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Using an Automated Knowledge Agent for Reference and Customer Service

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tial for the production of high-quality digital programming. Makeshift settings lacking these qualities cannot provide suitable environments for digitally recorded productions.

Ultimately, the digital learning object developed for this project will be further subdivided, indexed, and migrated to the Web. Health sciences libraries are increasingly involved in developing and managing these types of digital resources. As data casting of digital learning objects becomes ever more common to support communications among health care providers, educators, researchers, and the community at large, it seems only logical that opportunities for health sciences libraries to expand their roles in this arena will continue to grow.

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Using an automated knowledge agent for reference and customer service

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INTRODUCTION

Knowledge agents are software tools that sift through data to retrieve answers to questions. These agents may take many forms, including verbots, chatterbots, and intelligent agents. They have character and personality and reply to natural language inquiries. Agents “learn from their mistakes” and “grow smarter” when their programmers review failed interactions between the customer and the agent and then script correct responses [1].

One of the earliest automated intelligent agents was Eliza [2]. Eliza employed natural language processing to ask users questions and used those answers to create subsequent questions. Eliza was championed as a computer psychiatrist, and some users said they could not tell the difference between Eliza and a human. Today, some companies use similar technology to provide customers with the answers to their questions. These agents are known as automated customer service agents or virtual representatives.

Last year, the National Library of Medicine (NLM) received 34,500 email questions. Many questions were repetitive and easy to answer, such as “Where are you located?” To provide customers with a self-service alternative for finding answers, the library developed an automated customer service agent, using software from NativeMinds.

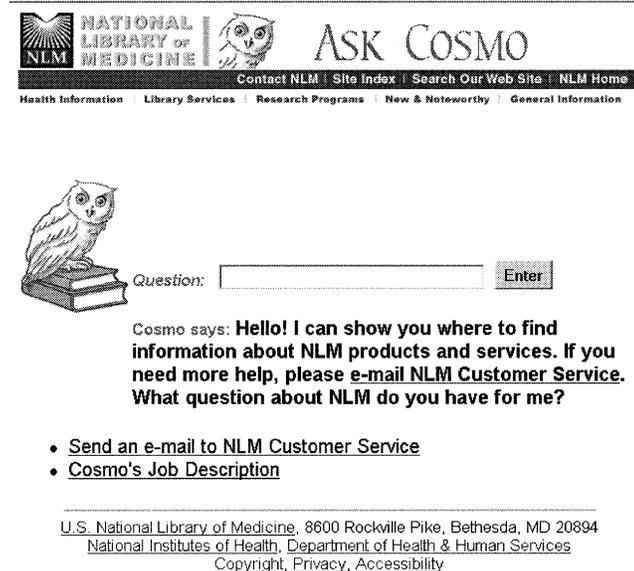
METHODS

In 2001, there were few automated agent software vendors, and NativeMinds was the only identified product that integrated with other NLM customer service software. Reference librarians began by writing a “job description” for the agent. The automated agent was to answer fundamental questions about NLM products and services that had existing Web pages with more information. Initial responses for the agent to use would be scripted from the Frequently Asked Questions NLM Website. In addition, the service would be integrated with the MEDLINEplus health topics and drug databases.

NativeMinds uses a proprietary language called Neuroscript, a variation on Java-enabled C++. Natural language processing identifies key concepts and dis-

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Figure 1
The Ask Cosmo Web page



cards irrelevant information. Pattern matching lists help identify all the possible ways the same type of question might be asked (e.g., What are your hours? When do you open? Are you open on weekends?) When the pattern category is recognized, the software triggers a scripted answer and appropriate hyperlinks.

Reference librarians reviewed customer service question logs, identified common questions, scripted pattern lists and categories, and wrote responses to questions they thought were most likely to be asked. The agent was given the name Cosmo (Customer Service M. Owl) and was graphically represented by an owl. Staff members were encouraged to ask Cosmo questions, so reference librarians could script responses to questions it was unable to answer before public release. Scripting, testing, and auditing of the agent continued, and Cosmo was placed on the external Contact NLM Customer Service Web page† in February 2003 (Figure 1).

RESULTS

The service now includes more than 900 answers to common questions. Cosmo continues to “learn” as librarians review questions and script responses for appropriate customer questions that were not answered or were answered incorrectly.

In April 2003, users asked the agent 466 questions. Cosmo answered 51% of these questions correctly and 22% incorrectly, 20% were out of scope for the agent’s job description, and 7% were out of scope for NLM. Of the questions within the agent’s job description (n

= 340), Cosmo answered 70% correctly. The agent answered questions such as:

- Where is NLM located?
- How can I license UMLS?
- What is azithromycin?

