

PREFACE

“Best of ITS 2004” Special Issue of the IJAIED

We are pleased to present the “Best of ITS 2004” special issue of the *International Journal of Artificial Intelligence in Education*. The issue features five articles based on work originally presented at the Seventh International Conference on Intelligent Tutoring Systems. Beginning with the First International Conference on Intelligent Tutoring Systems in 1988, the ITS conference series has developed a reputation as an outstanding venue for AI-based learning environments. In keeping with the rich tradition of ITS conferences, ITS 2004 brought together an exciting mix of scientists from a broad spectrum of disciplines ranging from artificial intelligence and cognitive science to pedagogy and educational psychology. Reflecting the growing international involvement in the field, ITS 2004 was convened in Brazil.

The articles in this issue are the product of a particularly rigorous review process. ITS 2004 received more than 180 submissions, of which 73 were accepted as full papers. Full papers addressed topics in student modeling, knowledge representation, cognitive modeling, pedagogical agents, authoring systems, collaborative learning, tutorial dialog, and novel applications of machine learning to ITS problems. Authors of a small number of the full papers that were deemed to be especially noteworthy were invited to submit extended articles describing their work in more detail. These articles underwent two rounds of reviews, yielding the five articles comprising the special issue.

Three themes characterize the articles in the special issue. First, empirical evaluation plays a major role in each of the projects. In one form or another, each project leverages formal experiments to reveal critical findings that would otherwise have been mere hypothesizing. Second, meta-cognition in general and help-seeking in particular are issues that have come to the forefront. It is now recognized that help-seeking behaviors are important and promoting them in the right context can improve current and future learning experiences. Third, natural language interfaces for ITSs are finally receiving the attention they have long deserved. Perhaps it is because progress in natural language has accelerated, perhaps because speech recognition accuracy rates have reached the point of practical use, or perhaps because the potential for conversational tutoring seems so high, tutorial dialogue has re-emerged as a central issue in ITS research after a long dormancy.

The issue is organized as follows. In the first article, “Toward Meta-Cognitive Tutoring: A Model of Help Seeking with a Cognitive Tutor,” Vincent Aleven, Bruce McLaren, Ido Roll, and Ken Koedinger propose an interesting approach to tutoring that moves beyond domain-specific skills to general help-seeking strategies. Extending a Cognitive Tutor to include a Help Tutor, they achieve a significant reduction in students’ meta-cognitive error rates.

The second article (“Using Knowledge Tracing in a Noisy Environment to Measure Student Reading Proficiencies”), by Joe Beck and June Sison, presents an innovative synthesis of automated speech recognition (ASR) and student modeling. Using speech recognition to draw inferences about students’ reading proficiency at sub-word levels, the model is accurate at more coarse-grain levels, e.g., word identification, even in the face of noisy ASR data. Without interrupting students’ reading activities, the model can be used to predict whether a student will request help with a given word.

The third article (“Spoken Versus Typed Human and Computer Dialogue Tutoring”), by Diane Litman, Carolyn Rosé, Kate Forbes-Riley, Kurt VanLehn, Dumisizwe Bhembe, and Scott Silliman,

describes a carefully controlled study investigating the effect of communication modality. In human-human tutoring, it was found that speech-based interactions yielded higher learning gains and greater efficiency than text-based interactions; in human-computer tutoring, the differences in moving from text to speech were less pronounced, though there were interesting differences in dialogue characteristics.

The fourth article (“Responding to Student Uncertainty in Spoken Tutorial Dialogue Systems”), by Heather Pon-Barry, Karl Schultz, Elizabeth Bratt, Brady Clark, and Stanley Peters, also explores issues in natural language interfaces for ITSs. Recognizing that speech-based dialogue may provide meta-communicative information via lexical hedges, filled pauses, and response latencies that is unavailable in text-based dialogue, the article introduces a speech-based conversational tutor. It then presents a study investigating the use of meta-communicative information to assess students’ levels of uncertainty and the use of appropriate linguistic devices such as paraphrasing to deal with the uncertainty.

The final article, (“CycleTalk: Data Driven Design of Support for Simulation Based Learning”), by Carolyn Rosé, Rohit Kumar, Vincent Aleven, Allen Robinson, and Chih Wu, investigates tutorial dialogue in a simulation environment. The article presents a cognitive task analysis of design exploration tasks and describes studies of students using the CyclePad simulation-based learning environment, both in an unguided mode and in conjunction with a human-tutor in a Wizard-of-Oz scenario. Finding that students often fail to take advantage of help facilities, it argues that tutorial dialogue can have a significant impact on learning in the context of creative design activities.

We would like to thank Paul Brna for his support in compiling the special issue, the ITS 2004 program committee for their assistance in selecting the conference papers, the special issue reviewers for all of their hard work, and, of course, the authors themselves.

At ITS 2004, Dr. Jeff Rickel was posthumously recognized for his outstanding contributions to AI and education. An innovator in pedagogical agents, he was a wonderful colleague with a keen intellect and a quick smile. This issue is dedicated to Jeff.

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