Free/open-source machine translation: the Apertium platform

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Contents

Free/open-source software

Software is **free** (Free Software Foundation, `www.fsf.org`) when

0. anyone can use it for any purpose
1. anyone can examine it to see how it works and modify it for any new purpose
2. anyone can freely distribute it
3. anyone may release an improved version so that everyone benefits

Conditions 1 and 3 require access to the source code, hence the name **open-source** (Open Source Initiative, `www.opensource.org`).

Copyleft

- **Copyleft** (pun on *copyright*, but still copyright) when added to a free license, means that modifications have to be distributed with the same (copylefted) license.
- **Non-copylefted free/open-source licenses**: The *3-clause* or "Simplified" BSD license, the MIT License, the Apache Software License, the Creative Commons Attribution license, v. 3.0.
- **Copylefted licenses**: *GNU GPL* (General Public License), creative Commons Attribution-Sharealike license, v. 3.0

Copyleft, commons, platforms

- Copyleft secures the existence of a software or knowledge *commons*.
- It protects that commons from private appropriation (incorporation into non-free software): a level field.
- It enables communities of programmers to build shared bodies of free/open-source resources...
- ...by requiring that all derivative work is always distributed under the same license.
- Copyleft may be used to promote the growth of a software *platform*.

Free/open-source software: open for business/1

Free/open-source software opens new business models:

- emphasizes *service-centered* models over traditional *license-centered* models
- customers avoid *vendor lock-in* and may move into *technological partnership* with the provider of their choice

Free/open-source software: open for business/2

Note that third parties may engage in business without permission from the original authors (limited vulnerability from competition):

- Business on copylefted software:
  - Installing, configuring, etc. for a customer.
  - Adapting the code (a price break may be offered in exchange for the right to distribute modifications).
  - Distributing the software and charging for the distribution cost.
- Business on non-copylefted software: all of the above, plus
  - Creating closed-source software (back to license-centered models)

Machine translation software

- Machine translation is special: it strongly depends on data
  - *rule-based* MT (RBMT): dictionaries, rules
  - *corpus-based* MT (CBMT): sentence-aligned parallel text, monolingual corpora
- Three components in every MT system:
  - *Engine* (also *decoder*, *recombinator*...)
  - *Data* (linguistic data, corpora)
  - *Tools* to maintain these data and convert them to the format used by the engine
- For MT to be free/open-source, the **engine**, the **data** and the **tools** must all be free/open-source (NB, in corpus-based MT this includes **corpora**!)

Background: it all started in 1999

Apertium (first release, 2005) is based on the technologies developed by the Transducens group at the Universitat d'Alacant during the development of two existing closed-source systems:

- **interNOSTRUM** (`interNOSTRUM.com`, Spanish–Catalan)
- **Tradutor Universia** (`tradutor.universia.net`, Spanish–Portuguese)