The agent could not answer questions such as:

- Can you help me with a search strategy on drugs for treating the types of cognitive dysfunction in the elderly? (too complex)
- Who was the third president of the United States? (outside the scope of NLM)
- What is the history of the NLM associate fellowship program? (no existing Web page)

The automated agent was initially placed at the bottom of the Contact NLM Customer Service Web page, which required the user to scroll down the page to use it. Because the agent “learns” from its mistakes and mistakes can be embarrassing, it was necessary to test and carefully review the agent’s performance before moving it up on the page. In May 2003, the agent was moved so it could be used without scrolling.

Some users assume Cosmo is just another search engine, but it has key differences. Cosmo’s purpose is to provide specific answers to specific questions and not simply lists of hyperlinks to possible answers. Cosmo works best when the user asks for information in the form of a question rather than simply entering a string of search terms. Scripting was done with the public in mind. Librarians are generally not the primary target user group, as they possess advanced searching skills and are adept in dealing with the limitations of search engines.

This service is available at all hours, provides immediate and consistent responses to questions, relieves boredom for humans from answering repetitive questions, has the potential for cost savings, and refers more difficult questions to human agents when a personal response is needed. In addition, the service is helpful when the Website search engine yields too many results. Finally, the automated agent is sometimes used for sensitive health questions a user might not want to ask a reference librarian.

DISCUSSION

NLM’s automated agent, Cosmo, is performing acceptably. Continuing evaluation will determine whether the product continues to meet NLM’s objectives. Questions to be answered include:

- How many Website visitors use the agent?
- What percentage of interactions escalates to telephone or email customer service?
- What questions do clients ask most often?
- How much of the knowledgebase is used?
- Based on client questions, are there other databases that should be integrated?
- What is the total cost of the service?

Future usability testing will help determine optimum appearance of the Web page. The Customer Service Contact NLM page now provides several options to assist users in finding what they want on NLM’s Website and good guidance on how to contact NLM if they need help.

† Cosmo may be viewed on the Contact NLM Customer Service Web page at <http://www.nlm.nih.gov/contacts/contact.html>.

CONCLUSION

It is unlikely intelligent agents will replace reference librarians. An automated agent does not know how to help a user who does not know what question to ask or how to phrase a question. Even with investments in scripting and management, this agent answers half the questions it is asked, leaving the rest to be answered by humans. However, having an added choice for customer service that is available at all times of the day and night and can answer basic, repetitive questions can benefit both clients and librarians. The real value of the agent is in providing answers rather than listing hundreds of hyperlinks that might answer a question. From the perspective of quality filtering of information and managing information overload, intelligent agents may be very useful.

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Confronting the challenges of HIV/AIDS information dissemination: report of the one-day HIV/AIDS Information Summit

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[‡] The Defense Logistics Information Service Website may be viewed at <http://www.dlis.dla.mil:4080>.

INTRODUCTION AND MISSION

The Pacific Southwest Regional Medical Library (PSRML), one of eight regional offices of the National Network of Libraries of Medicine (NN/LM), in cooperation with the California AIDS Clearinghouse (CAC), sponsored a one-day HIV/AIDS Information Summit, which was held at the University of California, Los Angeles (UCLA), on March 19, 2003. The idea for the summit developed from the natural partnership formed and the mutual interest shared between CAC and PSRML to address information needs of the AIDS community. The summit was initially conceived as a forum for various groups involved in HIV/AIDS information delivery to share concerns and develop action plans to address unmet information needs. Details about the summit, including online registration procedures, were posted to the event's Website,* as they became available. The summit's Website also includes links to Webcasts of most portions of the program, as well as links to all electronic slide presentations, meeting notes, handouts, photographs, and graphic recordings of the event.

PLANNING PROCESS

A steering committee, chaired by a librarian, was formed to plan the summit. The group included six additional members representing academic-based AIDS programs and AIDS services organizations. The committee met in person on August 27, 2002, to begin planning the format and content of meeting sessions and developed the following mission statement for the summit: "To define common challenges and identify potential strategies to improve the coordination and electronic dissemination of accurate and current HIV/AIDS information." The steering committee also decided to use the services of a graphic recorder, who colorfully captured the content of the plenary session and group reporting session on large charts, or "road maps." Planning efforts were completed through monthly teleconferences and electronic mail communications.

Publicity for the summit was widely distributed by email to HIV/AIDS surveillance contacts in all California counties and was posted on the CAC and California Department of Health Services Office of AIDS/HIV Epidemiology Websites. In addition, the health sciences communities at the University of California campuses and numerous community-based AIDS organizations were notified. Approximately 120 people attended the summit on March 19, 2003. Most of the attendees were from California, several delegates were from Arizona and Washington, and representatives from several other states and the National Library of Medicine attended as well. The majority of attendees were representatives from community-based organizations and municipal public health departments. A

* The HIV/AIDS Information Summit Website may be viewed at <http://nnlm.gov/psr/aids-summit.html>.