The GREYC Machine Translation System for the IWSLT 2008 campaign

Yves Lepage  Adrien Lardilleux  Julien Gosme  Jean-Luc Manguin

GREYC, University of Caen, France
The system


• ALEPH is a pure example-based system that exploits proportional analogies (analogies of form).

Previous system: analogies between character strings:

\[\text{you swim : he swims :: you surf :: he surfs}\]

New system: can also work on words (used in IWSLT):

\[\text{My hotel sucks : Your hotel sucks :: My hotel rocks :: Your hotel rocks}\]

⇒ Nothing the character-based approach cannot deal with, but faster.
THE PARTICIPATION OF THE GREYC

TRACKS: ALL BTEC TASKS

- Arabic to English
- Chinese to English
- Chinese to Spanish
- Chinese to Spanish by the way of English (Pivot)

CONDITIONS: used only training data (no development set)
NON-DETERMINISTIC ANALOGY SOLVER

Previous implementation in C:

\[ x : y :: z :? \Rightarrow ? = t \]

New solver in Python:

\[ x : y :: z :? \Rightarrow ? = t_1 \]
\[ \quad t_2 \]
\[ \quad t_3 \]
\[ \quad \vdots \]

Example

kalb : kulaib :: masjid : musaijidd
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NON-DETERMINISTIC ANALOGY SOLVER

Distribution of the number of analogical equations with the same number of solutions (number of solutions in abscissae; number of analogies in ordinates):

Ratio 1 solution:multiple solutions = 30:1
Re-engineering of the engine

Main issue of the engine

Efficient discovery of translation examples that are likely to form an analogical equation is critical.

⇒ Design of a new heuristic:

- Analogical terms are chosen according to their longest common substring.
- Can be pre-computed and saved on disk to speed up searches.

Benefit: number of attempted analogical equations that have at least one solution increased from 28% to 52%.
NEW ALIGNMENT METHOD

“Perfect” alignments contain those words that strictly appear on the same lines:

Allons boire un verre . ↔ Let ’s have a drink .
Allons boire une bière ou deux . ↔ Let ’s have a beer or two .
Une bière et un café . ↔ One beer and one coffee .
Je voudrais un verre de vin , s’ il vous plaît . ↔ I ’d like a glass of wine , please .
Je voudrais de la bière , s’ il vous plaît . ↔ I ’d like some beer , please .
Nous prendrons un pichet de vin . ↔ We ’ll have a jug of wine .

“Perfect”

bière ↔ beer

“Perfect”

Je voudrais _ , s’ il vous plaît ↔ I ’d like _ , please

“Perfect”

⇒

CONTEXTS

⇒

CONTEXTS

Allons boire une _ ou deux . ↔ Let ’s have a _ or two .
Une _ et un café . ↔ One _ and one coffee .
Je voudrais de la _ , s’ il vous plaît . ↔ I ’d like some _ , please .

un verre de vin _ . ↔ a glass of wine _ .
de la bière _ . ↔ some beer _ .
NEW ALIGNMENT METHOD
How to extract the alignments for ambiguous terms?

Allons boire un verre . ↔ Let ’s have a drink .
Allons boire une bière ou deux . ↔ Let ’s have a beer or two .
Une bière et un café . ↔ One beer and one coffee .

Je voudrais un verre de vin , s’il vous plaît . ↔ I ’d like a glass of wine , please .
Je voudrais de la bière , s’il vous plaît . ↔ I ’d like some beer , please .
Nous prendrons un pichet de vin . ↔ We ’ll have a jug of wine .

Make them perfect: split the corpus.

“Perfect”
verre ↔ drink

⇒

CONTEXTS
Allons boire un _ . ↔ Let ’s have a _ .

“Perfect”
verre ↔ glass

⇒

CONTEXTS
Je voudrais un _ de vin , s’il vous plaît . ↔ I ’d like a _ of wine , please .

\[
P(\text{drink}|\text{verre}) = 0.5 \quad P(\text{verre}|\text{drink}) = 1 \\
P(\text{glass}|\text{verre}) = 0.5 \quad P(\text{verre}|\text{glass}) = 1
\]
NEW ALIGNMENT METHOD

Experiments on development set 3, using the first half for tuning and the second half for testing:
Details of the runs

3 runs for each task:

**Primary**: ALEPH (EBMT), with training data inflated with alignments generated by *malign* [Lardillleux & Lepage, next Wednesday];

**Contrast 1**: Moses [Koehn et al., 2007] with translation tables generated by *malign*;

**Contrast 2**: Moses with default translation tables (refined alignments from IBM model 4, with Giza++ [Och & Ney, 2003]).
EVALUATION RESULTS

Results with CRR, case+punc:

![Bar chart showing BLEU scores for different language pairs and contrast conditions.](chart.png)
Results synthesis

In most cases: \( \text{primary} < \text{contrast}_1 \leq \text{contrast}_2 \)

- If one sees the \( \text{contrast}_2 \) as a kind of baseline, then our system could not even reach the baseline of SMT in its current state (recursivity not ready at the time of evaluation).
- + only training data was used . . . (and you?)
- There is room for improvement!