# A High Coverage Method for Automatic **False Friends Detection** for Spanish and Portuguese

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# Introduction

**Objective**: classify between false friends or cognates for Spanish-Portuguese

**False friends**: pair of words from different languages that are written or pronounced in a similar way, but have different meanings.

# Example False Friends

*obligado — obrigado*

*no — no*

*aceite — aceite*

*borracha — borracha*

*cadera — cadeira*

*desenvolver — desenvolver*

*propina — propina*

# Motivation

False friends make harder to **learn a language** or to **communicate**, especially when it's similar to the mother tongue.

- Between Spanish and Portuguese, the amount of cognates reaches the 85% of the total vocabulary (Ulsh, 1971).

# Related Work

**Frunza, 2006**: supervised machine learning using **orthographic distances** as features to classify between **cognates**, **false friends** or **unrelated**.

# Related Work

**Mitkov et al., 2007:** used a combination of distributional and taxonomy-based approaches. Worked with English-French, English-German and English-Spanish.

They use WordNet taxonomy similarities to classify, and if a word is missing they fall back to a distributional method.

# Related Work

**Mitkov et al., 2007**

For the distributional method they build vectors based on word windows, computing the co-occurrence probability. Then, they compared the N closest words of each word in the pair, translate one of them and count occurrences in the other one. They defined a threshold based on Dice coefficient.

# Related Work

**Ljubešić et al., 2013**: based on (Mitkov et al., 2007), experiment with several ways to build the vector space (e.g. tf-idf) and measure vector distances (e.g. cosine distance). They also proposed to use PMI.

They worked with closely related languages: Slovene and Croatian.

# Related Work

**Sepúlveda and Aluísio, 2011**: false friends resolution for Spanish-Portuguese, highly based on (Frunza, 2006).

They added an experiment with a new feature whose value is the **likelihood of translation**, from a probabilistic dictionary (generated taking a large sentence-aligned bilingual corpus).

# Word Vector Representations

Related work crafted their own word vector representations.

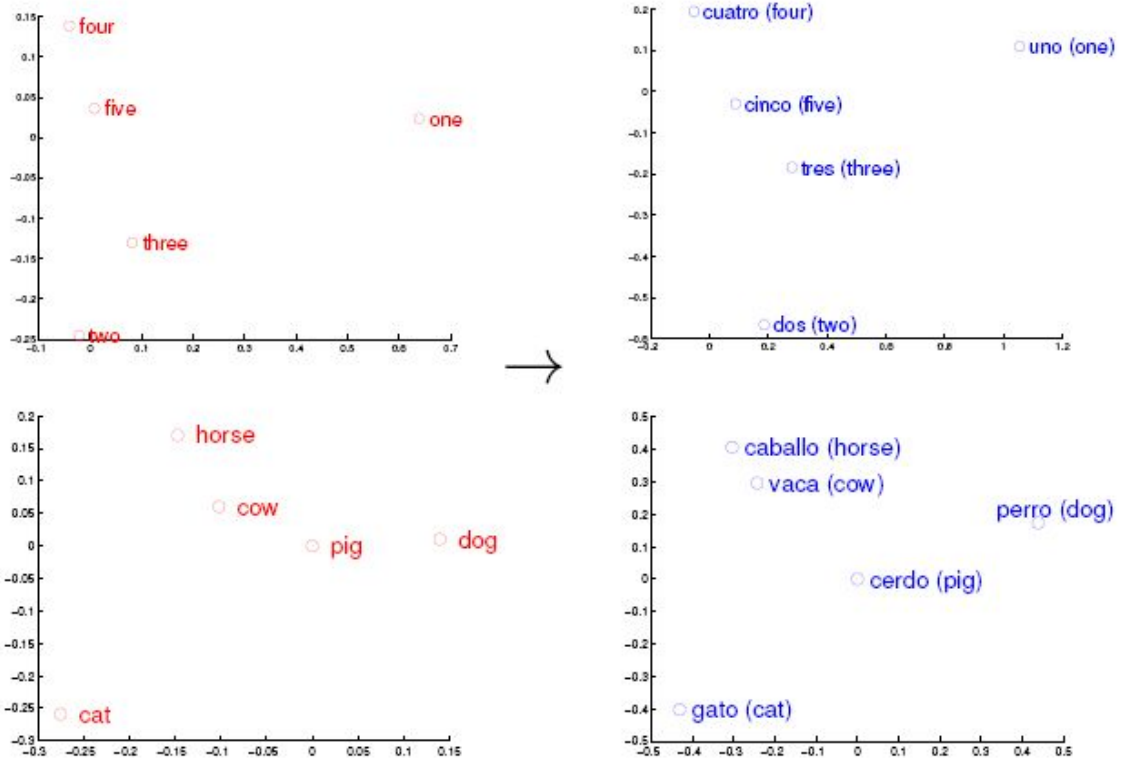
We propose to use the skip-gram-based **word2vec** model (Mikolov et al, 2013a).

