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Abstract

With the advent of Web-based collaboration technologies and microcomputer-based machine translation, multinational groups can meet asynchronously or synchronously with all comments and votes presented to each user in his or her own language. To our knowledge, no such system has yet been used to facilitate distributed meetings. Here, we describe a prototype Web-based Group Support System that allows individuals to exchange comments in any of 33 languages with text automatically translated in any combination (e.g., English to Spanish, Spanish to German, etc.). A case study of French, German, and English group members meeting at different times and another case study of German and English group members meeting at the same time illustrate its use and potential.

Introduction

Face-to-face meetings of more than seven participants who need to exchange ideas often benefit with the use of Group Support Systems (GSS) (Turoff, et al. 2001). These electronic meetings generally provide group members a means of communicating anonymously in parallel while text is automatically recorded, resulting in greater participant productivity and satisfaction. While most research has shown the benefit of a GSS in face-to-face meetings, its use in distributed asynchronous or synchronous meetings is more problematic (Fjermestad and Hiltz, 1997). People working in distributed meetings can experience a low sense of presence and little or no peer pressure or synergy from other members of the group (Nunamaker, et al. 1997). Some studies have shown that distributed GSS groups outperform face-to-face groups (e.g., Valacich, et al. 1990), while other studies have shown the opposite (Dennis and Valacich, 1993; 1994). Although the efficacy of distributed GSS meetings is still relatively unproven, several Web-based meeting services and technologies have arisen over the past few years. As businesses attempt to cut travel costs, the conferencing services market is projected to approach $14 billion worldwide by 2005, representing a 38% compound annual growth rate during 2000-2005 (Winther and Bryant, 2001).

Web-based meeting services and software are no longer novel (Romano, et al. 1998), but they have several limitations. For example, most meetings have been limited to the use of a single language, and the vast majority of research on GSS has been conducted on groups using English (Pervan, 1998). The addition of accurate language translation to Web-based meetings could increase the effectiveness and efficiency of multilingual groups by an order of magnitude. The objective of this paper is to describe a new Web-based group idea generation application that supports asynchronous and synchronous face-to-face and distributed meetings with automatic translation of comments among any of 33 different languages. Two case studies show how the system can be used to break down the barriers of distance and language.

Background

Although most studies of GSS use have been conducted in the United States using English-speaking groups, some electronic meeting studies have been conducted in other countries (e.g., Mejias, et al. 1997). However, it is not always clear what language was used in the meetings, and rarely, if ever, are two languages used in the same electronic discussion.

English is used in many locations throughout the world, but only 15% of Europe's half a billion population speaks English as a first language, for example, and only 28% speaks English at all (Global Reach, 2001). In 1997, only 32% of Web surfers on the European continent consulted the Web in English, even though English is used for 82.3% of Web pages (German is used for 4.0%, Japanese 1.6%, French 1.5%, Spanish 1.1%, Swedish 1.1%, and Italian 1.0%). Further, even if a person knows English, he or she would probably prefer to use a native language.

When multilingual groups communicate verbally, they traditionally have relied on human interpreters. Human interpreters, however, can translate for only one participant at a time and the discussion still suffers from the inherent limitations of oral meetings. A multilingual GSS extends to multilingual verbal meetings what traditional GSSs provide monolingual meetings. Even though automatic translation programs might not be completely accurate, even partial translation could be a considerable boon to multilingual groups. Meeting participants might not require exact translations as long as the meaning of a comment is understood. Further, if a participant does not understand a comment, he or she can easily submit another comment requesting clarification without disrupting the meeting. A multilingual GSS can provide simultaneous translation of multiple comments in addition to the parallel communication, anonymity, and automated record keeping provided by a monolingual GSS.

Although machine translation is not perfect, human translators are not perfect either. Further, humans are much slower. However, there is nothing to preclude a GSS from using both human and computer translators to maximize the advantages of each while minimizing disadvantages. For example, machine translation could make a rough, first pass, and the human translator could inspect, verify, and if necessary, edit the translated text. Such a combination promises to be fast and accurate.

Gray and Olfman (1989) proposed a GSS with translation over 10 years ago, but only human translators were included. After each comment, a staff member would have to read, translate, and submit the typed, translated comment. For groups with many participants, this process would necessarily bog down unless numerous translators were incorporated. Automating the task reduces or eliminates the need for human translators (decreasing the cost and scheduling problems) and increases the speed of translation. Only the accuracy has been the major hurdle to automated, multilingual meetings.

