MAY 1973

PROBLEM SOLVING (p. 16). "Another important emphasis that seems to be emerging is on providing more effective facilities in problem solvers for incorporating semantic information describing specific task domains. That is, before applying a problem-solving system to a set of problems from some particular domain we would like to be able easily to give the system significant amounts of information concerning the entities, operations, and relationships that are important in that domain. Moreover, we would expect the system to use this information intelligently in its problem solving activities in the domain.

"Thus, the current trend in automatic problem solving seems to be not toward the creation of more powerful general programs, but rather toward the creation of more powerful general methodologies and implementation tools that will help researchers produce useful specialized programs."

COMPUTER PERCEPTION (p. 24). "Recently, several laboratories have begun to apply techniques from perception research to practical industrial [robotic] tasks. Stanford University has demonstrated simple assembly operations using vision and touch. General Motors Laboratories has succeeded in mounting a wheel on an axle. Stanford Research Institute and Hitachi Ltd. have each demonstrated systems that can distinguish sheet metal parts on a moving conveyor belt and determine their orientation to enable manipulation. Template-matching techniques were used to take advantage of the two-dimensional nature of these tasks. Moreover, the conveyor demonstrations relied on the contrast between shiny metallic parts and the black belt to simplify segmentation. Many industrial processes share similar constraints or can be readily redesigned to do so. We thus expect a proliferation of industrial applications of computer perception in the near future."

NATURAL LANGUAGE (p. 30). "Research in language understanding is being actively carried forward in many centers and from many viewpoints. … One of the most exciting things about the research is that it is breaking down the boundaries between traditional disciplines of linguistics, psychology, mathematics, and computation. Through the interplay of their ideas, we are fast approaching the day when we will be able to communicate with computers in our own language. In the process of getting there, we will have come to a deeper understanding of our own use of language, and of the workings of the human mind."

MICROPROGRAMMABLE COMPUTER (p. 31). "Hewlett-Packard has introduced its new top-of-the-line minicomputer, the 2100S Microprogrammable Systems Computer.

"Users can store 256, 24-bit microinstructions on each of three writeable control store (WCS) cards. A single WCS module provides enough user programmable storage to effectively double the machine's instruction set.

"The programs on these WCS modules can be read or written under program control. For permanent storage, the microprograms can be fused by the computer's PROM writer into read-only-memory chips.

"The 2100S is supplied with a complement of 102 microinstructions and 86 basic machine language instructions. The microprocessor's cycle time is 196 nanoseconds."

DATA MODULE (p. 36). "A magnetic disk device with a new storage concept—the IBM Data Module—brings increased speed and flexibility to the handling of large amounts of computer data.

"Announced with IBM's System/370 Model 115, the 3340 direct access storage facility may be used with any System/370 operating under IBM's Disk Operating System/Virtual Storage (DOS/VS).

"The new IBM 3340 data module provides high data reliability along with increased flexibility in the amount of storage on-line at any given time. A technological advance over the disk packs used on other IBM devices, the data module combines disk recording surfaces, access arms and read/write heads into a single removable cartridge. With this design, the head that records data on the 3340's disk surfaces is always the head that reads the data back into the computer—eliminating problems caused by minute head-to-track misalignments."

ACADEMY AWARD (p. 37). "Consolidated Film Industries of Hollywood and International Business Machines Corp. shared an Academy Award for technical achievement.

"The two companies developed a technique for using a computer—an IBM System/7—to improve the reliability and efficiency of balancing colors in films made for theater and television viewing."

"The new computer-assisted film printing technique enables a timer—the specialist who sets the color standards for a film being processed—to achieve precision and a uniformity of film quality never before possible in the motion picture industry … ."

SPACE RESEARCH (p. 38). "Informatics Inc. Western Division, under contract to the National Aeronautics and Space Administration, is supporting an innovative space research project at the Ames Research Center in Mountain View, California, which will provide man with new knowledge of the nature of the universe."

"Informatics involvement with the flying telescope and airborne laboratory projects includes writing functional specifications, designing custom software, and implementing the comprehensive C-141 Data Management System that uses three minicomputers on board the aircraft. One of the three minicomputers is used exclusively for keeping the telescope accurately sighted. The other two minicomputers handle data acquisition and preliminary real-time analysis of data, as well as visually displaying preliminary findings and controlling a variety of peripheral devices."

