results. We also attempted to utilize N-best parse trees in the experiments.

Pre-reordering model

> Head-restructured CFG parse tree

For all S nodes in a CFG parse tree, a new layer contains dependency relationships is been inserted underneath.

> Reordering model

We use language model as a quick solution to tackle the reordering problem. In the reordering phase, the candidate order with highest LM score is selected.

> N-best reordering model

For all treelet \( t \) in the reordered parse tree, we use Cube Pruning to produce N-best reordering results based on the accumulation of LM scores recursively.

Evaluation results of English-Japanese task

<table>
<thead>
<tr>
<th></th>
<th>BLEU</th>
<th>RIBES</th>
<th>HUMAN</th>
</tr>
</thead>
<tbody>
<tr>
<td>N-best reorder</td>
<td>34.87</td>
<td>0.7869</td>
<td>+43.25</td>
</tr>
<tr>
<td>N-best reorder + N-best parse</td>
<td>35.04</td>
<td>0.7900</td>
<td>+36.00</td>
</tr>
<tr>
<td>BASELINE PBMT</td>
<td>29.80</td>
<td>0.6919</td>
<td>0.00</td>
</tr>
</tbody>
</table>

The inconsistency of human evaluation score and automatic evaluation scores for the second system is discussed in the organizer’s paper.

Evaluation of pre-reordering

> the effect of pre-reordering (Kendall’s Tau on training data)

After pre-reordering, about 15% of English sentences have the identical order of corresponding Japanese translations.

> Automatic evaluation scores after applying N-best reordering results and N-best parse trees

Incorporating N-best reordering results and parse trees lead to better automatic evaluation scores.

Online demonstrations

- Head-restructured CFG parse tree
  - http://raphael.uaca.com/demos/hdtree

- Pre-reordering
  - http://raphael.uaca.com/demos/raphreorder