SUPeRB: Dealing with bibliographic references in the Portuguese-speaking world

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Linguateca

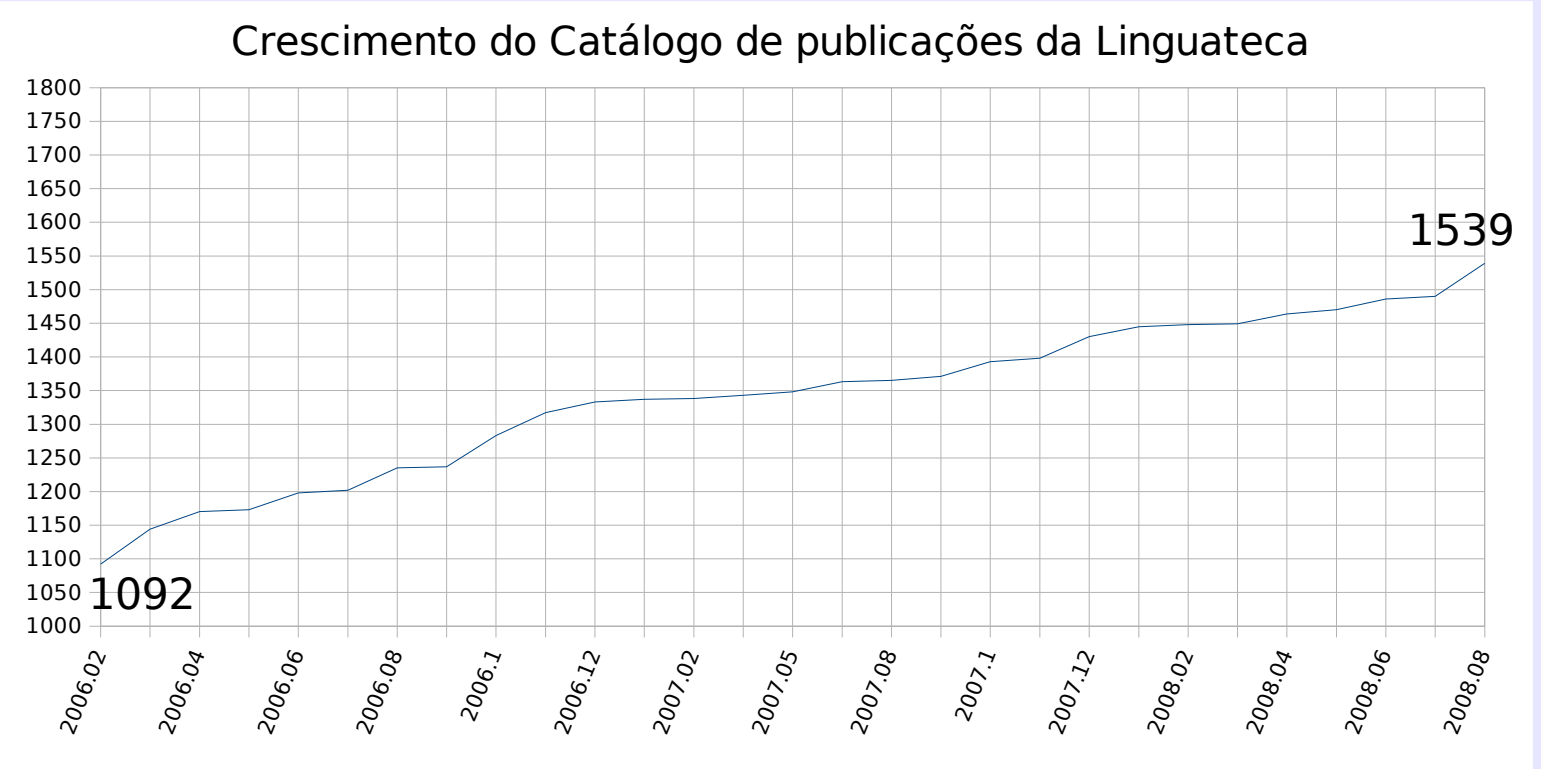
Presentation Outline

- Background
- Motivation
- SUPERB
  - Features
  - Use Cases
  - Architecture
  - Evaluation
- Current status
- Future Work
- Conclusions

Background

- Linguateca is a distributed resource center for Portuguese
  - http://www.linguateca.pt/
- The Linguateca's Catalogue of publications aims at providing bibliographic information about portuguese NLP
  - Gathering about 1547 references
  - 1116 links for the electronic version of the document (paper or presentation)
    - 988 total publications with a digital document link

Growth of the Catalogue of publications



Motivation

- Ease access to documentation written within a specific domain
- Improve an existing resource for the Portuguese speaking community, the Linguateca's publication catalogue
  - Improve its usability
  - Provide better means of gathering information from the web sources
- Improve processing of references written by Portuguese native speakers

SUPeRB

Sistema Uniformizado de Pesquisa de Referências Bibliográficas

- Is an semi-automatic system which helps in the search and the managing of bibliographic information
  - Extraction of new bibliographic information
  - Management of the bibliographic information within a catalogue
    - Add and edit
    - Tag
    - Validate
    - Generate summary pages

