Secondary Benefits of Feedback and User Interaction in Machine Translation Tools

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Abstract

User feedback has often been proposed as a method for improving the accuracy of machine translation systems, but useful feedback can also serve a number of secondary benefits, including increasing user confidence in the MT technology and expanding the potential audience of users. Amikai, Inc. has produced a number of communication tools which embed translation technology and which attempt to improve the user experience by maximizing useful user interaction and feedback. As MT continues to develop, further attention needs to be paid to developing the overall user experience, which can improve the utility of translation tools even when translation quality itself plateaus.

Introduction

One suggestion which is frequently put forward as the solution to improving natural language processing (NLP) systems is human interaction. The basic idea is that a human operator will be able to make disambiguating choices, rework inputs which fall outside of the processor's capabilities, or supply extra-linguistic information necessary to complete analysis or generation. Computer-aided human translation (CAHT) is an illustration of the primary benefits of user feedback. CAHT utilizes the strengths of the computer – speed, memory – and reduces its inaccuracy through user feedback in the form of post-editing.

Amikai's communication tools further leverage the secondary benefits of user feedback. A guiding principle in designing our tools has been to maximize feedback to the user in order to enable constructive human interaction with the system. However, this interaction differs from CAHT in that the primary goal is not simply to guide the computer toward attaining higher translation quality. Rather, the primary goal is to raise the user's level of confidence in and comfort with the MT system. By providing the user with feedback information, the Amikai system designers hope that the user will be better equipped to use the translation tools effectively, and will ultimately be more satisfied with the system's performance.

The Benefits of User Interaction

Across all areas of NLP, feedback and human interaction have been proposed as ways to improve system performance. In information retrieval (IR), interactive keyword expansion and human rating of search results are two methods of querying the user for information which can then be used to improve system performance (Koenemann & Belkin, 1996; Schatz, et al., 1996). In speech recognition, mechanisms are provided for users to correct mistranscriptions and thereby dynamically retrain speech models with the corrections (IBM, 2000). And in the field of MT, human interaction has been proposed as a way to disambiguate words, choose between multiple parses, and provide missing information for target language generation (Blanchon, 1997; Whitelock, et al., 1986; Yamabana, 1997).

Limits

However, it is notoriously difficult to generate feedback queries which clearly and correctly prompt for the necessary information and which are understandable by the average user. And worse yet, some information is essentially impossible for a monolingual user to provide, regardless of the feedback queries which the system presents. Bond & Ikehara (1996) give the example of differentiating count and mass nouns and selecting determiners when translating from Japanese into English. The countability of a noun like "scales" depends on the dialect of the reader and cannot be determined by even a cooperative monolingual user.

Secondary Benefits of Feedback

The utility of feedback does not end with incremental improvements in translation quality. Feedback can also consist of warnings about inputs that are likely to cause translation difficulties and notification that translation outputs contain grammatical errors or unlikely language. Information such as this will not directly improve the quality of the system's translations, but it seems to have a number of secondary beneficial effects. While our evidence is anecdotal, after working with a large number of users in developing our MT tools, we have witnessed the following benefits of increased feedback:

- Increased feedback about translation inputs, outputs, and error detection *educates users* about the strengths and weaknesses of the MT technology. As users gain more knowledge about an MT system, they are better equipped to use the system properly to generate the highest quality translations.

- As users gain more knowledge about an MT system's performance, they *gain confidence in the quality* of the outputs generated and are ultimately more satisfied with the translation experience. On more than one occasion consumer response has indicated that an Amikai tool produced superior translations to another MT application, when in reality the underlying technology of both tools was identical. We attribute the greater level of satisfaction with Amikai tools to the power of feedback to

enable users to feel more comfortable and confident with the tool, and to use the translations more effectively.

• Finally, by increasing the usability of the MT tools and user confidence in these tools, greater user feedback also serves to *increase the audience of potential users* of the technology. Monolingual users especially seem much more likely to use MT tools repeatedly with the reassurance of more information about the translation process.

Amikai Translation Tools

Amikai's suite of translation tools include:
• AmiChat, a translated internet chat application,
• AmiWeb, a web browser with integrated translation,
• AmiMail, translated email, and
• AmiText, a basic translated text box.

Additional applications and new features for the existing applications are also being readied for release. As the applications are developed, we attempt to maximize their overall usefulness through user-focused design incorporating feedback cues.

Figure 1: The "Huh?" button in AmiChat

AmiChat

AmiChat is a traditional internet chat room front-end built over a system of MT engines which allows real-time communication between many languages. The chat domain is a particularly good application for introducing users to MT technology because the setting is inherently interactive. As users converse, mistranslated outputs can immediately be queried for clarification, and the inputs can be reworded and resubmitted for translation. To aide this interaction, a button marked "Huh?" is provided next to every translated output, to allow quick and direct feedback between users about translation quality (Flournoy & Callison-Burch, 2000).

Furthermore, users are given the freedom to view whichever output languages they prefer, in addition to the

original source language of every input. This allows users with minimal knowledge of the other language to exercise that knowledge to figure out the source of mistranslations. And it also allows users without any knowledge of the source language to see when the input contained items which are not handled correctly by the MT engines, such as ASCII art or inputs containing multiple languages.

Finally, the user is given some measure of control over how the translations are performed through the use of "Do not translate" marks. These are text marks which set off sections of text – such as movie titles and names which are also common words – and block them from being translated literally by the MT engine. For example the English sentence *Nick read War and Peace* is translated as *Guerra y paz leídas mella* without "do not translate"

marks, but when marked up as *<Nick> read <War and Peace>* it translates *<Nick> leyó <War and Peace>*.