# Transform between Vector Spaces

**Mikolov et al, 2013b:** propose a method to correspond two word2vec vector spaces via a **linear transformation**.

Used to build dictionaries and phrase tables.

# Transform between Vector Spaces

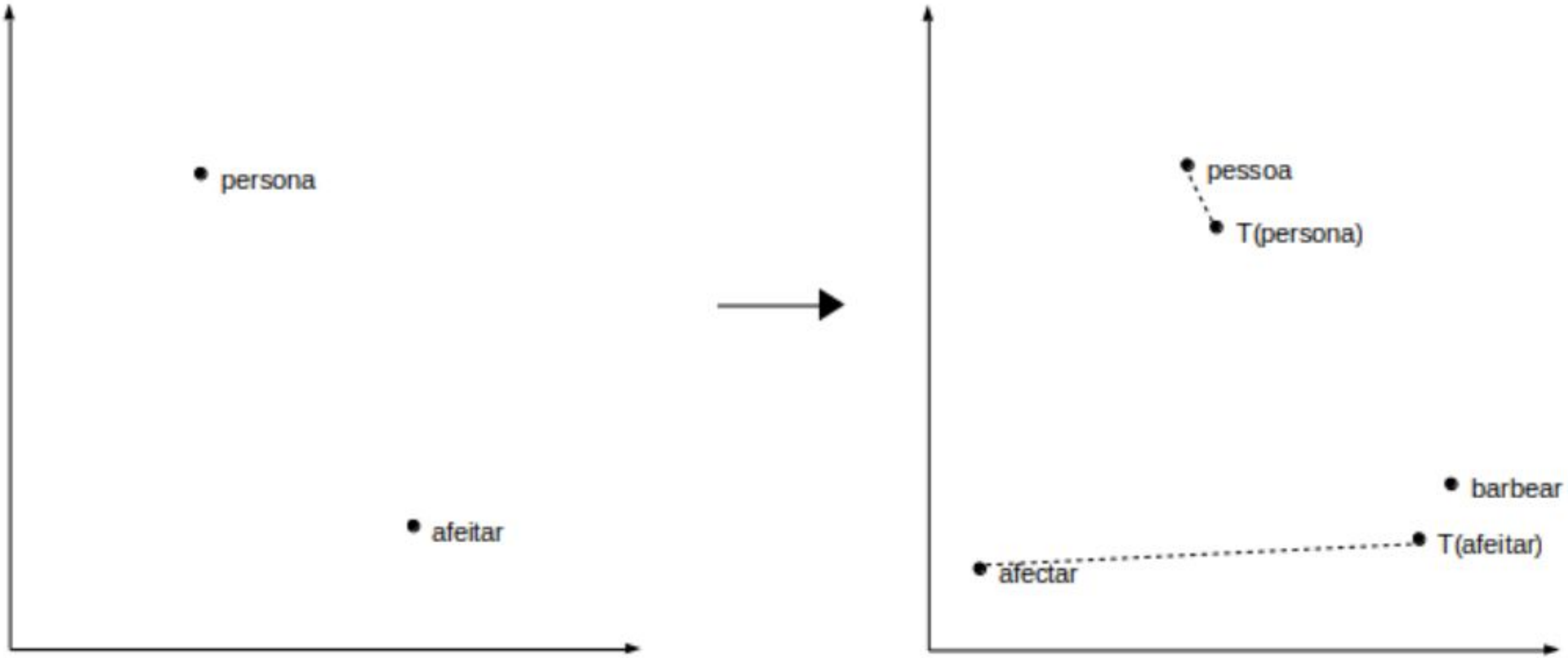


# Our Method

Build word2vec vector spaces, find a linear transformation and measure vector distances.

Note that we don’t cope with related/unrelated, we just focus on cognate/false friends

# Our Method


persona
afeitar
pessoa
T(persona)
barbear
T(afeitar)
afectar

# Our Method

We used the **Wikipedia**’s for the vector spaces.

**Open Multilingual WordNet** (Bond and Paik, 2012) was used as a bilingual lexicon to fit the linear transformation: we iterate over synsets and took lexical units from each language. Then we employed Least Squares.

