



OpenMaTrEx: A Free/Open-Source Marker-Driven Example-Based MT System

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Overview

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Freeing/open-sourcing MaTrEx

- Collaborative effort to combine a number of individual components
 - identify various translation workflows and provide unified support (still a work-in-progress!)
 - begin together code from researchers personal configurations
 - identifying authors of components and obtaining permission from IP holders
- This gave rise to a number of outcomes
 - identification and fixing of several bugs
 - creation of new FOS marker word files for languages
 - development of improved t-table merging procedure

Intro and Background

- MaTrEx developed based on successful research by the Dublin City University MT group
 - scores of publications based on components, particularly in terms of shared task participations (e.g. WMT 08-10, IWSLT 06-09, ICON 08, NTCIR 10)
- OpenMaTrEx is a free/open-source (FOS) implementation of the basic MaTrEx components
 - wrapper around existing FOS software e.g. Giza++, Moses
 - marker-based EBMT component – Marclator
- Freeing/open-sourcing MaTrEx guarantees **reproducibility** and encourages **collaborative research**

System Overview (1)

OpenMaTrEx is itself a hybrid example-based/statistical MT system containing:

- a marker-word driven **chunker**, with marker word files for a number of languages;
- a collection of chunk **aligners** using a variety of distance algorithms;
- tools for **merging** translation tables;
- two full MT engines
 - a proof-of-concept monotone chunk-based engine (example-based recombiner);
 - a wrapper around the statistical MT engine Moses (also FOS).
- Support is also included for automatic evaluation

System Overview (2)

- Central to the novel EBMT components of OpenMaTrEx (a.k.a. Marclator) is the **marker hypothesis** (Green, 1979)
 - all natural languages are marked for complex syntactic structure at surface form by a closed set of specific lexemes and morphemes: *markers*.

- Marker words may be used to chunk the text:

[He came] [from the office] [to witness] [the chemical process.]

[Vino] [del despacho] [para presenciar] [el proceso químico.]

- Aligned chunk pairs form *subsential translation units*:

[from the office] ↔ [del despacho]

Functionality - training

● Marclator (“example-based”) mode

- source and target sentences chunked using marker words
- subsentential chunks are aligned (edit distance, with/without jumps)
 - edit distance costs can include external word alignment probabilities

● MaTrEx mode

- run Giza/Moses components for alignment
- *merge* Moses and Marclator chunks
 - re-estimate phrase translation probabilities
 - (optional) feature indicating origin of translation pair

● MERT for tuning

Functionality - translation

● Marclator mode

- monotone (naïve) decoder
- input is chunked based on marker words and most probable chunk selected
- if no translation, back of to Giza++ word translations

● MaTrEx mode

- Moses decoder is run on the merged phrase table

- Other decoders may be plugged in – support included in future releases

Sample Experiment

- 200k sentences selected at random from Spanish-English WMT08 workshop data
- Tuning and testing done on sets provided by WMT08

System	BLEU	NIST	EBMT pairs
Baseline Moses	30.59%	7.517	27.6%
MaTrEx mode	30.42%	7.516	29.5%
MaTrEx mode + feature	30.75%	7.527	33.6%

Future Releases

- Current version 0.9 – Meteor support, large-scale LMs
- Regular releases to include:
 - improved marker files
 - improved installation process and documentation
 - improved running procedures for training and testing
 - freeing/open-sourcing of other successful MaTrEx modules and adding them as *new components*:
 - word-packing (Ma, 2009)
 - source-side context (Haque, et al. 2009)
 - sub-tree alignment (Tinsley and Way, 2010)
- Increase interoperability with other FOS tools
- Create a community of developers and contributors

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<http://www.openmatrex.org>

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