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International Conference on Computational Processing of the Portuguese Language

FINDING OPINION TARGETS IN NEWS COMMENTS AND BOOK REVIEWS

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Introduction

- **Opinion target identification** is an important part of the opinion mining process
  - *What is this opinion about?*

- It usually performed for products' reviews
  → **less common in other domains**

Opinion targets

- **Opinion targets** may be explicit or implicit
- Examples:

"Sócrates é retrógrado e antiquado."

Explicit

"Sensacional!"

Implicit

Purpose

- **We focused on identifying explicit opinion targets** in texts written in Portuguese
- 2 less explored **domains**
  - Comments about political news (SentiCorpus-PT)
  - Reviews about books (Corpus ReLi)
- 3 approaches
  - Centering
  - Pattern matching
  - Heuristics

Corpora

- **SentiCorpus-PT** (Carvalho et al., 2011)
  - **Comments about news articles** covering TV debates on the 2009 election of the Portuguese Parliament
  - ~1,000 comments segmented into ~4,000 sentences
  - Targets are **human entities**
    - Politicians, political organizations (generally used for referring its members), media personalities, or users.
  - 94% of the sentences have annotated targets
    - 79% of them have exactly one target

Corpora

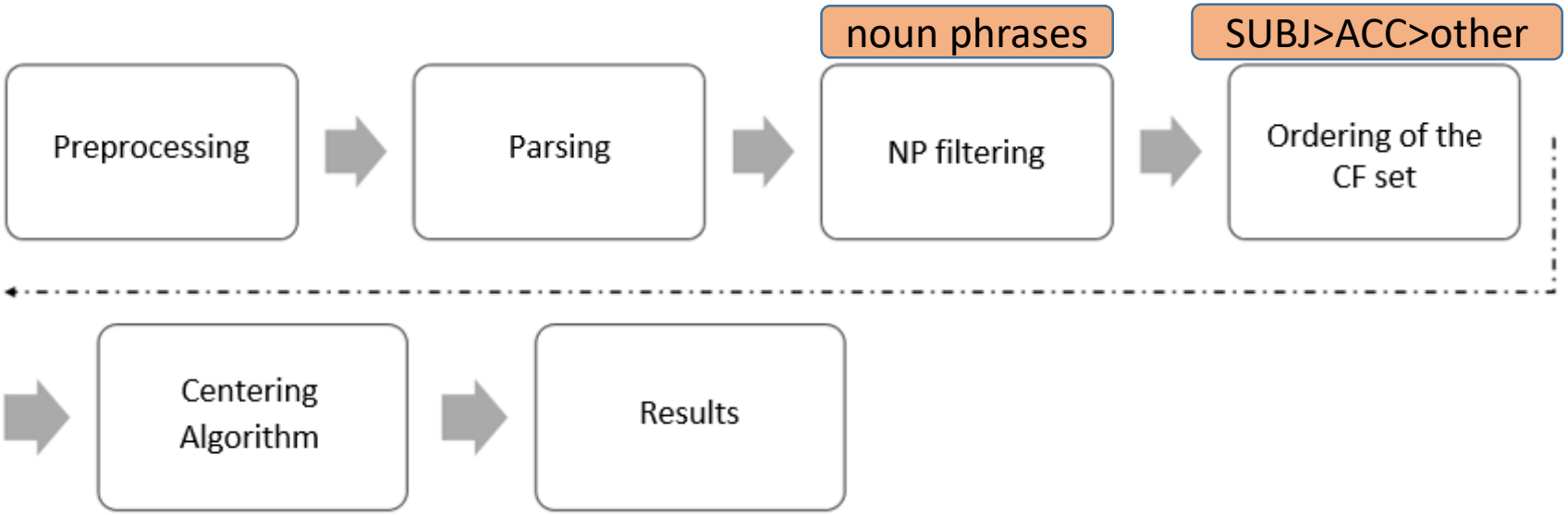
- **ReLi** (FREITAS et al., 2012)
  - **Book reviews** from an on-line social network of readers
  - 1,600 reviews from 13 different books, and it has ~13,000 sentences
  - Targets are either a **book or one of its parts**, such as chapters and characters
  - 18% of the sentences have annotated targets
    - 81% of them have exactly one target
    - A small proportion compared to SentiCorpus-PT

Centering

- **Centering** theory
  - Evaluates coherence in discourse by analyzing transitions among **centers of attention**
    - *"Since the center is the focus of attention, it is likely to be a target"*
- For extracting opinion targets
  - First proposed by Ma and Wan (2010) to identify targets in comments about news articles in Chinese
  - Explicit and implicit targets
    - Besides using CT on the comments, they also used information extracted from the articles

