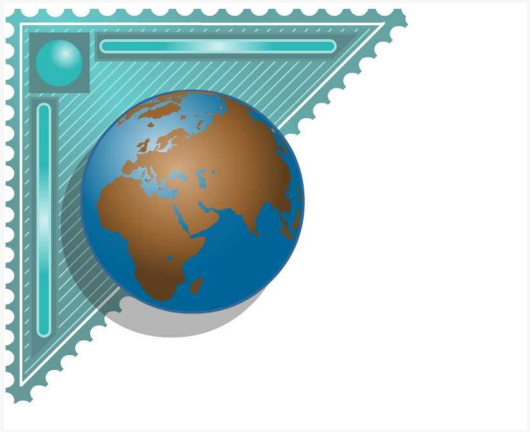
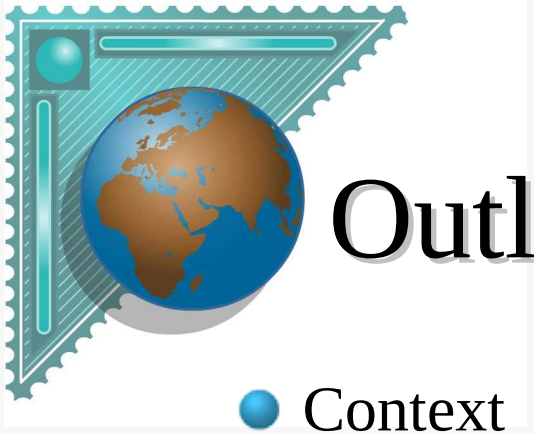


Multilingual Vocabulary Extraction from Software Documentation

Lucas Welter Hilgert



Outline

- Context
- Problems
- Research Work
- Related Work
- Corpus Construction
- Vocabulary Extraction
- Bibliography

Context

- **Project:** "*The Effect of Natural Language Processing in the Development of Brazil Competence in the Global Software Development Market*"
  - Investigation of NLP methods, techniques and tools aiming to contribute in the inclusion of Brazilian development teams in the global software development market
  - Focus on Real Time Machine Translation services

Problems

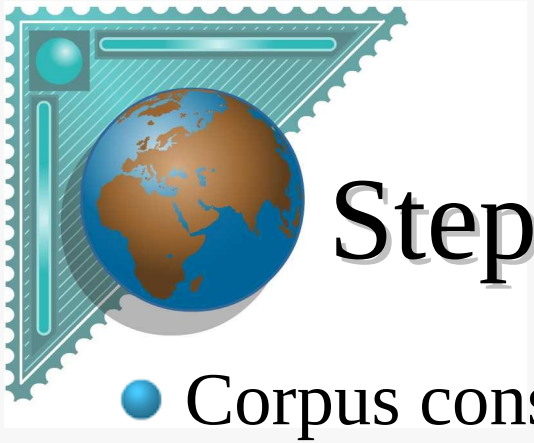
- Experiments involving Brazilian (PUCRS) and Italian (University of Bari) participants [Calefato *et al.* 2012]
  - Similar performance using English as a common language and Real Time Machine Translation during meetings [Calefato *et al.* 2012]
  - Comunication delays [Calefato *et al*., 2012][Yamashita and Ishida, 2006]
  - Difficulties establishing a common ground [Yamashita *et al.* 2009]

Purposed Work

- *"Multilingual vocabulary extraction from software documentation"*
  - Open source software user guides;
  - Parallel corpus (English – Portuguese);
  - Enrichment of machine translation services dictionaries (*Apertium*);
  - Utilization in writing aid technologies (auto-complete, spell-checking, etc.);

Related Work

- Lexicon Induction [Caseli and Nunes, 2007]
- OPUS Project [Tiedemann, 2009]
- Uplug [Tiedeman, 2003]
- Bilingual Terminology Extraction [Ha *et al.*, 2008]



Steps

- Corpus construction
- Vocabulary extraction
- Evaluation

Corpus Construction

- **Source:** *open source* project repositories

User Guide	Portuguese	English
Android 2.3.4	72.371	81.412
Blender 2.6	31.661	25.671
Debian	149.709	140.367
LibreOffice 3.3	100.978	108.450
Slackbook	65.549	64.744
TortoiseSVN 1.7	79.008	79.696
Ubuntu	54.057	55.687
Total	**553.333**	**556.027**

Corpus Construction

- Parallel corpus
- Manually constructed
- Corpus characteristics:
  - Noisy corpora
  - Cooperatively translated

Bilingual Vocabulary Extraction

- Corpus preprocessing:
  - Conversion to plain text (pdf, html);
- Sentence alignment
- Morphological analysis
- Lexical alignment

Sentence Alignment

- Tools:
  - Bilingual Sentence Aligner [Moore, 2002]
  - TCAaligner [Caseli, 2003]
  - Uplug [Tiedeman, 2003]

Morphological Analysis

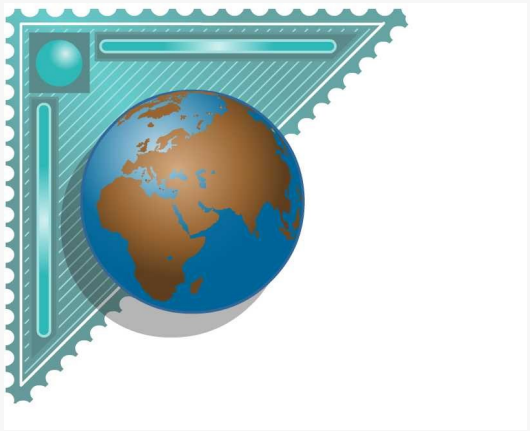
- Information:
  - Part-of-speech
  - Lemma
  - Inflections (gender, number,...)
- Tools:
  - Lttoolbox (*Apertium*) [Forcada *et al.*, 2011]
  - FreeLing 3.0
  - LX-Center

Lexical Alignment

- Statistical approach [Tiedemann, 2003]
  - Giza++ (version 2.0) [Och & Ney, 2003]
  - Trained using the whole corpus
  - Standard configuration
- Aligned in both directions (English → Portuguese, Portuguese → English)
- Union algorithm applied [Och & Ney, 2003]
- ReTraTos [Caseli & Nunes, 2003]

Vocabulary Extraction

- Evaluation:
  - Comparation with term lists:
    - ExATOlp [Lopes *et al.*, 2012] - pt
    - TTC Term Suite - en
  - Intrinsic



Questions?

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