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Proceedings

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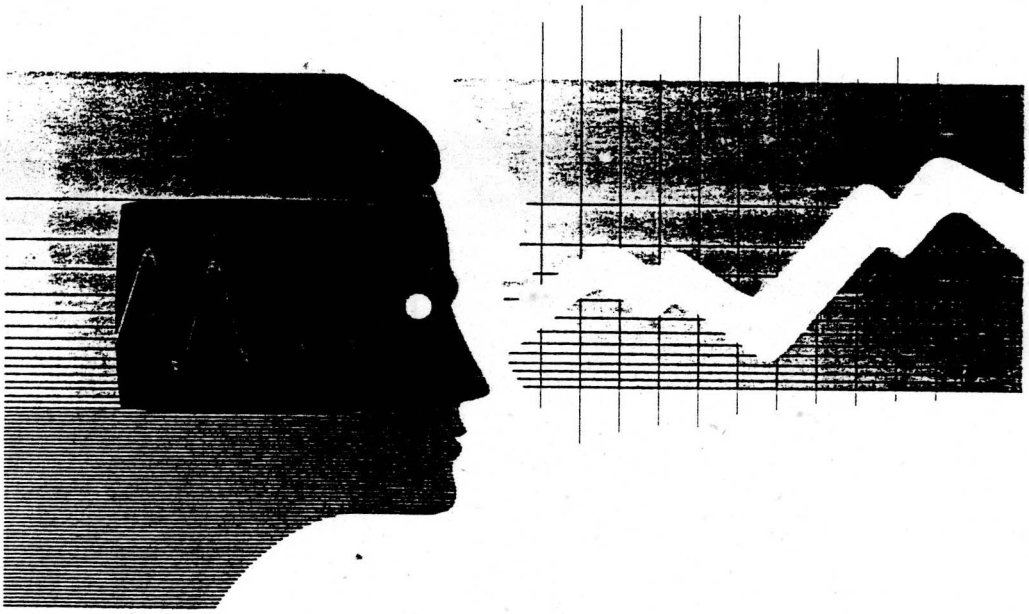

General Chairman's Foreword

Welcome to the 6th International Conference on Tools with Artificial Intelligence. TAI '94 continues to be a major international event that provides a popular forum for presentation and discussion on the technical aspects of specifying, designing, implementing, and evaluating tools with artificial intelligence and tools for artificial intelligence applications. The demand to develop more powerful, user-friendly, and reliable intelligent systems for various applications has lead to AI tools becoming an increasingly important area of study.

TAI '94 covers broad and diverse topics, which include Machine Learning; Computational Learning; Uncertainty learning, Fuzzy Logic; Knowledge Based Systems; Intelligent Database; AI Algorithms, Genetic Algorithms; Natural Language Processing; Information Modeling, Reasoning Techniques; Logic and Constraint Programming; Artificial Neural Networks; AI and Software Engineering; AI and Object-Oriented Systems; Distributed and Cooperative AI, Information Agents; Intelligent Strategies for Scheduling and Planning; Strategies for AI Development; AI Applications. This year, we received a record number of paper submission from many countries. The broad paper submissions from many countries proves that TAI '94 is truly an international conference.

To celebrate its 6th anniversary, we have invited three distinguished speakers: Dr. Edward W. Thompson, from ISTO of ARPA; Dr. Larry Reeker, from National Science Foundation; and Dr. Harold H. Szu, from Naval Surface Warfare Center. We are greatly honored to have them present their experience and vision on the research and development of A.I. tools in the future. Three concurrent workshops and three panels are also offered to debate the most important issues and the future R&D direction facing the A.I. Tools community.

The success of an international conference such as this depends greatly on the involvement of many individuals. First of all, I would like to thank the Conference Committee and Program Committee members, especially Program Chair Cris Koutsougeras and Vice Chairs; Industrial Track Chairs Stephen Szygenda and Raymond Paul; Workshop Chair Mark Boddy; Proceedings and Registration Chair Takis Metaxas; Publicity Chairs Rudiger Brause, Mikio Aoyama, Benjamin Jang, and Kwan-Hwa Jan; Local Arrangement Chair Akhtar Jemeel. Finally, I would like to express my special thanks to Professors Nikolaos Bourbakis and C.V. Ramamoorthy for providing the invaluable help and guidance necessary to put this conference together.

I hope that you will have a great time at TAI '94.

Jeffrey J.P. Tsai
General Chairman of TAI '94

Program Chairman's Foreword

The 1994 International Conference on Tools with Artificial Intelligence (ICTAI) marks the 6th edition of an event which was initiated by a group of highly enthusiastic researchers who envisioned it as a dynamic and intense forum to foster the transfer of ideas relating to artificial intelligence among academics, industry, and government agencies. It focuses on methodologies which can aid the development of AI, as well as the challenging issues involved in turning these methodologies to practical tools. Thus, this conference encompasses the technical aspects of specifying, developing, and evaluating theoretical and applied mechanisms which can serve as tools for developing intelligent systems and pursuing artificial intelligence applications.

