Multiple reference translations for European languages

Christian Buck, Daniel Zeman, Eva Hasler
Idea

- Create multiple reference translations by paraphrasing a single reference
- Use Pivot approach to create paraphrase table
- Train **en-en** paraphrasing system
- Tune paraphrasing system on multiple English references from another data set
Pivot approach to paraphrasing

- go forward and backward in phrase table
- for each English phrase find all French translations
- for each French translation find all English translations
- done!

(Bannard & Callison-Burch 2005)
Example

take

\[\rightarrow\] nehmen, einnehmen

\[\rightarrow\] take, consume, conquer, take away, eat
Filtering of paraphrases

Extraction generates *lots* of rubbish

Filter using:
- Heuristics (e.g. no substrings)
  - better: remove substrings only if additional subphrase unaligned (keep "though"/"although")
- Scores (e.g. keep only top-20)
- Absolute phrase length (e.g. max. 4)
- Consistency across different pivot languages
- Consistency across different topics
Filtering continued

- Consider quality of induced alignments

\[
\begin{array}{ccc|ccc|c}
| f1 & f2 & f3 & e1 & e2 & e3 & \ldots & 1-1 & 2-2 \\
| f1 & f2 & f3 & e3 & e4 & \ldots & 0-0 & 0-1 & 2-1 \\
| e1 & e2 & e3 & e3 & e4 & \ldots & 2-1 \\
\end{array}
\]

Ignore paraphrase if

- aligned token is punctuation
- alignment missing altogether
Data/models

- TED talks corpus (collection of talks)
- language pairs: fr-en, de-en
- HTMM, filter using stop words, 10 topics, “unknown” topic if filtering left empty sentences
- compute topic model on one side of the corpus → map topics to other side
- translation should preserve the topic, though lexical differences between languages might induce different topic models
"economy" ||| einnehmen ||| earn ||| ...  
"economy" ||| einnehmen ||| to make money ||| ...  
→ earn ||| to make money ||| ...

"medicine" ||| einnehmen ||| to take orally ||| ...  
"medicine" ||| einnehmen ||| to ingest ||| ...  
→ to take orally ||| to ingest ||| ...

"politics" ||| einnehmen ||| to conquer ||| ...  
"politics" ||| einnehmen ||| to occupy ||| ...  
→ to conquer ||| to occupy ||| ...
Paraphrase tables

- Identity feature: train a weight to learn how often we should translate a phrase into itself vs. into a paraphrase
- avoid including topic features into phrase table by splitting corpus according to topics
- extract separate sets of paraphrases on these subsets of the training data, merge tables
  → valid set of paraphrases
- extract paraphrases from entire training data and filter with merged paraphrase table
Examples of extracted paraphrases

1.3 million ||| one point three million ||| ... good!

10 miles ||| 15 kilometers ||| ... maybe?

10 percent ||| 10 mm |||...
10 percent ||| 30 ||| ...
10 percent ||| make 10 ||| ...
bad..

220 ||| about 110 ||| .... aaaaahrr!
Examples of extracted paraphrases

pretty much ||| pretty much ||| ...
pretty much ||| pretty sure ||| ...
pretty much ||| quite different ||| ...
pretty much ||| quite ||| ...
pretty much ||| rather ||| ...
pretty much ||| real ||| ...
pretty much ||| really , really ||| ...
pretty much ||| really ||| ...
pretty much ||| relatively ||| ...
pretty much ||| see very ||| ...
TODO

- Train en-en translation systems using paraphrase table, tune on sets of multiple English references (NIST data)
- Translate references!
- Cross language extraction
  - Intersect paraphrase tables resulting from the two different language pairs
- Compare both paraphrasing approaches
- Evaluate
  - use multiple references in tuning step