WeMiT: Web-Mining for Translation
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Abstract. The quality of machine translation is often dependent on the quality of lexical transfer from a source language to a target language. In this work we present an automatic method to translate specialized terms. The proposed approach is based on two steps: (1) extraction of candidates for translation into web pages, (2) identification of the most relevant candidates by using web-mining techniques.

1 INTRODUCTION

For translation task, the lexical transfer from one language to another one is crucial. However, current tools can be inefficient. For instance the French term *fouille du web* is often translated with *searching the web* (e.g. using Google Translate as the example of the Figure 1). Of course this translation is irrelevant. Actually a lot of available tools have problems to translate phrases from specialized domains [3].

Generally the multilingualism lexical acquisition tasks are based on the use of alignments [6] or comparable corpora [8]. Other approaches use Wikipedia articles available in different languages [4]. In addition, the statistics of the web can be used to validate possible translations [8]. We will also use the web resources in order to extract translation but also to validate them. From this last task our method is closer to [9].

Our approach, called WeMiT (Web-Mining for Translation), allows to provide a relevant translation for a given term. WeMiT is based on the principle of PMI-IR algorithm (Pointwise Mutual Information and Information Retrieval) [9]. PMI-IR queries the Web using the AltaVista search engine in order to determine synonyms. In our approach, three major differences are identified. First, we apply different statistical measures to rank the elements. In addition, we use measures that research co-occurrences found in a context flexible or not. Finally, our approach is more global because it takes into account a preliminary step to extract candidates into Web pages. This point is developed in the next section. Ranking functions for translation are described in Section 2.2. Experiments on real data are developed in Section 3. Finally, Section 4 details the future work.

2 THE WeMiT APPROACH

2.1 Extraction of candidates for translation

In order to extract translation candidates from Web pages, we deal with the first 100 pages returned by a search engine (by specifying a language) with a query using the expression *to translate*. To extract the candidates (*cand*), we adopt the following process. For each page, we identify the parts where the expression is. We seek a first pair of parentheses in the text to extract its contents (e.g. *La fouille du Web (Web Mining, WM)*). In fact we assume that this marker (i.e. parentheses) is often adapted in order to find translation candidates. This type of method is also used for other tasks such as extraction of acronym/definition in texts [7]. After checking if this content is written in English, a cleaning process is applied (i.e. removing noise and linguistic markers as *called*, *too*, and so forth). So we have a list of candidates for translation according to the expression *exp*. For example with the expression *to translate fouille du web* (in French), we have obtained the candidates *open mango*, *web data*, *mailing*, *web mining*, *web mining wm*. The next section presents our approach to rank them.

2.2 Ranking of candidates

In order to rank candidates, we use four types of statistical measures that calculate the dependence between *exp* and *cand*.

Several measures can be applied in a web context developed in this work [1, 2, 7]. We select the more popular measures only based on the number of pages returned with *exp*, *cand*, and their co-occurrences:

- Frequency (FR): \( nb(exp, cand) \)

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\(^3\) Test date: January 23, 2012

\(^4\) In our experiments *exp* is a French expression and *cand* is an English candidate.
The following example shows that the translation web mining to the term fouille du web candidates are possible:

To assess the measure quality the sum of the ranks of relevant queries with Google search engine.

In order to evaluate our methods applied in a French/English translation context, this section provides an evaluation of 358 couples (see Figure 2).

A graphical user interface has been developed to find a new translation online and/or to enrich a dictionary with terms.

Figure 2. WeMiT Software.

3 EXPERIMENTS

In order to evaluate our methods applied in a French/English translation context, this section provides an evaluation of 358 couples (exp, cand). We have used a set of terms based on specialized documentations from Computer Science domain. For these experiments we have performed more than 1,500 queries with Google search engine.

To assess the measure quality the sum of the ranks of relevant translations is calculated. The minimization of this sum is equivalent to maximize the Area Under the ROC Curve [5].

Table 1 presents the average of ranking sum obtained. The results show that strict dependencies are more efficient. Moreover, these results show that Dice measure (DM) has a good behavior with both types of dependencies (strict and flexible). With these parameters (strict dependence + DM) based on 358 couples, 83% of the first translations returned with our system are relevant. With this same data set, the result given with Google Translate is 67%.

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**Table 1. Evaluation of measures with 127 couples.**

<table>
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4 CONCLUSION AND FUTURE WORK

In this paper, we have presented the WeMiT method which (1) extracts translation candidates from web pages, (2) ranks these translations with web-mining techniques.

Our system is based on an unsupervised approach. Supervised techniques could improve results. But in this case it is necessary to label manually a learning set with a high human cost. So in order to combine these different constraints, the use of active learning approaches could be adapted.

In our future work, we plan to combine strict and flexible dependencies with our web-mining approaches. Indeed, candidates can return no result with the strict dependence which is very restrictive. Thus, we propose to introduce a measure that ranks candidates by using strict dependencies, and when we obtain a score at zero, a flexible dependence will be applied. This principle takes into account the quality of results returned with strict dependencies and high coverage obtained with flexible dependencies. Finally we plan to propose other kinds of combinaisons too.

REFERENCES