Interactive Machine Translation using a Web-based Architecture*

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ABSTRACT

In this paper we present a new way of translating documents by using a Web-based system. An interactive approach is proposed as an alternative to post-editing the output of a machine translation system. In this approach, the user's feedback is used to validate or to correct parts of the system output that allow the generation of improved versions of the rest of the output.

Author Keywords

Computer Assisted Translation, Interactive Machine Translation, Statistical Machine Translation

ACM Classification Keywords

H.5.3 Group and Organization Interfaces: Web-based interaction; I.2.7 Natural Language Processing: Machine translation

General Terms

Design, Algorithms, Experimentation

INTRODUCTION

Computer-Assisted Translation (CAT) is an alternative approach to Machine Translation, integrating human expertise into the automatic translation process. Interactive Machine Translation (IMT) [1] can be considered as a special type of the CAT paradigm. In this framework, a human interacts with a system until the output desired by the human is completely generated. In this way of working the system provides an initial translation of a given source sentence on screen. Then the user validates a prefix of such system translation, introducing the next character(s) of the desired translation to correct some of the errors produced by the system; whereupon the system provides a suffix that best completes the prefix validated by the user. This process is repeated until the desired translation has been completely generated. The IMT framework was later extended in [5], in which the possibility of *rejecting* a given suffix was introduced.

The WWW with its universal access to information and instant communication between users has created a physical and geographical freedom for translators that was inconceivable in the past [2]. The above mentioned interactive framework for CAT is shown to work quite well by a Web-based architecture. In similar web-based natural language processing systems [4], the user's feedback has shown to improve system accuracy, and increase both system ergonomics and user's acceptability.

Predictive interaction is approached in such a way that both the main and the feedback data streams help each-other to optimize overall performance and usability. Since the users operate within a Web browser, the system also provides cross-platform compatibility and requires neither computational power nor disk space on the client's machine.

DEMO DESCRIPTION

The proposed system coordinates client-side scripting with server-side technologies. At first, the Web interface loads an index of all available corpora. Each corpus consists of a Web document that is parsed from an automatically generated Translation Memory eXchange (TMX) file[1]. The user then navigates to a page and begins to translate the document by text segments. She can make corrections with the keyboard and also accomplish some mouse operations. User's feedback is then processed by the Interactive CAT engine.

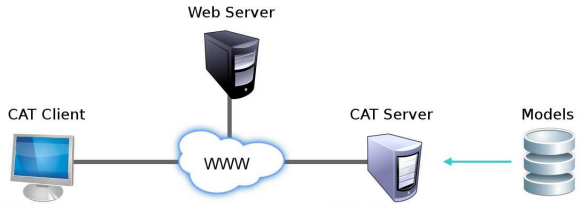

Figure 1. Interactive CAT system architecture.

Figure 1 shows a diagram of the IMT system architecture. More interaction modes are being currently researched.

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[1]TMX is an open XML standard for the exchange of translation documents.

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source	Para ver la lista de recursos:
interaction-0	To view the resources list:
interaction-1	To view |a list of resources
interaction-2	To view a list i ng resources:
interaction-3	To view a listing o f resources:
acceptance	To view a listing of resources:

(a) User Interactions

(b) Demo Interface

Figure 2. 2(a) IMT session to translate a Spanish sentence into English and 2(b) implemented interface for the demo system. On interaction-0, the system suggests a translation. On interaction-1, the user moves the mouse to validate (VP) the first eight characters "To view" and rejects (R) the next word; then the system suggests completing the sentence with "a list of resources". On interaction-2 the user moves again the mouse to accept the next six characters and presses the key *i* (KS). interaction-3 is similar to interaction-2. Finally, the user completely accepts (A) the present suggestion.

User Interaction Protocol

The protocol that rules the interaction process has the following steps:

1. The system proposes a full translation of the selected text segment.
2. The user validates the longest prefix of the translation which is error-free and/or corrects the first error in the suffix. Corrections are entered by amendment keystrokes or mouse-clicks operations.
3. In this way, a new extended consolidated prefix is produced based on the previous validated prefix and the interaction amendments. Using this new prefix, the system suggests a suitable continuation of it.
4. Steps 2 and 3 are iterated until the user-desired translation is produced.

System Interaction Modes

Our proposed system works both at full-word and character level, that is, the user can introduce modifications to the system by interacting with minimum and atomic text parts, respectively. The types of operations that can be carried out are grouped in 4 categories:

Validate prefix (VP) The text at the left of the mouse pointer is validated

Key stroke (KS) The next character of the desired translation is inserted

Reject (R) The received suffix is wrong.

Accept (A) The text is finally correct.

Figure 2(a) shows an example of a typical IMT session involving the 4 interaction modes that have been described above (key stroke operations are represented with framed boxes and reject operations are represented with vertical bars).

TECHNOLOGY

In this section we describe the technology used to implement the IMT server and the Web interface needed to communicate both client and server sides.

Interactive CAT Server

The IMT server is based on the phrase-based statistical machine translation (SMT) approach [3] to generate the suffixes completing the consolidated prefixes given by the user.

State-of-the-art SMT systems use a log-linear combination of features to generate their translations. Among the features typically used in this log-linear combination, the most important of them are the statistical language model and the statistical translation model. Fully automatic SMT systems require certain modifications for its use in the IMT framework [1].

Web Interface

Client-Server communication is made asynchronously via Ajax, providing thus a richer interactive experience, and Server-Engine communication is made through binary sockets. All corrections are stored in plain text logs on the server, so the user can retake them in any moment, also allowing other users to help to translate the full document(s).

EVALUATION RESULTS

Experimental results were carried out on two different tasks: the Xerox and the European Union corpora [1]. The results suggest that the proposed techniques can reduce the typing effort needed to produce a high-quality translation of a given source text by as much as 80% with respect to the effort needed to simply type the whole translation.

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