

Preface

Innovative Applications of Artificial Intelligence 3 is the 1991 addition to the IAAI series.

This series aims to promote applications of the highest caliber in AI. To be included, a contribution must demonstrate innovation from a technical, economical, managerial, or application domain perspective. It must also represent a successful application in actual use in an operational environment. Each book in the series is a case-book for the businessperson—showing in a variety of domains what can be done with the current technology as well as practical problems that arise in its application.

As in many computational disciplines, research in AI is driven by applications—especially those pressing on the frontiers of what we know how to design and implement. By highlighting both the successes and the problems actually faced by the appliers of today's AI technology, the IAAI series aims to suggest areas ripe for research.

In addition to describing the application domains of their systems, how the systems operate, and the AI technology they use, authors are asked to cover a variety of other dimensions. These include *payoff*, in terms of competitive advantage gained, enhanced quality or productivity; *cost* of development and deployment in terms of time, personnel, and equipment; mechanisms by which *validation* of performance has been achieved; and *maintenance*, including automated knowledge-base update in dynamic environments.

Given that this is the third book in the IAAI series, it is interesting to examine the entire collection, looking for visible trends and changes. In doing this, we noticed the following points:

We tend to see AI technology used in situations where data rate, time

pressure, problem complexity, requisite knowledge, or the dynamic nature of the task environment overwhelm humans. "The Application of Artificial Intelligence in the Field of Chemical Regulation" (page 55), and "AES: SunAmerica's Appointment Expert System" (page 233), are two examples. "MOCA—A Knowledge-Based System for Airline Maintenance Scheduling" (page 21), is a third example. In addition, this chapter demonstrates the care with which new technology must be introduced into the workplace, and the understanding required of the existing social context.

In many situations, AI technology is being used to make inferences based on mining the information held in corporate databases. "Meeting a Competitive Challenge in the Frequent Flyer Competition" (page 11), is one such example.

The areas of finance and engineering/manufacturing each contribute to account for approximately 20 percent of the contributions. Something new in IAAI-3 is a collection of three applications that indicate extensive use of AI technology by commercial airlines (pages 3-37).

The vast majority of the systems can be described as expert systems. As in past years, a few additional AI technologies are presented in IAAI 3. These include natural language ("Automatic Letter Composition for Customer Service," page 67); vision ("The Thallium Diagnostic Workstation," page 105—also the first medical application in the series); machine learning ("QDES: Quality-Design Expert System for Steel Products," page 177), and case-based reasoning ("A Case-Based Reasoning Solution to the Problem of Redundant Resolutions of Nonconformances in Large-Scale Manufacturing," page 121).

Systems tend to be built on top of shells, either vendor-supplied or developed along with the applications, with an eye to reuse in subsequent projects. The most popular shells are rule based, although many include support for object-oriented programming.

Noteworthy is the rise of C and C++. In 1989, almost all reported systems were based on Lisp. By 1991 there was an even balance. The practice continues of developing systems on top of one programming languages, and then porting them to another for production use.

Another trend is increased use of personal computers and engineering workstations as development and delivery platforms. This year they have overtaken AI workstations in popularity.

Most developers note payoff in terms of *quality* of products, services, or decisions. Almost as common is savings in time or money. Some authors note that AI systems have allowed them to head off an increased number of personnel that otherwise should have kept pace with business growth.

On a discouraging note, application developers continue to be forced to spend large fractions of their time coping with the unfortunate and grim realities of integrated computing in today's world. While we may dream that human energy will be concentrated almost exclusively on capturing, representing, and applying knowledge to business problems, careful reading of the chapters in this book reveals the darker picture. Far too much talent and time is dissipated in piecing together, rewriting, or force-fitting low-level components not designed for evolution.

On a brighter note, we are awash in opportunities and challenges for improving information technology in the future!

To be sure, the above trends are important and representative of the "here and now" of AI applications. However, in our view, there is one common theme that stands out in IAAI 3: Almost all applications are integrated with or embedded in the very core of the information systems used in today's business environment. They are intimately connected with the mainline company databases, financial systems, design systems, and manufacturing facilities. We believe this is a striking indication that AI tools have become peers among the traditional computational tools in the business toolbox.

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