AI in Telecommunications

Andrew Jennings (Chairperson)
Telecom Australia Research Laboratories
Melbourne, Australia

Akira Kurematsu
President,
ATR Interpreting Telephone Laboratories
Kyoto , Japan

Adam Irgon
Bell Communications Research
New Jersey, USA

Greg Vessonder and **Jon R. Wright**
AT&T Bell Laboratories
New Jersey, USA

Abstract

The telecommunications industry has been a fertile field of application for AI. Some of the earliest field applications of expert sytems were in telecommunications. So when we are looking to the future we wish to examine the current status of AI in telecommunications. Is telecommunications to continue to be at the center of application of AI? If so what are the applications that will be explored?

Introduction

AI has found a wide application in improving the efficiency of the telecommunications infrastructure. Some of the world's first practical expert systems were employed to improve operations and maintenance of telecommunications networks and services. With the growth in complexity of networks, there will be ample opportunity for the application of AI to this future infrastructure. Several of the panel members will present their contributions in this direction.

Future telecommunication services are very complex, and if they are to be promulgated to a wide audience they will require a much easier user interface. AI holds the promise of overcoming these difficulties and playing a major role in the widespread promulgation of new services. How do we construct new environments that are suitable for this task ? What are the key research issues in creating these service environments? What role will speaker understanding have in this progression ?

Others hold the hope of AI techniques overcoming the difficulties that different languages present. The future promise of translation of language as part of a communication network has profound implications for all of us. Whilst this is a long term goal, the implications are very far seeking. It is timely to review progress in this direction, and to assemble the issues that need addressing. With progress towards high rate international communication networks, there are great opportunities for adding high level services such as translation.

Future information services offer the promise of delivering a wide range of information sources to a very large audience. Yet we are only now beginning to grapple with the issues of how to present these services to new customers. Many hold the promise of AI techniques playing a large part in the new information society. New techniques for natural language processing and knowledge acquisition are very important in this area.In many ways AI may be one of the key enabling technologies for the creation of these new services. This panel will highlight the research issues that are important for this new phase we are entering.

Given that we have some experience in the application of AI, it is timely to review the important issues in this application. What are the prerequisites to successful application and what issues are important for the future? How will this experience contribute to better methods of building AI Systems? Clearly we would like to take the lessons of the past to give a direction to the future of AI in telecommunications.

This panel will present a view of the state of AI in telecommunications from the viewpoint of a number of international contributors. It presents a view of the current status of AI in telecommunications, and examines the key issues for the near future.

The perspective of Automatic Telephone Interpretation

Akira Kurematsu
President
ATR Interpreting Telephone Laboratories
Kyoto , Japan

An automatic telephone interpretation system will transform a spoken dialogue from the speaker's language to the listener's automatically and simultaneously. Creation of such a system will require developing various constituent technologies: speech recognition, machine translation and speech synthesis. Technology to integrate individual subsystems to form an automatic telephone interpretation system is also important. A sig-

nificant requirement for an automatic telephone interpretation system is two-way spoken language interpretation between persons speaking different languages. The recent progress in the technologies on speech recognition, machine translation of dialogues, and speech synthesis allows a promising forecast of the feasibility of an automatic telephone interpretation system in an goal-oriented dialogue in a specific domain. The perspective of an automatic telephone interpretation system will be discussed in this panel.

Bellcore's R&D Program in AI

Adam Irgon
Bell Communications Research
New Jersey, USA

A wide range of issues drive Bellcore's R&D program in AI, from communicating with customers to providing new types of service to day-to-day management of the network. Communicating effectively and efficiently with customers is one problem motivating a program in natural language processing, which includes work on the lexicon, parsing, and generation, and on the acquisition, analysis, management, and delivery of massive document collections. As new telecommunications services become increasingly complex, predicting their behavior becomes correspondingly crucial. This is one problem motivating work in logic programming, including deductive databases and extending the expressive power of logic programming languages. A program in neural networks and connectionist learning, including the development of neural network chips, addresses issues that cannot be handled easily by traditional methods. Moreover, the ubiquity of software in today's telecommunications business is leading us to address a range of software engineering problems through AI. Finally, we observe that the American telecommunications industry now has fewer people who are expected to learn how to do more and more complex tasks, which motivates work in Intelligent Tutoring Systems with emphasis on ITS authoring. We explore Bellcore's current R&D effort in these and other areas and identify some opportunities and issues yet to be addressed.

A Decade of Applying AI at AT&T

Greg Vessonder & Jon R. Wright
AT&T Bell Laboratories
New Jersey, USA

AT&T has been involved in applying artificial intelligence for over a decade. Our first commercial application of artificial intelligence was the expert system ACE, a diagnostic system that assists analysts in the local telephone loop network. Since that time we have developed systems that are in regular use for both telecommunications and non-telecommunications applications. During this period, we passed through several generations of techniques and tools used for building AI systems.

We will describe several systems that we have developed during the past decade and discuss some of the lessons we have learned during that period.