Putting a Less Resourced Language in the Forefront: the Case of Basque

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Outline

- How are languages facing the ICT and HLT challenges?
- Which languages are "less resourced"? Six different levels
- Strategy to develop Language Technologies for less-resourced languages
- Related work
- Conclusions
How are languages facing the ICT and HLT challenges?

- Figures about amounts of resources on the Internet for different languages are not easy to obtain.

- We should use more specific public rankings:
  - Internet users,
  - Internet documents,
  - Wikipedia's articles.
How are languages facing ICT?

**Number of users**

- **Internet World Stats 2010**
  - English:
    - 636 million users
    - 30%
  - Top ten languages:
    - 1.600 million users
    - 82.2%
  - Rest of the languages:
    - 360 million users
    - 17.8% of users
    - 36% of world population

Estimated internet users are 1,966,514,816 on June 30, 2010
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How are languages facing ICT?

Number of Internet documents

- Reliable statistics for different languages are scarce

- A study on the presence of Romance languages (2007)
  - 45% of the webpages were written in English,
  - 5.9% in German, 3.80% in Spanish, 4.41% in French, 2.66% in Italian, 1.39% in Portuguese, 0.28% in Romanian, and 0.14% in Catalan.
How are languages facing ICT?

Number of articles in Wikipedia
http://meta.wikimedia.org/wiki/List_of_Wikipedias

Articles in 282 languages (October 2011).

Top 10 languages:
English (3.8 million articles),
German (1.3 M), French (1.2 M),
Dutch, Italian, Polish, Spanish, Russian, Japanese, and Portuguese.

- Chinese, Arabic and Korean are not in this second top list, instead of them Polish, Italian and Dutch are included.

Surprisingly:
- 13th: Catalan (357 K)
- 27th: Esperanto (156 K)
- 36th: Basque (106 K)
How are languages facing HLT?

Several public repositories:
- ELRA, LDC, ACLWiki, NLSR

Presence in the most popular linguistic services
- word processing
- search engines
- machine-translation engines
How are languages facing HLT?

ELRA European Language Resources Association.
- > 1000 resources **for 60 languages**
- Resources distributed by ELRA agency (some products are free for research)
- 6 products for Basque.
- *The Universal Catalogue*
  - Collaborative enriching and comprising information
  - Recently added by ELRA
  - Other products not distributed by ELRA.
  - The catalog does not offer “Search by language” functionality.
How are languages facing HLT?

LDC. Linguistic Data Consortium

- > 500 resources for 82 languages
- Search by language is allowed.
- No products for Basque
How are languages facing HLT?

ACLwiki. Association for Computational Linguistics

- Resources for 73 languages
- Search by language is allowed.
- 15 products for Basque
How are languages facing HLT?

yourdictionary.com

- On-line lexical resources for 300 languages
- Search by language is allowed.
- 5 links to Basque resources (although they are >40)
How are languages facing HLT?

Presence in the most popular linguistic services

- Word processing
  - MSWord
    - 91 languages
  - Libreoffice
    - 104 languages
How are languages facing HLT?

Presence in the most popular linguistic services

- Search engines
  - Google:
    - Identifies **45 languages**
- MT systems
  - Babelfish: **13 languages**
  - Google-Translate: **63 languages**
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- Which languages are "less resourced"?
  Six different levels
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How are languages facing HLT?

Which languages are "less resourced"?

- The answer is relative

- Six different levels
Which languages are "less resourced"? Six different levels

1. First level: English.
   - 37.9% of the users of Internet.
   - 45.00% of the web pages.
   - 62% of the HLT resources in LDC
   - 51% in ELRA.
   - Almost all the types of HLT applications.
Which languages are "less resourced"?

Six different levels

- Second level: top 10 languages in the web
  - 82.2% of the Internet users (55.4% excluding English)
  - Active LR development
  - Most major categories of HLT are represented
  - Most of the resources described in LDC or ELRA are available for those languages
    - 45.79% for German, 41.27% for French, 40.76% for Spanish; 36.24% for Italian,
    - 31.31% for Portuguese

- Streiter et al. (2006) use "central languages" to refer to this set of languages.
Which languages are "less resourced"? Six different levels

- Third level: around 70 languages.