Features

- Capable of:
  - Search and get bibliographic sources existing on the web
  - Process several digital document formats, converting then to a common format
  - Identify relevant information
  - Extract bibliographic details
  - Support edition and validation of bibliographic information
  - Integrate the information in a bibliographic catalogue

SUPeRB: Some terminology

- Bibliographic references and elements

[Marrafa & Ribeiro 2001]
Palmira Marrafa & António Ribeiro. "Quantitative Evaluation of Machine Translation Systems: Sentence Level". In *Proceedings of the MT Summit VIII: Fourth ISLE workshop* (Santiago de Compostela, 22 de Setembro de 2001), pp. 39-43. http://www.eamt.org/summitVIII/papers/marrafa.pdf

- Bibliographic references
- Bibliographic elements

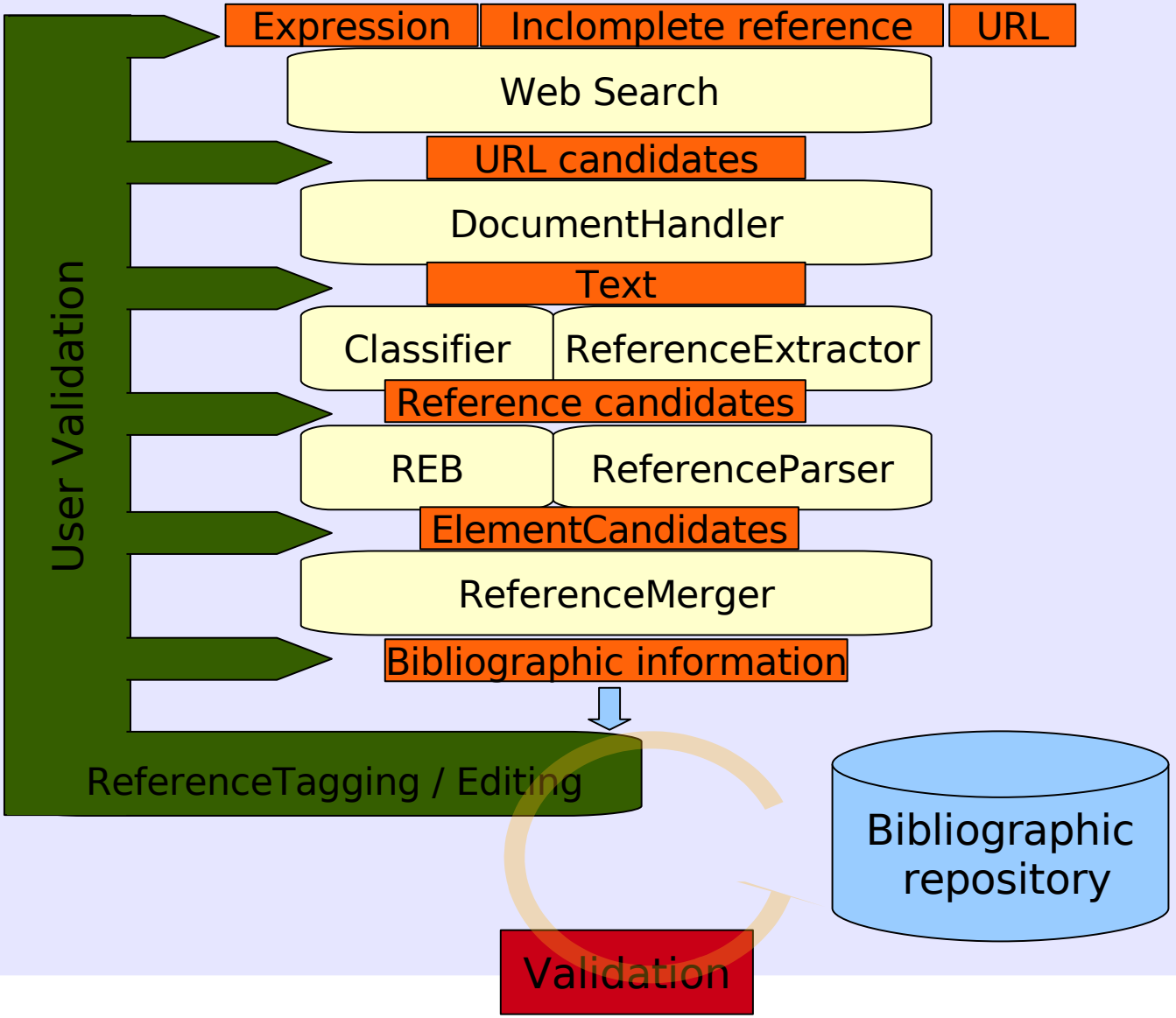
- Bibliographic formats (BibTeX, RIS, EndNote)

```
@inproceedings{marrafa:ribeiro:MIS01,
        author = {Palmira Marrafa and António Ribeiro},
         title = {Quantitative Evaluation of Machine Translation},
    booktitle= {MI Summit VIII: Fourth ISLE Workshop},
        year = 2001,
         page= {39--43}
}
```