Prototype based on Centering

- Adaptation of Ma and Wan's approach that considers **only explicit targets**
- Since it searches for the most salient center, it **identifies only one target per sentence**



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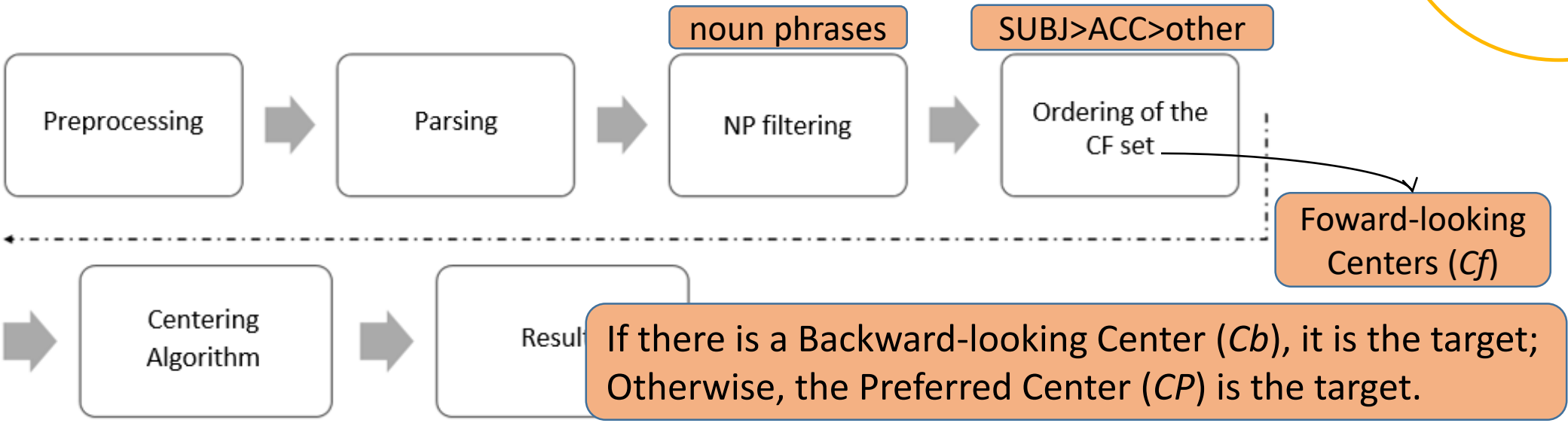
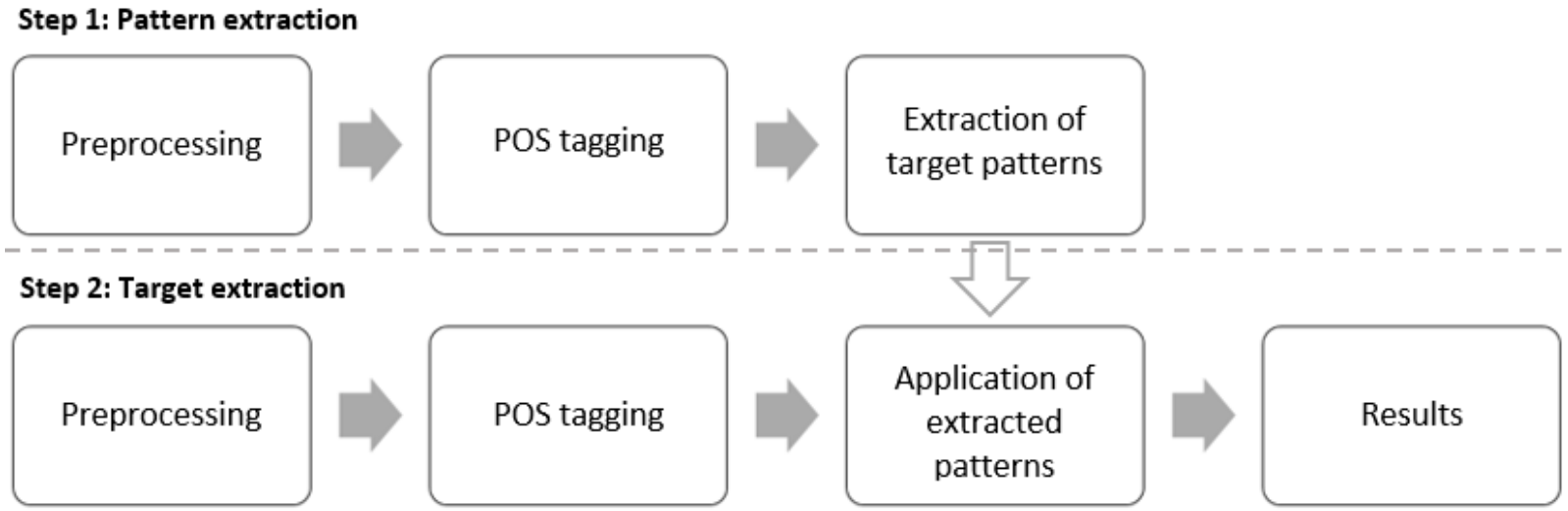


