Resource-poor Translation of Multiword Expressions

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BACKGROUND

- The correct identification, interpretation and translation of multiword expressions (MWE) is vital for the successful operation of most NLP applications and computer-aided tools that support various users including language learners, teachers, translators, interpreters and terminologists.
- The cross-lingual analysis of these expressions and automatic extraction of their translation equivalents is still an under-research topic.
- Previous corpus-based distributional similarity approaches to discover translation equivalents have not yet reported good results for MWEs.

Difficulties in translations of MWEs

pay attention:	*prestar/poner atención*
pay homage:	*rendir homenja*
pay a compliment:	*decir un cumplido*

OBJECTIVES

- To exploit from comparable corpora in order to find translations for a specific category of MWEs, entitled Verb + Noun expressions.
- To extract bilingual contexts from comparable corpora to find cross-lingual similarities between expressions.
- To propose a new distributional similarity approach based on word embedding in order to find translation-equivalents.

MOTIVATIONS

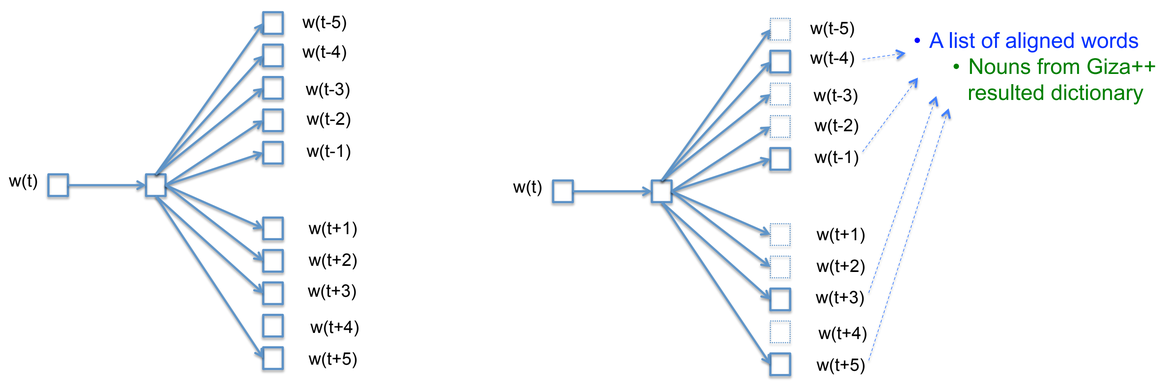
- Distributional similarity hypothesis

earthquake	riot	**take place**	…	problem
terremoto	disturbios	**tener lugar**	…	problema

METHODS

Word Embedding

Word2vec: representing each word as a dense vector derived by various training methods inspired by neural-network language modeling.



Word2vecf: a modified version which allows to define any context

We adapt the model to our task of finding translation equivalents for multi-word collocations, by:

(i) treating sequences of words as single units/terms

(ii) defining bilingual contexts by drawing on a core set of known translation pairs.

RESULTS

Corpora:

Using ACCURAT Toolkit

- Gathering news from the web
- Pairing the documents according to their similarity to have a highly comparable corpora

Experimental Expressions:

- Focusing on Verb+Noun(s) constructed from 9 highly-frequent verbs in English and 6 in Spanish.
- Reporting the results for expressions with frequencies higher than 9 in the paired comparable corpora

Extracting Translation Equivalents:

Given a candidate expression *s* from the source language, the goal is to find the best translation equivalent in the target language using the following algorithm:

For each document *D1* in the source language containing *s*:
For each target language document *D2* paired to *D1*:
Find the most similar expressions in *D2* with *s*

Evaluation:

- Baseline: A simple distributional similarity approach
  - Sets of context pairs
  - Jaccard similarity coefficient to compare the corresponding sets
- Using loosely comparable corpora
  - Computing and comparing the results by adding noisy pairs to our accurately-paired documents
- Human annotation
  - Finding a good translation among the top-5-ranked candidates

Spanish to English translations

	coverage	10-20%	20-30%	30-40%	40-50%	50-60%	60-70%	70-80%
Paired CC	baseline	82%	55%	24%	22%	18%	16%	12%
	word2vec	50%	46%	40%	36%	34%	32%	33%
CC+Noise	baseline	78%	50%	24%	18%	14%	13%	8%
	word2vec	44%	45%	38%	**37%**	30%	**33%**	32%

English to Spanish translations

	coverage	10-20%	20-30%	30-40%	40-50%	50-60%	60-70%	70-80%
Paired CC	baseline	79%	52%	46%	35%	26%	22%	18%
	word2vec	39%	37%	34%	36%	34%	29%	31%
CC+Noise	baseline	70%	50%	24%	22%	18%	12%	13%
	word2vec	38%	34%	31%	**39%**	**39%**	**32%**	31%

Translation accuracies for semantically coherent MWEs

	Accuracy (coverage: 80%)	
	Spanish	English
wodr2vec approach	48%	44%

- These results were presented in (Taslimipoor et al., 2016)

CONCLUSIONS

- A methodology is proposed for extracting cross-lingual contexts from comparable corpora.
- Cross-lingual contexts have been then used to build embedding-based vector representations for MWEs.
- The vectors have been successfully used to find translation equivalents for Verb+Noun combinations between Spanish and English.
- The results show that our approach outperforms a simple distributional similarity baseline.
- It has been also shown that, in contrast to the simple distributional similarity baseline, the word2vec approach is less vulnerable to noise in the corpus.

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