The conference program has been driven primarily by the emerging topics, breakthrough developments, and the quality of the paper submission which are perceived to reflect the current thrusts and needs of the professional community of Artificial Intelligence researchers and practitioners. This is the mechanism by which the ICTAI adjusts to the needs of this community and serves it as a quality forum.

This year we received 240 papers representing institutions and industry around the world. A vice chair was appointed in each major AI area and was charged with the responsibility of obtaining reviews. Many papers were independently reviewed in more than one area if they did not clearly relate to a single AI area. We also sought enough reviews so as to ensure as clear a review consensus as possible. These arrangements resulted in each paper receiving from three to seven reviews. The Program Committee, consisting of the vice chairs and other members, met on June 18th in New Orleans, considered the reviews, performed additional ones as deemed necessary, and decided on paper selections. By employing this process, we did our best to ensure the quality of the conference and the best service to the participating professional community. We are happy to report that in a number of cases, the reviewers praised certain papers as being of journal quality. At the Program Committee meeting we decided to depart from the format followed in previous years which called for full papers, short papers, and poster papers. We accepted only full papers and poster papers while we increased the page allocation of poster papers. This reflects the fact that there was a good number of excellent papers deserving to be publicized while there is a limit to the conference presentation slots.

The conference organization involves a lot of sensitive decisions which define its course, and I wish to acknowledge here the good fortune of having by my side

the dedication and support of Drs. Jeffrey Tsai, Nick Bourbakis, and C.V. Ramamoorthy. My sincere gratitude is expressed for the efforts and the mentoring of Dr. Jeffrey Tsai who is the Conference chair, Dr. Nick Bourbakis who is the founding visionary of this conference, and Dr. C.V. Ramamoorthy who has been a most inspiring mentor, supporter, and advisor ever since the inception of this conference.

The key to the program's success rested on the selection of a very competent and dedicated team to coordinate the multiple details of such a complex event. The appointment of the Vice Chairs is always a critical choice and I am proud and honored with the participation and hard work of each and every one of the 1994 Conference Vice Chairs. Their professional and diligent work and their thoughtful advice were of unique importance, quality, and value. I am grateful to all the vice chairs and the rest of the Program Committee members, the publications and promotion chairs, and the numerous reviewers for their heroic efforts throughout the process. The quality of this program is a tribute to them all.

I would like to express special thanks to Drs. Jeffrey Tsai and Takis Metaxas, for they went "extra miles" to cover a significant load of work and to ensure the quality of the program presentation material and this volume of proceedings. Last, but definitely not least, I would like to thank Janet Harward, Lisa O'Conner, and the rest of the IEEE Computer Society staff members, as well as Akhtar Jameel, Bill Thomason, and Yanni Vassilopoulos, for their diligence and long hours spent to handle the loads of the required work.

To set the tone for the presentations, we have invited three recognized plenary speakers. Dr. Edward Thompson from ARPA, Dr. Larry Reeker from the National Science Foundation, and Dr. Harold Szu from the Naval Surface Warfare Center have honored us by accepting our invitation to plenary presentations. Three panels have been organized with the initiativity of Drs. Abraham Waksman from the AFOSR, Dr. Bill Manaris from the University of Southwestern Louisiana, and Dr. Nick Bourbakis from SUNY-Binghamton. We hope they will generate constructive debates about the future directions of currently critical or controversial technical issues in the AI field.

Welcoming you to the 6th International Conference of Tools with Artificial Intelligence, we hope that you will find the conference activities most beneficial to your current and future work and that you will enjoy New Orleans.

Cris Koutsougeras

Program Chair, ICTAI '94

Proceedings Editor's Foreword

Welcome to New Orleans and to the Sixth International Conference on Tools with Artificial Intelligence!

The TAI '94 Proceedings contains 85 papers and 42 posters that were accepted for presentation at this year's conference. The submissions came from 29 countries from five continents, and went through three or more peer reviews each. The selection of the accepted papers were made at the New Orleans meeting of the Program Committee, and it was based on both the reviewer's suggestions and the Program Committee's additional comments. In many cases, revisions of the final submissions were requested based on the reviewers' comments. We hope that the conference participants and the TAI community in general will be pleased with the quality of the papers that appear in this volume.

We would like to take the opportunity to thank all the people who submitted papers in this conference. It is with their contribution that we are able to maintain and, in fact, increase the quality of this conference. Additional thanks go to all the authors for their cooperation in revising and submitting the camera-ready paper despite the fact that the work had to be done during the summer.

This volume has been edited by the undersigned, although papers were requested in camera-ready form in standard IEEE format. We hope, therefore, that in the technical part, this volume is error-free. With this opportunity we would like to thank Stacy Szucsik and Li Ye for their help in managing the workload when papers poured in at the submission deadline. Also, we would like to thank Lisa O'Conner, Production Editor of the IEEE Computer Society Press, for her work on turning the stacks of papers into a real proceedings volume

Once again, I welcome you to the 1994 Sixth International Conference on Tools with Artificial Intelligence and hope that you will enjoy the meetings and New Orleans!

Panagiotis Takis Metaxas
Editor, TAI '94 Proceedings

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Larry Reeker, National Science Foundation
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