

A REAL-TIME SPOKEN-LANGUAGE SYSTEM FOR INTERACTIVE PROBLEM SOLVING

Patti Price and Robert C. Moore

SRI International
Menlo Park, CA 94025

1. PROJECT GOALS

The goal of this project, to develop a spoken language interface to the Official Airline Guide (OAG) database, has been developed along two overlapping research and development lines: one focussed on an SLS kernel for database query, and the other on the interactive system.

2. RECENT RESULTS

SRI has developed a spoken language system to retrieve air travel planning information. Progress can be measured by comparing DARPA benchmark results in February 1992 and November 1992. Between February 1992 and November 1992, for all utterances tested, SRI's word error rate in the ATIS speech recognition test improved from 11.0% to 9.1%. Weighted utterance error improved from 31.1% to 23.6% in the natural-language understanding test, and from 45.4% to 33.2% in the spoken-language understanding test. Other recent results include:

- Ported ATIS system to new, 46-city database; coordinated with internally funded effort to port to the online OAG.
- Improved speech understanding by modeling spontaneous speech phenomena, including filled pauses and verbal repairs. The study included development of method for labeling and classifying repairs and tools for their analysis.
- Developed algorithms for tracking discourse structure that correctly determine discourse context with greater than 90% accuracy on the ATIS training corpus.
- Improved GEMINI system's linguistic coverage of the ATIS task to 93% syntactic coverage and 86% semantic coverage in a fair test on the evaluable utterances in the November 1992 ATIS benchmark test set.
- Integrated GEMINI system into overall ATIS system, and used it for the benchmark tests in conjunction with the Template Matcher.

- Performed pilot experiments on the use of natural language constraints to improve speech recognition; initial evidence showed an encouraging 22% reduction in word error rate.
- Analyzed human-machine problem solving using SRI's ATIS system. Analyzed user satisfaction and system performance as a function of system errors and user experience.
- Collected ATIS training and test data (speech, transcriptions, and logfiles) using SRI ATIS system, including about a thousand utterances using the new database.
- Improved user interface of SRI ATIS system, including better paraphrasing of system's understanding, easier to read displays, and improved system error messages.
- Produced one journal publication, sixteen conference talks and proceedings papers, and many invited talks; provided support and training for four graduate students.

3. PLANS

- Complete integration of GEMINI system into SRI ATIS, including tighter integration with Template Matcher.
- Explore tighter integration of speech and NL processing for better overall SLS performance, perhaps via lattices.
- Improve system robustness, portability and scalability.
- Develop complete telephone-based ATIS system.