MAY 1989

PROTOTYPING (p. 9). "The predominant model for current application development is the phased refinement approach. In this approach, all system functionality is specified in the first step of development, and subsequent implementation phases add prescribed design details. This approach is criticized for its high cost of maintenance, for lack of motivation in using abstract tasks in early phases of development, and for complications in system integration.

"Prototyping, as an evolutionary system development paradigm in which a number of nonstandard concepts work together, promises to achieve effective evolution of integrated hardware/software systems."

COMPUTER-AIDED PROTOTYPING (p. 24). "The effectiveness of prototyping is limited if carried out manually. A high-level language, a systematic prototyping method, and an integrated set of computer-aided prototyping tools are important for realizing the potential benefits of prototyping. Simplicity was the primary goal in designing the Computer-Aided Prototyping System, since the feasibility and efficiency of rapid prototyping depend on simplifying the tasks of the software engineer."

SOFTWARE STORMING (p. 39). "At the Mitre-Washington Artificial Intelligence Center we have experimented with a method for rapidly producing highly functional prototypes. This method, for which we have coined the term *software storming*, involves experts in the initial design and implementation of a system during an intense development effort that combines knowledge engineering with the latest advances in software development technology and workstation hardware. … Using software storming, we developed a software prototype with significantly more functionality than a standard prototype in less than four months."

SHOWING AND TELLING (p. 51). "Manuals, programming languages, and other written documents attempt to teach users and machines alike by telling them what to do. Showing, on the other hand, involves the direct manipulation of 'objects' without a need for manuals, programming languages, or other written documents and without linguistic ambiguity because it is direct.

"Showing a computer what to do is difficult and less successful than giving it instructions via a programming language. However, showing has the potential for major advances in programmer productivity, while programming by telling has reached a 20-year plateau."

SOFTWARE ENGINEERING (p. 81). "What does 'software engineering' mean today? The term commonly refers to a certain collection of ideas and views regarding the software development process and relevant management principles. Most literature on the subject covers topics such as the software life cycle, design procedures and tools, user-developer interaction, specifying software systems, organizing documentation, estimating development cost and time, and project planning and management. Useful as this material may be, it does not in any way capture the essence of engineering; it would not be recognized by engineers in the classical fields as 'engineering.'"

THE BRIDGE MACHINE (p. 86). "When most of us think of a 386, we have an image of the top-of-the-line microprocessor for the IBM PC series of personal computers. But Sun has used this powerful microprocessor in an intriguing way—to bridge the gulf between the MS-DOS and Unix worlds.

"The Sun 386i is billed as a 'bridge machine' for very good reasons. It supports both operating systems and makes it easy to painlessly move from the familiar DOS environment to the more powerful Unix world. Sun has achieved some pretty impressive results sure to pleasantly surprise and please many users."

CRAY SUPERCOMPUTERS (p. 99). "Cray Research has extended its line of Cray Y-MP supercomputers to 19 standard models featuring one, two, four, or eight processors for prices ranging from $5 million to $23.7 million. A CPU with a 6-ns clock cycle is implemented on a single multilayer module, allowing modular upgrading of systems. Three frame sizes are offered, with two, four, or eight CPU slots."

"Cray Y-MP systems come with the Unicos operating system, based on AT&T's Unix System V with Berkeley extensions and other enhancements. The systems also come with Fortran, C, and Pascal compilers; debugging and program maintenance tools; and utilities and libraries."

MATHEMATICA (p. 107). "Using a Macintosh II hooked up to project its display onto a movie-size screen, [Stephen] Wolfram demonstrated what could be done (numerical, symbolic, graphical) with his program, called Mathematica."

"Mathematica, written in an object-oriented extension of the C language, contains about 200,000 lines of code, 160,000 lines in a kernel that do the mathematics and 40,000 lines in the front end that interface to the particular computer it is running on, Wolfram said.

"A program of this scope will no doubt lead to many changes in the way mathematics is done."

Editor: Neville Holmes; neville.holmes@utas.edu.au.