Languages with any HLT resource registered

- 60 languages in ELRA,
- 82 in LDC,
- 73 in ACLWiki
Which languages are "less resourced"? Six different levels

- Fourth level: Around 300 languages

Languages with any lexical resource on-line registered

- 307 languages in yourdictionary.com

- It is almost the same set of languages that is present in Wikipedia (282 languages).
Which languages are "less resourced"? Six different levels

- Fifth level:
  Languages that have writing systems (Borin, 2009)
  - Here are included other 2,014 languages

- Sixth level:
  the big bag also including only-spoken languages in the world
  - Here are included at least other 4,500 lang.
How are languages facing HLT?

Which languages are "less resourced"?

- The answer is relative
- Six different levels
How are languages facing HLT?

Which languages are "less resourced"?

- The 3rd or the 4th are the levels of languages usually called as Less Resourced in the HLT domain.
- Languages in the 5th and the 6th levels are really endangered.
Which languages are "less resourced"?
Six different levels

- This classification is not strict,

- but it may be useful to recognize application domains (sets of languages) for possible different strategies in the development of HLT resources.
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Strategy to develop HLT in Basque
IXA Research Group

**Basque language**
- < 1 million speakers.
- Very different linguistically. Alone in its language family.
- In regression for centuries. But revitalising process in the last 40 years.
- It is not an official language in Europe (partially in Basque Country).

**IXA research group (created in 1988)**
- Our aim was to face the challenge of adapting Basque to HLT.
- 1988: 5 members 2012: 31 computer scientists and 10 linguists
- 10 HLT products valuable to promote use of Basque.

http://ixa.si.ehu.es
Strategy to develop HLT in Basque
IXA Research Group

We presented an open proposal for making progress in HLT:
Aduriz et al., 1998

A framework for the automatic processing of Basque

Anyway, the steps proposed did not correspond exactly with those observed in the history of the processing of English
- Different kinds of resources available
- a single coordinated plan <=> many independent efforts
Strategy to develop HLT in Basque
IXA Research Group

We consider it may be useful to promote languages from the 5th level to the 4th or from the 4th to the 3rd.
Underlying strategy

- Need of **standardization** of resources to be useful:
  - in different researches
  - in different tools
  - in different applications

- Need of **incremental design and development** of language foundations, tools, and applications
  - in a parallel and coordinated way
  - in order to get the best benefit from them

- Based on **open source**
Strategy to develop HLT in Basque Standardization

Our steps on standardization of resources brought us

• to adopt TEI and XML standards as a basis for linguistic annotation at the different levels of processing
• to define a general methodology for corpus annotation (stand-off, representing multiple interpretations)

• X. Artola, A. Diaz de Ilarraza, A. Soroa, A. Sologaistoa 2009
  Dealing with Complex Linguistic Annotations within a Language Processing Framework
  IEEE Transactions on Audio, Speech, and Language
• Rigau G., Soroa A., W. Bosma, P. Vossen, M. Tesconi, A. Marchetti, M. Monachini, C. Aliprandi 2009
  KAF: a generic semantic annotation format
  Generative Lexicon 2009. pp 145-152
We propose four phases as a general strategy for language processing

Z. Vetulani (Ed.): LTC 2009, Lecture Notes in Artificial Intelligence LNAI 6562,
Strategic priorities: from basic research to application development

- Research & development
  - End-user applications
    - Language tools
  - Basic & applied research
    - Linguistic foundations
    - Linguistic resources
Strategy to develop HLT in Basque
Four phases
Phase I: laying foundations

- Phonetics
- Lexicon
- Morphology
- Syntax
- Semantics

MRD's
Comp. description of morphology
Basic Lexical Database
Raw corpus (written texts & speech recordings)
Phase II: first basic tools and applications

Xuxen: spelling checker/corrector
Lemmatiser/Tagger
Morphological analyser
Statistical tools for the treatment of corpora

MRD's
Comp. description of morphology
Enriched Lexical Database
Morphologically annotated corpus

Phonetics          Lexicon          Morphology          Syntax          Semantics
Phase III: more advanced tools and applications

- **Phonetics**
- **Lexicon**
- **Morphology**
- **Syntax**
- **Semantics**

**Tools and Applications**

- Electronic dictionaries
- Web crawler
- Grammar checker
- Environment for linguistic tools integration
- Lexical Database
- MRD's

