Mars Information Access Server

Boris Katz, Sue Felshin, Aaron Fernandes, Jimmy Lin, Jerome McFarland, Alp Simsek & Chloe Tergiman

Artificial Intelligence Laboratory
Massachusetts Institute of Technology
Cambridge, Massachusetts 02139

http://www.ai.mit.edu

The Problem: A great deal of information is available online today, but in difficult-to-access heterogeneous format.

Motivation: We build technologies to address problems with finding information online (see [1] and following abstracts). We have applied these technologies to a variety of data sources on the World Wide Web.

The Jet Propulsion Laboratory has the dual interest of making it possible for the public to send queries to Mars mission spacecraft while they are in operation, and of providing convenient public access to information on their Web site about Mars and missions to Mars. Their data access needs serve as an excellent test bed for our technologies, and our technologies can help them fulfill their data access needs.

Approach: Our long-term goal is to build, in association with JPL, an information access server which will aid a future Mars mission rover in conversing with people concerning its activities on Mars. As our first step toward this goal, we have created an information server which answers individual queries.

JPL's data presented an interesting mix of structured data, semi-structured data, and unstructured data. Different components of the START system were brought to bear to handle different types of data. Structured data, such as the Mars Atlas and JPL's index of solar system exploration missions, was made available through parameterized annotations [1, 2, 3]; see Figure 1. Using this data, we can answer queries such as "what are the goals of Mars Global Surveyor," "when was Mariner 4 launched," "where did Amazonis Planitia's name come from," "what is a chasma," "show me the Mars Pathfinder rover," "list some Martian mountains," etc. Semi-structured data such as Mars Team Online was handled by our Sapere information retrieval system [4]. Mars Team Online is a large collection of explanations provided by JPL researchers in response to public queries. Each explanation is labeled with a short phrase or sentence which describes it. Since these descriptions were already available, we were able to treat them as automatically derived annotations, and parse and index them with Sapere. Unstructured data such as Mars mission data was added to the system using individual annotations, as well as by properties—such as locations of photographs—associated with lexical items [1]; this allows us to answer queries such as "what is the current position of the Mars Odyssey," "what goals does NASA hope to accomplish on Mars," "what missions have we sent to Mars," "show me a picture of a human face on Mars."

Impact: At the annual JPL open house this spring, our Mars server (see Figure 2) was unveiled to the public. Attendees of the open house, especially children, enjoyed the server immensely. The URL was made available, and members of the public have continued to query the server. [5]

The Mars server server has successfully exercised all the technologies of the START system and demonstrated their value for realistic access to heterogeneous information.

Future work: We hope to continue our association with JPL to provide information access for a future Mars mission. Users, such as advanced junior high school science students, will be able to send email to the Mars rover. With START's help, the user will answer users' emails in conversational style.

Research Support: This research is funded by the Jet Propulsion Laboratory under contract number 1226895.

References:

[1] B. Katz et al. From Sentence Processing to Multimedia Information Access. In *MIT Artificial Intelligence Laboratory Research Abstracts (this volume)*, September 2001.

[2] B. Katz et al. Omnibase: A Universal Data Source Interface. In *MIT Artificial Intelligence Laboratory Research Abstracts (this volume)*, September 2001.

[3] B. Katz, S. Felshin, and J. Lin. Annotating the World Wide Web. In *MIT Artificial Intelligence Laboratory Research Abstracts (this volume)*, September 2001.

[4] B. Katz, J. Lin, and S. Felshin. Improving the Precision of Information Retrieval Systems Using Syntactic Relations. In *MIT Artificial Intelligence Laboratory Research Abstracts (this volume)*, September 2001.

[5] Joel Wilf and Douglas Hughes. Dear Mars – developing a natural language auto-responder for Mars outreach. *NASA Science Information Systems Newsletter*, July 2001.

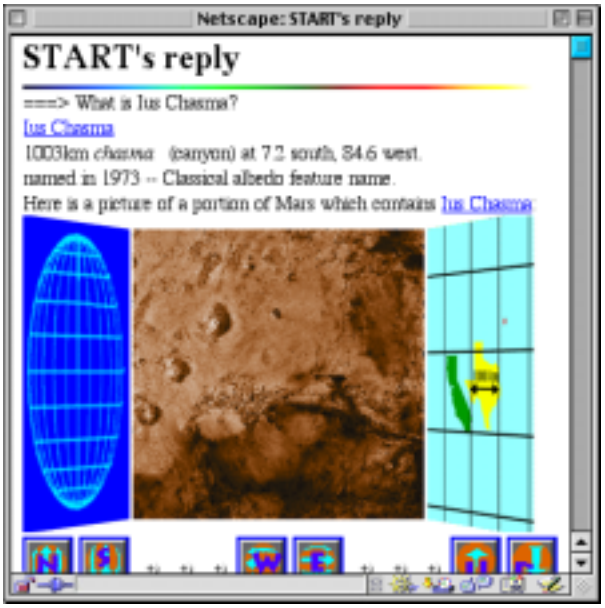

Figure 1: Information about a Martian surface feature retrieved from a JPL database.

Figure 2: JPL `dearmars` server