A Multilingual Web-Based GSS Prototype

The unique aspect of the prototype described here is the integration of completely automated language translation.

The application provides support for 33 languages in any combination (33*32=1056 language pairs). For languages that do not use the Roman alphabet, the GSS allows selection of which keyboard to use, e.g., Korean, Chinese, etc. In addition, different editor modes are available. For example, Chinese can be entered in Mandarin (BIG5 or MingLiU) or Cantonese (Pin Yin). The software also supports right-to-left text entry, used for languages such as Hebrew and Arabic.

A case study was conducted using the prototype Web-based GSS described above. Four male participants in four different locations in three states and three time zones used the system asynchronously to discuss Osama Bin Laden. One used German, one used French, and two used English. There was no time limit in the meeting, and participants added comments at leisure. The software automatically translated each comment from one language into two comments in the remaining languages. After the meeting, two objective reviewers evaluated the grammatical accuracy and understandability of all comments.

Many errors occurred because of contractions found in the French source comments. In addition, the translated grammatical accuracy suffered because of problems with word gender in German and French. For example, "its" instead of "her" or "him" appeared in the translated text often. Another problem arose because of the topic. "Bin" and "Laden" just happen to be German words for "are" and "load," and the software took the words literally, even though they were capitalized. An objective evaluator judged the overall accuracy to be about 50% while the understanding accuracy to be about 95%. That is, even though a comment can have grammatical mistakes, the underlying meaning can still be determined in many instances.

A second case study focused on five participants (two German- and three English-speaking) in four locations in three states and three time zones using the Web-based GSS synchronously to discuss the effect of terrorism on travel for five minutes. The meeting was planned through e-mail messages, but once the meeting began, coordination was provided through the facilitator's alert box messages. After the meeting, the four male and one female group members were asked to evaluate the system. The responses are summarized below:

All respondents reported 100% understanding accuracy of their own language and could not easily tell which of the comments were translated and which were not. Although the grammar was not accurate, it did not affect the comprehension. Most of the English speakers reported 0% accuracy for understanding the comments written in German (not the translated English equivalent), and most did not even bother trying to read those comments. However, one designated English speaker reported that he did attempt to read the German comments, and was able to understand one of them. In addition, he stated that he recognized several words in the German comments and estimated that he understood 10-15% of the German text overall. Both of the German participants knew English and thus could understand comments in both languages.

Participants expressed high satisfaction with the application, finding it easy to use and the comments understandable. The comment submission rate was very high, however (31 comments in five minutes), possibly due to the participants being informed before the meeting of the topic (giving them a chance to think of comments), and due to the high experience of the participants (all had used a GSS before).

One thought five minutes was not enough time and was not able to contribute all that he wanted, causing him to leave the meeting feeling less satisfied. Another thought that comments were being added too quickly to keep up. Allowing extra time would probably have reduced the rate of submission.

As with other distributed meetings, some expressed doubt whether all were participating. In a face-to-face environment, it is clear how many are in the meeting. Although the source and translated text were juxtaposed (or nearly so), one participant suggested putting translations in a different color to more clearly distinguish them. Finally, one participant suggested that an introduction screen could provide new users with software instructions, the purpose of the meeting, and the anticipated duration.

Conclusion

Lingual barriers to communication in group meetings reduce their efficiency and effectiveness. Ten years of research at the University of Mississippi using non-English-speaking groups with and without automatic translation have demonstrated how the use of a Group Support System can overcome these barriers.

It is yet to be determined what an acceptable error rate in translation is. For informal, less-critical meetings, more errors might be tolerated. For more important meetings, human translators can provide a backup, reviewing and editing each translation if necessary before it is sent out to the other participants.

The problem of multilingual communication is of major importance due to global competitiveness and the need for multinational corporations to communicate with people of different national origins. Businesses are constantly urged to compete globally, but lingual barriers to communication hinder this expansion.

This paper has described a prototype multilingual Group Support System (GSS) that provides groups with anonymity, automated record keeping, parallel communication, and translation of comments among languages. A multilingual GSS allows better communication and consequently greater group productivity and satisfaction with the meeting. At the same time, nonverbal communication problems can be reduced or eliminated. Future research utilizing the GSS will provide additional information about multilingual group communication and the effects electronic technology has on such groups.

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