An Automatic Extractor for Biomedical Terms in Spanish

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Introduction

- Terms are linguistic realizations of concepts in a specific domain [1, 2].
- Automatic Term Recognition (ATR) aims at identifying candidate words in a text.
- ATR involves indentifying two features of a term: its *termhood* and its *unithood* [2].
- Further difficulties arise when systems deal with variations [3] and homonymous words.
- We present a system that uses lexically-based, tagger-based, and ruled-based methods.

System architecture

- The system consists of four steps (Fig. 1), each selecting different types of candidates:
  - □ **High reliability**: we use a gold standard list of terms curated from dictionaries [10-13].
  - □ **Medium reliability**:
    - ‣ **Single-word terms**: there are two types:
      - Items registered in a silver standard list.
      - Words that were not in the silver standard are proposed as candidate terms if:
        1. a Part-of-Speech tagger for Spanish (GRAMPAL, [14]) does not recognize them; and 2. a list of biomedical roots, stems and affixes matches any unrecognized word.
    - ‣ **Multi-word terms**: we use rules of multi-word term formation and phrase patterns.

The PoS tagger and the list of stems, roots and affixes

- GRAMPAL [14] contains more than 50,000 lemmas and generates over 500,000 words.
- The list of Biomedical stems, roots and affixes is made up of:
  - □ **Graeco-Latin affixes** (e.g. *cardio*-) and **roots** (e.g. *pancrea*-) gathered from studies on medical terminology [22-24].
  - □ **Stems/affixes** for the recognition of **pharmacological** and **biological substances** (e.g. *–cavir*). They were compiled from lists approved by medical institutions [25-28].
- We excluded general affixes: e.g. *pre*-

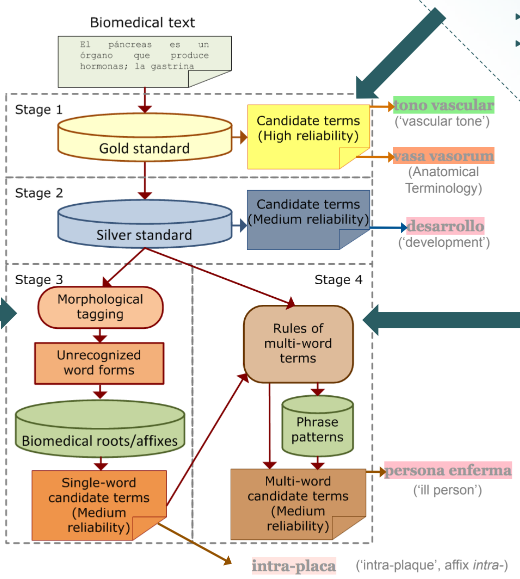


Figure 1. Processing pipeline and examples

Background

- Several non-commercial term extractors have been applied to the medical domain:
  - □ For English: TerMine [4] and the systems exposed in [5]
  - □ For French: TERMINO [6] and FASTR [7]
  - □ For Spanish: YATE [8] and TExtractor [9]
- At this stage, our system only focuses on term classification [1].

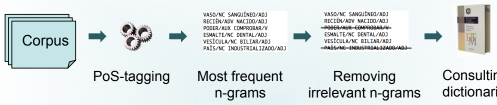
The gold standard and the silver standard lists

- For the lists of biomedical terms, two types of resources were used:
- □ **Corpora**: terms extracted semi-automatically [15] from the MultiMedica corpus [16].
- □ **Lexical resources**: terms that were not found in the corpus were semi-automatically curated from general and specialized resources [17-20].
- The **gold standard list** gathers terms registered in leading medical dictionaries [10-13].
- The **silver standard list** includes:
  - □ Terms not registered in medical dictionaries, but found in leading books and papers. We used the Google Books corpus [21] to reference each item.
  - □ Terms that were registered in medical dictionaries, but have:
    - ‣ A very general sense: e.g. *posibilidad*, 'probability'.
    - ‣ Some senses not restricted to medicine:
      e.g. *valorar* ('to titrate', chemistry) ~ 'to assess'.
  - Lists include inflected forms to cope with variants of terms:

crónico ('chronic')	→	*crónico, crónica, crónicos, crónicas*
curar ('to heal')	→	*curado* ('healed'), *curando* ('healing')…

Rules for multi-word terms and phrase patterns

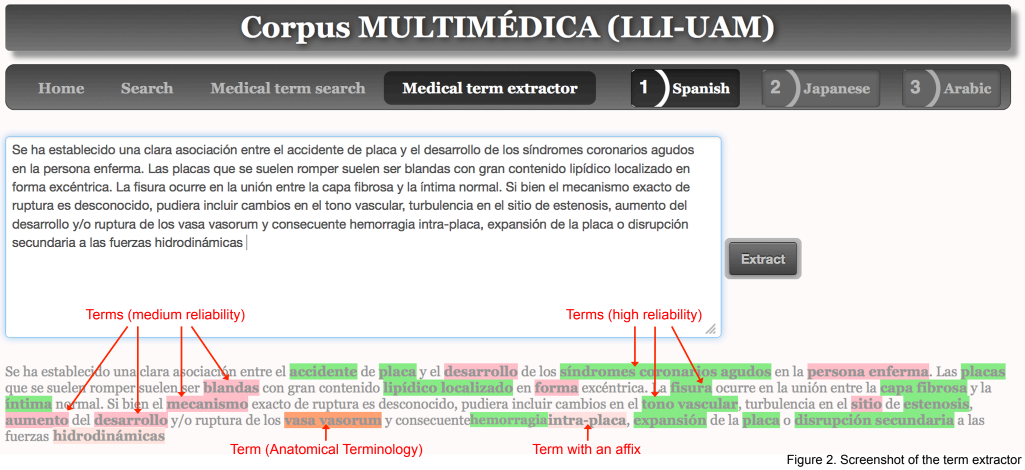
- They were obtained semi-automatically in the following way:



- Rules cover, among others, the following combinations:
  - □ N + ADJ: e.g. *cólico nefrítico* ('renal colic').
  - □ N + PREP + N: e.g. *enfemedad por depósito* ('storage disease').
  - □ N + N: e.g. *virus Coxsackie* ('Coxsackie virus').
- Context/phrase patterns serve as templates where terms appear: e.g. *persona con* + noun: *persona con* <u>*demencia*</u> ('person with <u>dementia</u>')

The interface

- http://cartago.lllf.uam.es/corpus3/extractor.pl?menu=extractor



Se ha establecido una clara asociación entre el accidente de placa y el desarrollo de los síndromes coronarios agudos en la persona enferma. Las placas que se suelen romper suelen ser blandas con gran contenido lipídico localizado en forma excéntrica. La fisura ocurre en la unión entre la capa fibrosa y la íntima normal. Si bien el mecanismo exacto de ruptura es desconocido, pudiera incluir cambios en el tono vascular, turbulencia en el sitio de estenosis, aumento del desarrollo y/o ruptura de los vasa vasorum y consecuente hemorragia intra-placa, expansión de la placa o disrupción secundaria a las fuerzas hidrodinámicas

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Figure 2. Screenshot of the term extractor

Conclusions

- Our extractor is complementary to existing systems for Spanish, but depends more on the lexicon and the tagger.
- The next step will be to evaluate its performance.
- To improve the usability, domain experts should assess other user-related aspects such as:
  - □ The intuitive use of the interface.
  - □ The understandability and the quality of the results.

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