AmiWeb

While there are many browsers with integrated translation, Amikai has attempted to increase the feedback to the user and the power the user has over the translations seen in the browser. The major way this is done is by optionally showing both the original and translated texts interleaved. By showing both the original and translation, the system allows a user to consult the original for cues about why a mistranslation may have occurred.
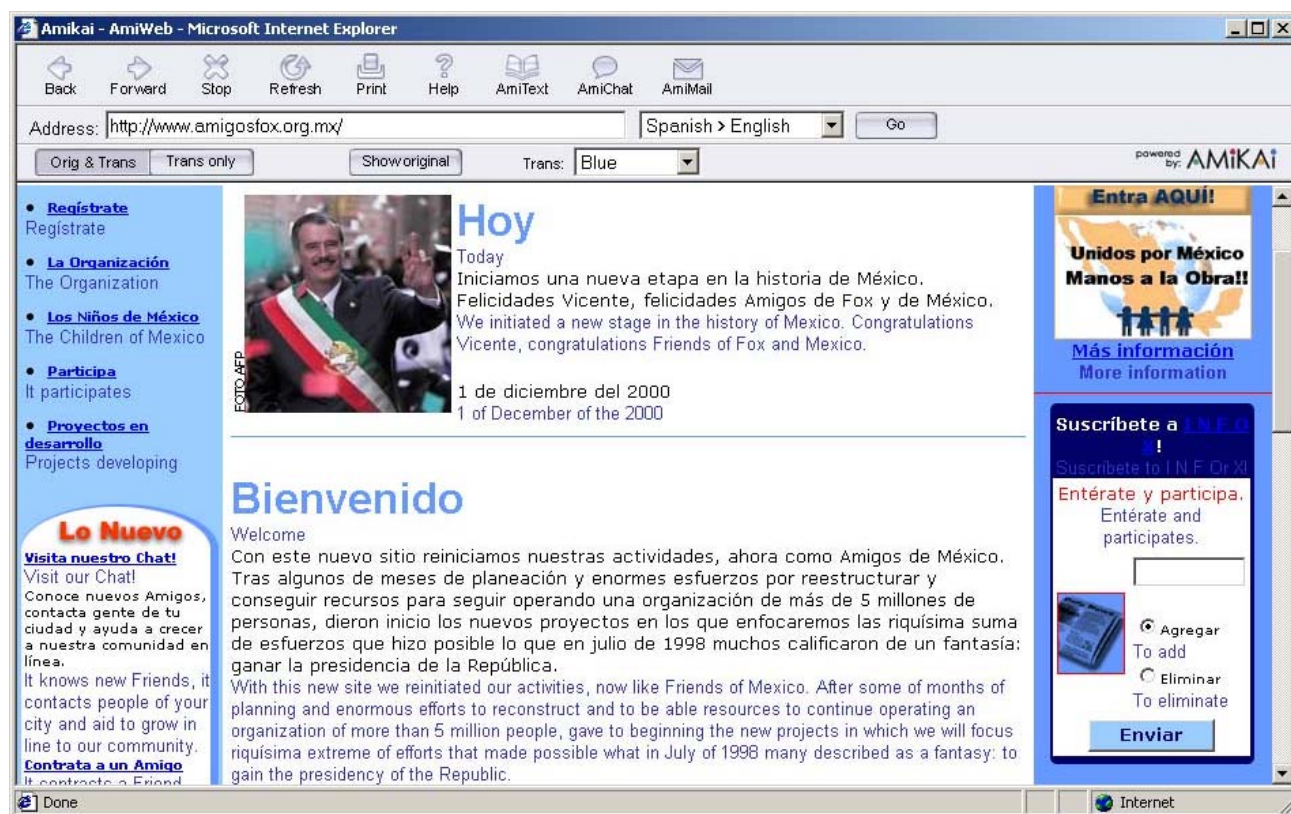
Figure 2: AmiWeb

Composition Tool

A new feature which will soon be added to a number of the Amikai tools, including AmiMail and AmiText, is a composition tool, which interactively guides the user to enter language which is as "translation-friendly" as possible. As with other controlled language checkers, it monitors for words and phrases which do not match the checker's allowed subset of English inputs. Items which are flagged by the checker include:

- Unrecognized words
- Ambiguous words
- Constructions which are likely to cause mistranslations
- Long and convoluted sentences

When possible, the composition tool queries the user for clarification or suggests alternate phrasing, but even when the tool cannot produce suggested alternatives, it serves the useful purpose of teaching the user to avoid certain words and constructions if possible. Amikai's goal in designing the checker was not to correct or clarify every input received, but rather to give the user as much information as possible about the strengths and weaknesses of the translation engines, so he or she can use the translation technology most effectively.

Toward the Future

As machine translation technology continues to develop, more accurate systems are undoubtedly on the horizon. However, errors will always be with us, and even near-human quality translation still appears to be quite a way off in the future. Feedback and human interaction are one solution proposed to assist MT systems to attain higher quality translations, but a secondary benefit of such interaction is that users learn more about the MT systems themselves. Users learn what translates well and what constructions to avoid, and they develop greater confidence in the translation tools, ultimately leading to a quicker and wider acceptance of technology.

Amikai has attempted to harness these secondary benefits of interaction by designing MT tools which are sensitive to the user experience and which maximize the useful feedback to the user.

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