Learning to Differentiate Better from Worse Translations
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1. Task Formulation
- Decide which of two alternative translations \( t_1 \) and \( t_2 \) is better given the reference \( r \)
- **Motivation:** Higher correlation with human judgments compared to absolute scores (Duh, 2008; Song & Cohn, 2011)

2. Proposed Solution
- Use the framework of structured kernel learning (Severyn & Moschitti, 2012)
  - Pairwise learning to rank formulation with kernels
  - Is more powerful than kernel similarity (Guzmán et al., 2014)
  - Learns features (structure fragments) automatically
  - Allows integrating several information sources
  - Integrate lexical, syntactic, and discourse information in a single structural representation
  - Use both reference and system output simultaneously
  - Learning object: \( \langle t_1, t_2, r \rangle \)

3. Enriched Structural Representation

4. Structured Kernel Learning
- \( PK(t_1, t_2, r; \langle t'_1, t'_2, r' \rangle) = K(t_1, t_2, r, r') + K(t_1, t_2, r, r') + K(t'_1, t'_2, r, r') \)
- \( PK(t_1, t_2, r; \langle t_1, t_2, r \rangle) = K(t_1, t_2, r, r') + K(t'_1, t'_2, r, r') \)
- \( PK(t_1, t_2, r; \langle t'_1, t'_2, r' \rangle) = K(t_1, t_2, r, r') + K(t'_1, t'_2, r, r') \)

5. Experimental Settings
- **Train:** 10K judgments per language (WMT-11)
- **Langs:** Czech–English (cs-en), German–English (de-en), Spanish–English (es-en), French–English (fr-en)
- **Eval:** Kendall’s Tau as a measure of correlation on WMT-12 data (official)
- **Results** are compared with direct kernel similarity

6. Evaluation Results
- Train & Test for each language pair separately on different structures

<table>
<thead>
<tr>
<th>Structure</th>
<th>cs-en</th>
<th>de-en</th>
<th>es-en</th>
<th>fr-en</th>
<th>all</th>
</tr>
</thead>
<tbody>
<tr>
<td>SYN</td>
<td>0.169</td>
<td>0.188</td>
<td>0.203</td>
<td>0.222</td>
<td>0.195</td>
</tr>
<tr>
<td>DIS</td>
<td>0.130</td>
<td>0.174</td>
<td>0.188</td>
<td>0.169</td>
<td>0.165</td>
</tr>
<tr>
<td>DIS+POS</td>
<td>0.135</td>
<td>0.190</td>
<td>0.170</td>
<td>0.172</td>
<td>0.167</td>
</tr>
<tr>
<td>DIS+SYN</td>
<td>0.156</td>
<td>0.205</td>
<td>0.206</td>
<td>0.203</td>
<td>0.192</td>
</tr>
</tbody>
</table>

SYN (syntactic parse), DIS (RST discourse parse relations), POS (part of speech)

7. Conclusion
- Unified framework for integrating layers of linguistic information for MT evaluation
- Pairwise learning-to-rank with structural kernels
- Competitive performance

8. Future Work
- More linguistic information: SRL, Brown clusters, etc.
- Integrate scores from other MT evaluation metrics
- Use of more relations between \( t \) and \( r \)

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