Pattern matching

- **Patterns** are units of information that are recurrent in the text
- For extracting opinion targets
  - Patterns are usually based on POS information
    - Turney (2002), Htay and Lynn (2013), Maharani et al. (2015), Rocha et al. (2016)(named entities)

Prototype based on patterns

- A two-step process:
  - Step 1 – pattern extraction: ~ ½ corpus randomly selected for training
  - Step 2 – target extraction: the remaining of the corpus used for testing



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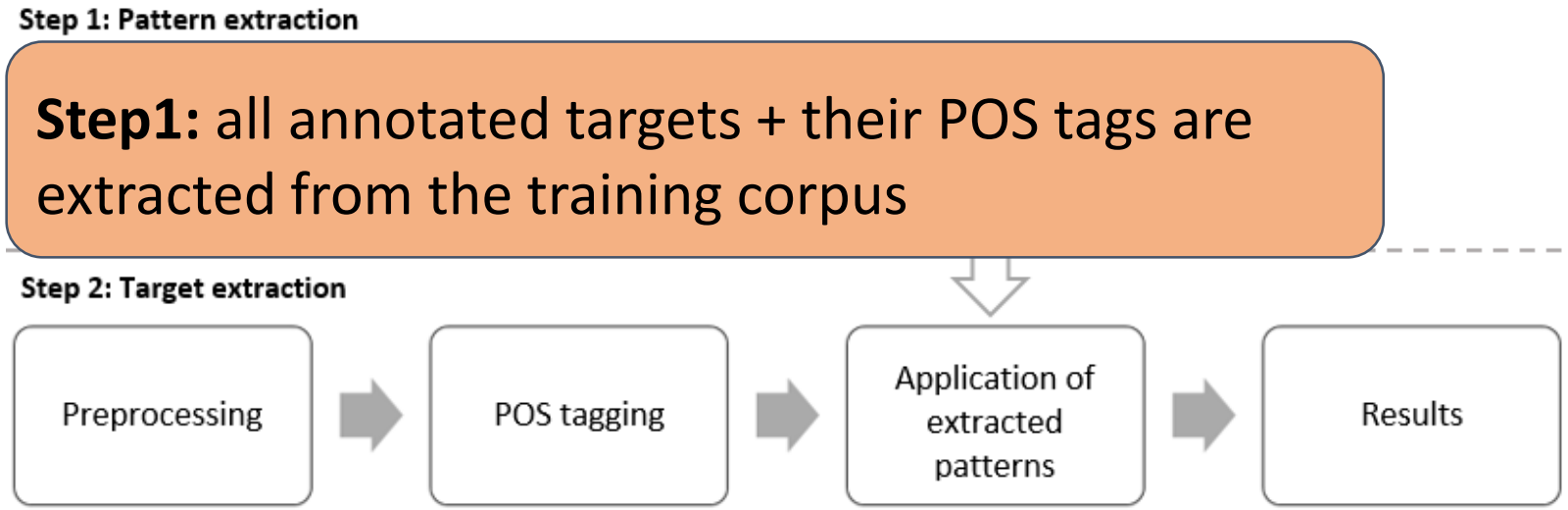