**Corpora**

- Morphologically and syntactically annotated corpus

**Resources**

- Comp. description of morphology
- Comp. grammar
- Lexical-semantic KB
Phase IV: multilinguality and general applications

- Translation aids, dialog systems, ...
- Information retrieval and extraction
- Advanced CALL

- Electronic dictionaries
- Web crawler
- Grammar checker
- Environment for linguistic tools integration

- Xuxen: spelling checker/corrector
- Lemmatiser/Tagger
- Morphological analyser
- Statistical tools for the treatment of corpora

- MRD's
- Comp. description of morphology
- Comp. grammar
- Multilingual lexical-semantic KB

- Lexical Database
- Morphol., synt., and semantically annotated multilingual corpus

Phonetics | Lexicon | Morphology | Syntax | Semantics
Using open-source programs is a key factor of success,

- **Efforts are not repeated** and there is a more or less widespread making contribution.
- Developing open-source code is more difficult and laborious, because it is necessary to **structure the programs** and **prepare good documentation**.
  - But simultaneously this is a **key factor of quality** and so, **sustainability**.
- **Tool version control systems** as SVN, and **public repositories** brings us to a better methodology and so, easier reuse.

**However**, arranging communities to help in enriching resources for less-resourced languages is not an easy task, **without a substantial critical mass of collaborators** this kind of processes is inviable.
Strategy to develop HLT in Basque

The strategy established a good position to adopt those initiatives emerging during the last years:

- **BLARK, Basic Language Resources Kit** (Krauwer, 2003). Its aim was the definition of the minimal set of language resources necessary to do any precompetitive research and education,

- **CLARIN** (Váradi et al. 2008), an interoperable research infrastructure of language resources and language technology that would allow to offer a stable, persistent, accessible and extendable infrastructure for the research in eHumanities;

- **META-NET Network of Excellence**

- **Flarenet**
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Related work
Roadmaps of tools (I)

- "Basic toolkit for HLT" (Agirre et al. 2002) (IXA group)

- “Basic Language Resource Kit (BLARK)” (Krauwer, 2003)
  - Joint initiative between ELSNET and ELRA in 1998.
  - Maegaard et al. (2004) BLARK for Arabic
  - Simov et al. (2004) BLARK for Bulgarian...
  - The term BLARK has been very successful and it is used in a large number of papers in the area.
The ELSNET network of excellence prepared definitions for a language resources and evaluation roadmap (Busemann & Uszkoreit, 2004).

- Several different roadmaps have been published.
- Their level of granularity in the diagram elements is very much fine than ours.
- Definition of a roadmap for “central languages”, mainly for the main European official languages.

- Meta-NET white papers (2012)
Related work

- Streiter et al. (2006)
  - They propose instructions for funding bodies and strategies for developers.
  - They use the *non-central* term and
  - Benefits and problems when using open source software for non-central languages.

- Forcada (2006)
  - He remarks the opportunity of using open source machine translation for minor languages.
  - Apertium initiative
Related work

- Ostler (1998):
  - "a language will not get by in the world of today unless it is equipped with a parser and a multi-million-word corpus of text".
- Borin (2006 and 2009)
  - relation among the sociology of language and HLT
  - Some strategic considerations,
    "those languages for which information extraction resources and tools will be available will probably exhibit a more secure and prominent presence on the Semantic Web than those lacking such resources, and as a consequence, acquire the status in the eyes of their speakers that such a presence confers".
Related work

- Efforts to create, coordinate and make language resources and technology available and readily usable for a big number of languages
  - Clarin
  - Flarenet
  - MetaNet
  - ELRA

- SALTMIL (http://ixa2.si.ehu.es/saltmil)
  Speech And Language Technology for Minority Languages

- AfLaT (http://AfLaT.org)
  Language technology research for African languages
Conclusions

- From our experience we defend that research and development for less resourced languages should be faced to build a BLARK following these points:
  - 1) high standardization
  - 2) open-source
  - 3) reusing language foundations, tools, and applications
  - 4) incremental design and development of them.

- We have defined six different sets of languages attending to their penetration on HLT technologies.

- We think that our strategy to develop language technologies could be useful for several hundred languages: those that have developed a written standard and perhaps also some initial lexical resources but that are still very far from central languages.
Thanks

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