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Artificial Intelligence in Education

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Preface

The 20th International Conference on Artificial Intelligence in Education (AIED 2019) was held during June 25–29, 2019, in Chicago, USA. AIED 2019 was the latest in a longstanding series of now yearly international conferences for high-quality research in intelligent systems and cognitive science for educational applications.

The theme for the AIED 2019 conference was "Education for All in the XXI Century." Inequity within and between countries continues to grow in the industrial age. Education that enables new economic opportunities plays a central role in addressing this problem. Support by intelligent information technologies have been proposed as a key mechanism for improving learning processes and outcomes, but may instead increase the digital divide if applied without reflection. The collective intelligence of the AIED community was convened to discuss critical questions, such as what the main barriers are to providing educational opportunities to underserved teachers and learners, how AI and advanced technologies can help overcome these difficulties, and how this work can be done ethically.

As in several previous years, the AIED 2019 events were co-located with a related community, the Learning at Scale (L@S 2019) conference. Both conferences shared a reception and a plenary invited talk by Candace Thille (Stanford University, USA). Also, three distinguished speakers gave plenary invited talks illustrating prospective directions for the field with an emphasis on accessibility, equity, and personalization: Jutta Treviranus (Ontario College of Art and Design University, Canada); Nancy Law (University of Hong Kong, SAR China); and Luis von Ahn (Carnegie Mellon University, USA).

There were 177 submissions as full papers to AIED 2019, of which 45 were accepted as long papers (ten pages) with oral presentation at the conference (for an acceptance rate of 25%), and 43 were accepted as short papers (four pages) with poster presentation at the conference. Of the 41 papers directly submitted as short papers, 15 were accepted. Apart from a few exceptions, each submission was reviewed by three Program Committee (PC) members. In addition, submissions underwent a discussion period (led by a leading reviewer) to ensure that all reviewers' opinions would be considered and leveraged to generate a group recommendation to the program chairs. The program chairs checked the reviews and meta-reviews for quality and, where necessary, requested for reviewers to elaborate their review more constructively. Final decisions were made by carefully considering both meta-reviews (weighed more heavily) scores and the discussions. Our goal was to conduct a fair process and encourage substantive and constructive reviews without interfering with the reviewers' judgment. We also took the constraints of the program into account, seeking to keep the acceptance rate within the typical range for this conference.

Beyond paper presentations and keynotes, the conference also included:

- A Doctoral Consortium Track that provided doctoral students with the opportunity to present their emerging and ongoing doctoral research at the conference and receive invaluable feedback from the research community.
- An Interactive Events session during which AIED attendees could experience first-hand new and emerging intelligent learning environments via interactive demonstrations.
- An Industry and Innovation Track, intended to support connections between industry (both for-profit and non-profit) and the research community.

The AIED 2019 conference also hosted ten half-day workshops with topics across a broad spectrum of societal issues, such as: life-long learning; educational data mining; multi-modal multi-channel data for self-regulated learning; ethics; informal learning; human-centered AI products design; standardization opportunities; team tutoring; intelligent textbooks and using AI to teach AI in K12 settings.

We especially wish to acknowledge the great efforts by our colleagues at DePaul University for hosting this year's conference.

Special thanks goes to Springer for sponsoring the AIED 2019 Best Paper Award and the AIED 2019 Best Student Paper Award. We also want to acknowledge the amazing work of the AIED 2019 Organizing Committee, the PC members, and the reviewers (listed herein), who with their enthusiastic contributions gave us invaluable support in putting this conference together.

May 2019

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Abstracts of Keynotes

Learning to Learn Differently

Jutta Treviranus

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Abstract. Our data-driven decision processes reduce diversity & complexity. All data is about the past. This leads to bias against outliers, small minorities, and novel changes. Most artificial intelligence amplifies and automates this pattern. This leads to disparity and blind spots in education and research. How can we design intelligence that recognizes, understands and works for diverse learners and educators?

Human Development and Augmented Intelligence

Nancy Law

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Abstract. Records of human civilizations date back to more than five millennia. The history of human civilization is deeply intertwined with its history of technological advancement. While humans are not alone in their ability to create tools for augmented performance, humans are the only species that create and use technology to connect minds over time and space. Hence human society has been able to advance not only through evolution, but more importantly, through learning. The twentieth century has brought a major technological breakthrough in creating machines that learn, machines that provide humans with augmented intelligence. Scientific investigations of human intelligence and human learning have inspired and benefitted from technological advances in artificial intelligence from the start of these efforts. Drawing on current studies on human development in the digital age, this talk explores how human development may be affected ontologically in the increasingly digitally connected and augmented world that we are in, and its social implications, particularly for education.

Duolingo: Free Language Education for the World

Luis von Ahn

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Abstract. Duolingo is the free language education platform that has motivated over 300 million people worldwide to learn a language. The platform's digital-native experience, intuitive design and data-based approach to optimizing education has lead to its selection by Apple as iPhone App of the Year by Google, as "Best of the Best Android App" 2 years in a row. Luis will talk about the company's trajectory and mission, the future of education, and the role of computer science in optimizing the learning process in ways that were previously impossible.

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