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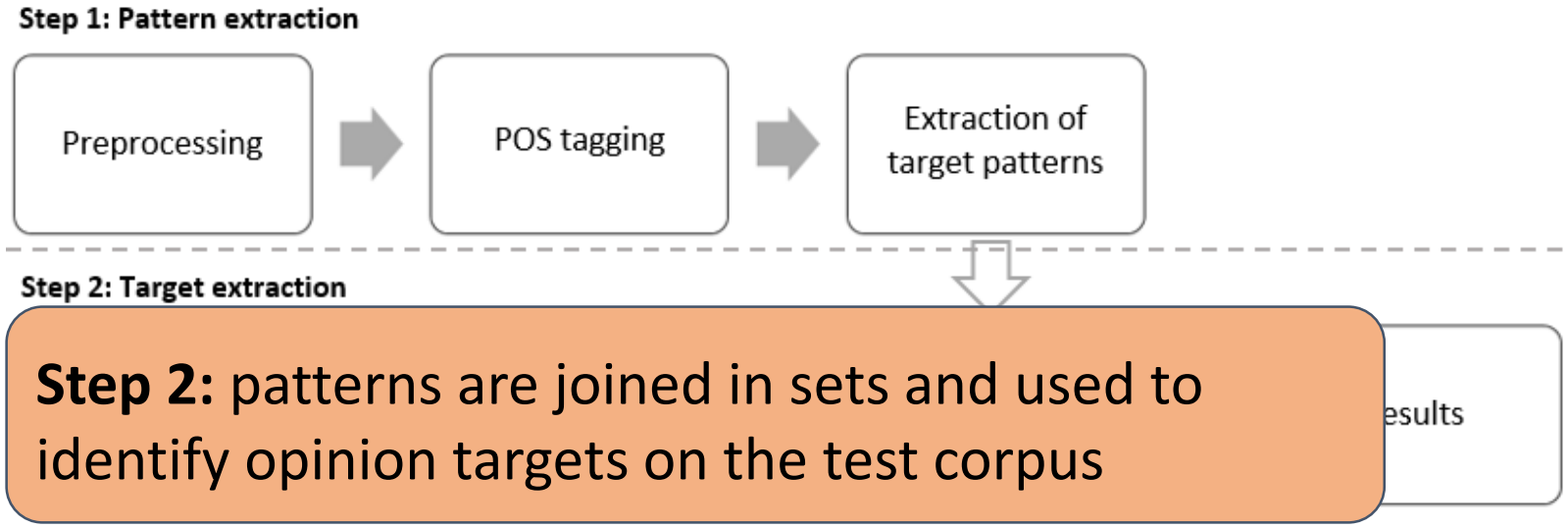

Step 2: patterns are joined in sets and used to identify opinion targets on the test corpus

Heuristics

- 3 baselines based on the following intuition:
  - *“Many targets are proper names or have the function of subject”*

Baseline 1: the subject of the sentence is the target

If the parser identifies more than one subject, they are ranked by their POS, as follows: proper name > noun > others.

The best ranked subject is the target.

One target per sentence

Heuristics

- 3 baselines based on the following intuition:
  - *“Many targets are proper names or have the function of subject”*

Baseline 1: the subject of the sentence is the target

Baseline 2: the first proper name is the target

Regardless of its syntactic function in the sentence.

One target per sentence

Heuristics

- 3 baselines based on the following intuition:
  - *"Many targets are proper names or have the function of subject"*

Baseline 1: the subject of the sentence is the target

Baseline 2: the first proper name is the target

Baseline 3: all proper names are targets

Regardless of their syntactic function in the sentence.

Many targets per sentence

Results (Centering)

- **SentiCorpus-PT**

Prototype	Precision	Recall	F-Measure
Baseline 1	0.61	0.31	0.41
Baseline 2	0.79	0.38	0.51
CT without correference	0.47	0.29	0.36
CT with correference	0.58	0.36	0.44

- **ReLi**

Prototype	Precision	Recall	F-Measure
Baseline 1	0.11	0.22	0.15
Baseline 2	0.06	0.00	0.06
CT without correference	0.10	0.27	0.15

Results (Pattern matching)

- **SentiCorpus-PT**

Prototype	Precision	Recall	F-Measure
Baseline 3	0.70	0.61	0.65
Set 1 (5-most frequent)	0.25	0.91	0.39
Set 2 (most precise + prop)	0.56	0.63	0.59
Set 3 (all prop)	0.63	0.62	0.63
Set 4 (5 prop + pron-pers)	0.52	0.71	0.60

- **ReLi**
  - ReLi has few targets in relation to its number of sentences, so we could not found patterns that occur with relevant frequency
  - For this reason, this prototype was tested only on SentiCorpus-PT