# Our Method

We take one of the word vectors, transform it to the other space and compute:

1. The cosine **distance** between T(source_vector) and target_vector.
2. The **number of word vectors** in the target vector space **closer** to target_vector than T(source_vector).
3. The **sum of the distances** between target_vector and T(source_vector_i) for the **top 5** word vectors source_vector_i **nearest** to source_vector.

# Experiments

We used (Sepúlveda and Aluísio, 2011) dataset, which is composed by 710 pairs (338 cognates and 372 false friends).

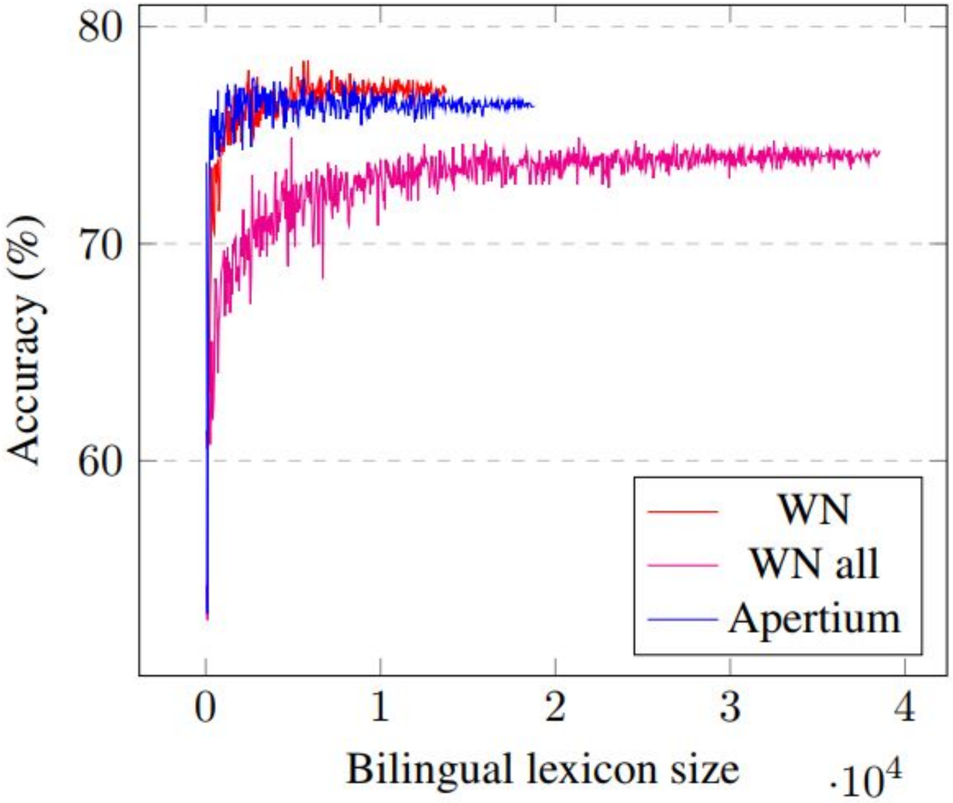
# Experiments

| Method | Accuracy | Coverage |
|---:|---:|---:|
| WN Baseline | 68.18 | 55.38 |
| Sepúlveda 2 | 63.52 | 100.00 |
| Sepúlveda 3.2 | 76.37 | 59.44 |
| Apertium | 77.75 | 66.01 |
| Our method | 77.28 | 97.91 |
| + frequencies | 79.42 | 97.91 |

# Experiments: different configurations

| Method configuration | Accuracy |
|---|---|
| es-400-100 | **77.28** |
| es-800-100 | 76.99 |
| es-100-100 | 76.98 |
| es-200-100 | 76.84 |
| es-200-200 | 76.55 |
| pt-200-200 | 76.13 |
| es-200-800 | 75.99 |
| pt-400-100 | 75.99 |
| pt-100-100 | 75.84 |
| es-100-200 | 75.83 |
| es-100-100-2 | 74.98 |

# Experiments: bilingual lexicon



# Conclusions

- We have provided a new approach to classify false friends with high accuracy and coverage.
- We studied it for Spanish-Portuguese and provided state-of-the-art results for the pair.
- The method doesn’t require rich bilingual datasets.
    - It could be easily applied to other language pairs.

# Future Work

- Experiment with other word vector representations and state-of-the-art vector space linear transformation.
- Work on fine-grained classifications.
  - E.g., partial false friends.

# Thank you!

Questions?

Code and slides available at: **`github.com/pln-fing-udelar/false-friends`**