Machine Learning in the Statistical Natural Language Processing Group of the University of Stuttgart

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April 11th, 2013 - Pascal
Pascal2 at Stat NLP Stuttgart

Stat NLP group Stuttgart - led by Hinrich Schütze, sub-groups Alexander Fraser (Machine Translation), Helmut Schmid (Parsing).

Pascal2 funding played a big role in published papers on:
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- discriminative reranking of syntactic parsing (see poster)

ML at StatNLP Stuttgart

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- new statistical models of translation
- predicting German grammatical features when translating from English to German (see poster)
Unsupervised transliteration mining

- Consider a list of word pairs which are either transliterations of each other or non-transliterations.
- This can be extracted from Wikipedia Interlanguage Links (balanced classification) or from parallel text (mostly not transliterations).
- Transliteration mining extracts the transliteration pairs from the list of word pairs.
- We showed this can be done without any linguistic knowledge and without supervision.

<table>
<thead>
<tr>
<th>Word 1</th>
<th>Word 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aamir</td>
<td>आमिर/aamir</td>
</tr>
<tr>
<td>Aapne</td>
<td>आपने/aapne</td>
</tr>
<tr>
<td>Ability</td>
<td>रकम/rakam</td>
</tr>
<tr>
<td>Behave</td>
<td>करने/karne</td>
</tr>
<tr>
<td>Chin</td>
<td>चिन/chin</td>
</tr>
</tbody>
</table>
New translation models

- Long-distance reordering is a difficult problem in translation
- Google Translate (and our previous work) solves this problem using heuristic preprocessing
- We have studied long-distance reordering in two general statistical translation approaches
  - Our work on **sequence-based translation**:  
    - We have defined markov (n-gram) models over minimal translation units, rather than unigrams over so-called phrase pairs (phrases are memorized groups of consecutive words in two languages)  
    - Our sequences contain lexically triggered word reordering which can apply over arbitrary distances  
  - Our work on **synchronous context-free grammars (SCFGs)**:  
    - We have studied the ability of SCFGs to capture the reorderings required to translate German to English  
    - We have determined how to model these reorderings in a principled way during inference
What is on the poster

What I didn’t talk about:

- Discriminative reranking for syntactic parsing
- Predicting rich morphology (German here, but we use similar approaches when translating English to French and Spanish)

Summary:

- Overview of 5 different groups of work (within machine translation and syntactic parsing)
- Wide variety of Natural Language Processing problems, solved using machine learning techniques
- Novel generative and discriminative models, training methods, etc
- Pascal funding was very useful to us