Conclusion

- We tested 3 approaches for extracting explicit opinion targets in two corpora in Portuguese
- Results were better for SentiCorpus-PT. Why?
  - ReLi has a low ratio of explicit target per sentence
    - The CT prototype usually extracts one target per sentence, so the performance in ReLi was much lower than in SentiCorpus-PT
    - It also impaired the search for frequent patterns, and therefore this approach was not tested on this corpus
  - Targets are mentioned in different ways in the two corpora
    - Targets in SentiCorpus-PT are mostly mentioned by proper names (~60%), which improved the results of the heuristics and the pattern matching
  - Further analysis of ReLi would be necessary to guide the proposal of new approaches and better heuristics for this corpus

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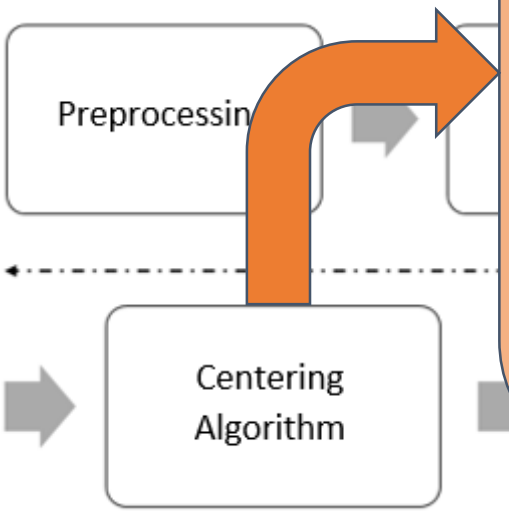
Prototype based on Centering

- Adaptation of Ma and Wan's approach that considers **only explicit targets**
- Since it se
only one

For each sentence s_i in text S
  If $i=1$ (s_i is the first sentence)
    Choose the highest ranked element in $Cf(s_i)$ as target t_i
  Else
    For each c_i in $Cf(s_i)$
      If c_i realizes (equals or refers to) an element $c'i$ in $Cf(s_{i-1})$
        Add c'_i to $Cb(s_i)$
    If $Cb(s_i)$ is not empty
      Choose the highest ranked element in $Cb(s_i)$ as t_i
    Else
      Choose the highest ranked element in $Cf(s_i)$ as t_i

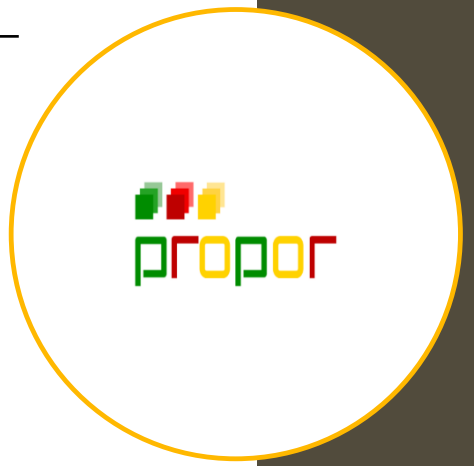
Adapted from Ma and Wan (2010)



Results for pattern matching

- The four best-performing sets of patterns

Set 1 (5-most frequent)	{prop, n, pron-pers, prop prop, prop prop prop}
Set 2 (most precise + prop)	{pron-det prp+pron-pers, prop prp+art prop, n prop prop, n prp n prp+art prop, prp+pron-pers, n prp+art prop, n prp prop prop, prop prp prop, pron-pers pron-det, prop prp+art n, prop prop, prop}
Set 3 (all prop)	{prop, prop prop, prop prop prop, prop prp prop, prop prop prop prop, n prp+art prop, n prop, prop adj, n prop prop, prop prp+art prop, prop prp+art n, n prp n prp+art prop, n prp+art prop prop, n prop prop prop, n prp prop prop, n prp prop}
Set 4 (5 prop + pron-pers)	{pron-det prp+pron-pers, prop prp+art prop, n prop prop, n prp n prp+art prop, prp+pron-pers, n prp+art prop, n prp prop prop, prop prp prop, pron-pers pron-det, prop prp+art n, prop prop, prop, prop prop prop, prop prop prop prop, pron-pers pron-det, pron-pers}



Corpora

- Corpora data summary

SentiCorpus-PT				ReLi			
Sentences with	**#**	**Targets with**	**#**	**Sentences with**	**#**	**Targets with**	**#**
No targets	221	1 word	3331	No targets	10281	1 word	2337
1 target	3071	2 words	597	1 target	1818	2 words	102
2 targets	494	3 words	370	2 targets	320	3 words	108
3 targets	77	4 words	69	3 targets	72	4 words	84
4 targets	18	5 words	20	4 targets	20	5 words	47
5-6 targets	7	6-8 words	13	5 targets	3	6-20 words	89