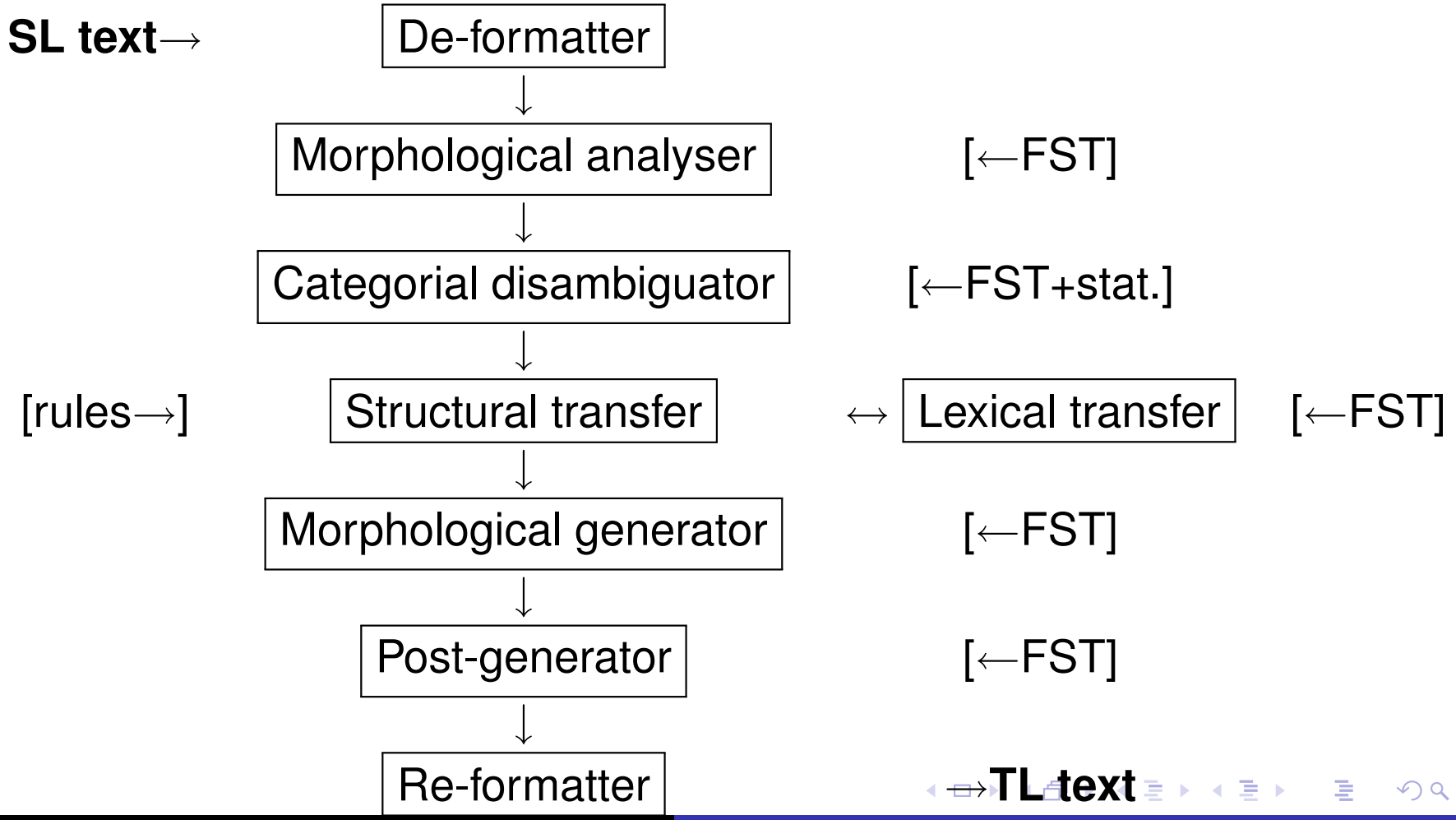
These technologies, initially designed for related-language pairs, have been extended to handle language pairs which are not so related.

The Apertium platform

Apertium is a free/open-source machine translation platform (`http://www.apertium.org`) providing:

1. A free/open-source, modular, shallow-transfer, language-independent machine translation **engine** with:
   - text format management
   - finite-state lexical processing
   - statistical lexical disambiguation
   - shallow transfer based on finite-state pattern matching
2. Free/open-source **linguistic data** in well-specified XML formats for a variety of language pairs
3. Free/open-source tools: **compilers** to turn linguistic data into a fast and compact form used by the engine and software to learn disambiguation or translation rules.

The Apertium engine



Language-pair data

The Apertium project hosts the development of a large number of language pairs:

- *Stable* language pairs include: br→fr, ca→eo, ca↔oc, cy→en, es→ast, en↔ca, en↔es, en↔gl, es↔ca, es→eo, es↔fr, es↔gl, es↔pt, es↔oc, eu→es, is→en, nn↔nb, pt↔ca, pt↔gl, ro→es
- There is also a growing number of language pairs under development.

Project funding

Funded by

- The Ministry of Industry, Tourism and Commerce of Spain (also, the Ministries of Education and Science and of Science and Technology of Spain)
- The Secretariat for Technology and the Information Society of the Government of Catalonia
- The Ministry of Foreign Affairs of Romania
- Universitat d'Alacant and Universitat Oberta de Catalunya
- The Ofis ar Brezhoneg (Breton Language Board)
- Google Summer of Code scholarships (2009, 2010)
- Companies: Prompsit Language Engineering, ABC Enciklopedioj, Eleka Ingeniartiza Linguistikoa, imaxin|software, etc.

The Apertium community

Not the ideal community development situation, but close.

- Very active group of more than 100 developers in `sf.net/projects/apertium`
- Wiki documentation (`wiki.apertium.org`)
- IRC channel `#apertium` in `freenode.net`
- Mailing list `apertium-stuff@lists.sf.net`
- Stable packages ported to the Debian and Ubuntu GNU/Linux distributions

Research and business with Apertium

Apertium is already an active research and business platform:

- **Research:** 30+ publications, 1 PhD thesis, 4 master's theses
- **Business:** companies (Prompsit, Eleka, Imaxin|software, etc.) offering services to customers such as Autodesk, the Government of Catalonia, one of the main Basque banks, the daily newspaper *La Voz de Galicia*, etc.)

The free/open-source model creates a **community** which effectively connects **researchers**, **developers**, **vendors** and **users**.

Lots of free/open-source MT out there!

- For a comprehensive list of free/open-source machine translation (FOSMT) systems, visit: `www.fosmt.info`
- In addition to Apertium, I am involved in OpenMaTrEx (`www.openmatrex.org`): a free/open-source release of the basic components of Dublin City University's marker-driven example-based machine translation system MaTrEx

These slides are free/open-source