Using SUPeRB

- Two kinds of users
  - Repository user, allowed to search, suggest and tag bibliographic references
  - Repository manager, responsible for validating users actions and generate final data
- Input
  - Expression composed by a set of keywords
  - Partial reference
  - Link to a web document
- Output
  - Relevant bibliographic content, properly formatted for use or storage

Architecture



WebSearch
Searching the Web

- Module responsible for processing expressions given by users, rewriting then and generating multiple expressions
  - joins specific domain words into the expressions,
  - queries search APIs (Google API, Yahoo API)
  - Returns URLs to relevant digital documents on the Web

DocumentHandler

Convert documents into text

- Obtain the content from different file formats
  - Gets remote documents if necessary
  - Converts documents formats into text
    - Using publicly available programs
    - Can be easily configured to use other programs

ReferenceExtractor

Finding references from unstructured text

- Capable of identifying and delimiting bibliographic references
  - Relies first on classification methods to match the document structure to expected genres (article, dissertation, homepage, ...)
  - Handles each structure in a different way
    - Article's header
    - Article's reference section
    - List of references

ReferenceParser

Parsing bibliographic references

- Takes one bibliographic reference and obtains its bibliographic elements (author, date, etc.), using a combination of methods
  - Paratools (Jewell)
  - Heuristics
  - Ontology based validation (*REB*) before user validation
- *REB* (Repositório de Elementos Bibliográficos) is both:
  - An ontology of authors, conferences and places allowing relations between elements (dealing for instance with abbreviations)
  - A set of similarity detection methods (both used for updating the ontology and validating the reference)

ReferenceMerger

Avoiding duplicates

- Identifies duplicates or partial references (different parts of the same reference)
- Merges a set of partial references, combining the distinct elements in each
- Checks whether the reference is already in the catalogue and if it needs updating

Other Modules

- *ReferenceTagger*
  - Allows users to provide additional information by assigning tags
- *ReferenceConverter*
  - Provides conversion between different bibliographic formats (BibTeX, EndNote, etc.)

Relevant design options

- Each task can be user-supervised

Evaluation of *ReferenceParser*

- Followed a methodology inspired by HAREM
  - 33 bibliographic references in several languages in the NLP area
  - 239 bibliographic elements
- Each element can be:
  - Correctly delimited and classified
  - Correctly delimited but misclassified
  - Correctly classified but incorrectly delimited (partially correct)
  - Missing

Evaluation of *ReferenceParser*

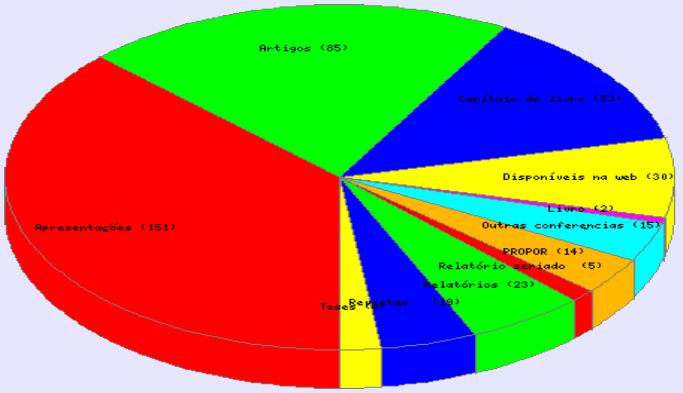
- Loose precision takes also in consideration the partially correct

	Precision	Recall	F Measure	L-Precision	L-Recall	Under-Gen.	Over-Gen.
author	0.72	0.40	0.26	1.00	0.56	0.44	0.00
year	0.41	0.50	0.23	0.80	0.97	0.03	0.21
title	0.39	0.57	0.23	0.50	0.73	0.27	0.43
conference	0.36	0.44	0.20	0.45	0.56	0.44	0.39
location	0.75	0.40	0.26	0.75	0.40	0.60	0.00
pages	0.83	0.77	0.40	0.92	0.85	0.15	0.08
volume	1.00	0.33	0.25	1.00	0.33	0.67	0.00
institution	0.33	0.40	0.18	0.50	0.60	0.40	0.50
average	0.60	0.427	0.25	0.74	0.62	0.38	0.20

These results helped detect several bugs which have now been fixed

Current status

- SUPeRB manages more than 2000 publications + 120 virtual places of publication (conferences, books and journals)
- SUPeRB produces aggregated reports in several languages and generates the corresponding charts
  - places, dates
  - conventions
  - sorting



Future Work

- Integrate faceted search with SUPeRB
- Extract keywords from abstract or the complete text
- Accept user defined ontologies
- Scheduling for publications related tasks
  - checking missing fields
  - making available electronic versions

Availability

http://www.linguateca.pt/SUPeRB/

- Manages Linguateca's catalogue
- Source code available separately
- Documentation in Portuguese

Concluding remarks

- Motivated by a practical problem
- System used in practice
- An example of information extraction of a specific kind of information (references)
- Potential usefulness in virtually any scientific area with Portuguese speaking authors
- Publicly available

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