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Strategic Computing Natural Language Workshop

Proceedings of a Workshop
Held at
Marina del Rey, California
May 1-2, 1986

Sponsored by the
Defense Advanced Research Projects Agency

University of Southern California
Information Sciences Institute
Report Number ISI/SR-86-172
August, 1986
Norman K. Sondheimer
Workshop Organizer

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FORWARD

LTC. Robert Simpson, DARPA/ISTO

Natural Language Technology Base Contracts within DARPA's Strategic Computing Program

LTC. Robert Simpson, DARPA/ISTO

May 1, 1986

The overall objective of the Strategic Computing Program (SC) of the Defense Advanced Research Projects Agency (DARPA) is to develop and demonstrate a new generation of machine intelligence technology which can form the basis for more capable military systems in the future and also maintain a position of world leadership for the US in computer technology. Begun in 1983, SC represents a focused research strategy for accelerating the evolution of new technology and its rapid prototyping in realistic military contexts. The more specific top level goals supporting this single broad objective are to produce technology that will:

1. enable the operation of military systems under critical constraints such as time, information overload, etc.,
2. enable the management of forces/resources under constraints of information overload, geographic distribution, cost of operation, etc., and
3. facilitate the design, manufacture, and maintenance of defense systems within time, performance, quality, reliability, and cost constraints.

Even though capabilities for man-machine interaction will ultimately form an important component of systems in all of these areas, the second of those goals has been selected as the initial area to include emphasis on decision-making aids, including natural language processing.

Subgoals of these top level goals include:

1. To strengthen/develop areas of science and technology that enables the building of computer systems needed to attain the top level goals.
2. The technologies identified are:
 - Artificial Intelligence,
 - Software development and Machine Architectures,
 - Micro-electronics, and related infrastructure.
3. To build demonstration systems in specific military areas that:
 - Provide focus for technology development,
 - Provide means for exercising technology in real environments,
 - Facilitate manpower training,
 - Facilitate development of industrial capability, and
 - Facilitate technology transfer to the military.

There are four very ambitious demonstration prototypes being developed within the SC Program. They are:

1. the Pilot's Associate which will aid the pilot in route planning, aerial target prioritization, evasion of missile threats, and aircraft emergency safety procedures during flight;
2. the Autonomous Land Vehicle (ALV) which integrates in a major robotic testbed the technologies for dynamic image understanding, knowledge-based route planning with replanning during execution, hosted on new advanced parallel architectures;
3. two battle management projects one for the for the Army, which is just getting started, called the AirLand Battle Management program (ALBM) which will use knowledge-based systems technology to assist in the generation and evaluation of tactical options and plans at the Corps level; and
4. the other more established program for the Navy is the Fleet Command Center Battle Management Program (FCCBMP) at Pearl Harbor. The FCCBMP is employing knowledge-based systems and natural language technology in a evolutionary testbed situated in an operational command center to demonstrate and evaluate intelligent decision-aids which can assist in the evaluation of fleet readiness and explore alternatives during contingencies. It is within this context that the natural language contractors are currently demonstrating the potential of natural language technology.

Competitive awards were made to seven contractors in 1984. Four (BBN Laboratories, Inc., University of Southern California Information Sciences Institute (USC-ISI), the University of Pennsylvania, and the University of Massachusetts) are involved in research and development in natural language interfaces; three others (New York University (NYU), Systems Development Corporation (SDC), and SRI International) are involved in research and development in text processing.

The work in natural language for strategic computing, which includes no work currently directed to speech recognition, focuses on producing and demonstrating two "new generation systems." One for natural language interfaces and another for processing free form text from military messages. One of the natural language new generation systems is a state-of-the-art interface being jointly designed and implemented by BBN and USC-ISI. The other is a highly accurate natural language text understanding system which is being constructed by the university/industry team of NYU and SDC. In each case, they will serve the purpose of supporting the integration of specific research efforts produced by participating component technology contractors. The design of the new generation systems will be developed in concert with the needs of other research contractors and the resulting implementation will be furnished to them for use as a framework to support their own research efforts.

This document is the proceedings of a workshop held to review the ongoing research. The first section of the document contains summary reports from most of the participating groups. The second section contains selected technical papers from the research groups.

The workshop was held May 1 & 2, 1986, at USC-ISI, Marina del Rey, California. Presentations were also made by research groups focusing on speech understanding (Carnegie-Mellon University and BBN Laboratories Inc.) and expert systems technology (Teknowledge, Inc., and Ohio State University). Also in attendance were representatives from a variety of organizations within the Department of Defense.

DARPA/ISTO would like to extend its thanks to USC-ISI for hosting the workshop and preparing this proceedings.

SECTION 1: OVERVIEW OF RESEARCH EFFORTS

Bolt, Beranek, and Newman, Inc.
New York University
SRI International
University of Massachusetts
University of Pennsylvania
University of Southern California

