AI for Education (AI4EDU): Advancing Personalized Education with LLM and Adaptive Learning

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ABSTRACT

Recent advanced AI technologies, especially large language models (LLMs) like GPTs, have significantly advanced the field of data mining and led to the development of various LLM-based applications. AI for education (AI4EDU) is a vibrant multi-disciplinary field of data mining, machine learning, and education, with increasing importance and extraordinary potential. In this field, LLM and adaptive learning-based models can be utilized as interfaces in human-in-the-loop education systems, where the model serves as a mediator among the teacher, students, and machine capabilities, including its own. This perspective has several benefits, including the ability to personalize interactions, allow unprecedented flexibility and adaptivity for human-AI collaboration and improve the user experience. However, several challenges still exist, including the need for more robust and efficient algorithms, designing effective user interfaces, and ensuring ethical considerations are addressed. This workshop aims to bring together researchers and practitioners from academia and industry to explore cutting-edge AI technologies for personalized education, especially the potential of LLMs and adaptive learning technologies.

CCS CONCEPTS

• **Applied computing** → **Education**; • **Human-centered computing** → *Human computer interaction (HCI)*; • **Computing methodologies** → *Machine learning*.

KEYWORDS

Education, Edtech, Adaptive Learning, LLM

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1 INTRODUCTION

Following the success of the previous multiple AI4EDU workshops, which were co-organized by our co-organizers, we are looking forward to hosting the new AI4EDU workshop in KDD 2024. Different from those previous workshops, the AI4EDU workshop at KDD 2024 will (1) provide a platform for both academia and industrial researchers from different fields, e.g., data mining, machine learning, artificial intelligence, education, etc, to exchange ideas and promote collaborations, and (2) focus on new emerging LLMs and adaptive learning in education. Specifically, this workshop aims to explore cutting-edge LLMs and adaptive learning technologies for personalized education. The objectives of the workshop are to: 1) Review the current state-of-the-art in LLM-based systems and their applications in education. 2) Discuss the state-of-the-art technologies of adaptive learning and mining that tailor education to the individual needs, learning styles, proficiency levels, and problem areas of each student, for personalized learning experience. 3) Identify challenges and opportunities in using LLMs as both communication and collaboration interfaces in adaptive learning systems, educational games and intelligent educational assistants. 4) Explore ethical considerations and standardization issues in the use of LLMs. 5) Introduce and design new approaches such as prompt engineering, local fine tuning, integrated reasoning, and delegation framework for dialog-based systems that not only generate content but also shape the behavior of the system.

2 TOPICS OF INTEREST

This workshop encourages submissions of innovative solutions for a broad range of AI for Education problems. Topics of interest include but are not limited to the following:

- Mining multimodal data for comprehensive learning analytics in LLM-aided education.
- Challenges and opportunities in integrating LLMs with existing adaptive learning systems.
- Adaptive learning and mining systems and their applications in educational settings.
- Predictive modeling in education using LLMs for student success and retention.
- The potential of LLMs in education from both the theoretical and practical angles.
- Ethical considerations in the use of LLMs as interfaces in educational settings, especially with AI standards committee.
- Frameworks for standardization and benchmarking of LLMs in educational technology.
- Data-driven approaches to curriculum development using LLM insights.
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- LLMs role in automated assessment and real-time feedback for students.
- The future of LLMs in education: trends, potentials, and unforeseen consequences.

3 PAPER SUBMISSION AND REVIEW PROCESS

We invite high-quality paper submissions of theoretical and experimental nature on the broad AI4EDU topics. The workshop solicits 4-7 pages double-blind paper submissions from participants. Submissions of the following flavors will be sought: (1) research ideas, (2) case studies (or deployed projects), (3) review papers, (4) best practice papers, and (5) lessons learned. All submissions will be peer-reviewed. Some will be selected for spotlight talks, and some for the poster session.

Each submitted paper will be evaluated by at least two reviewers, using the same criteria as SIGKDD Research Track papers: novelty, technical quality, potential impact, and clarity. As with Research Track papers, we will consider sufficiently innovative application-oriented papers, in addition to theoretical and methodological contributions. The program committee members and other researchers recommended by the program committee members will review the papers. Additional reviews may be solicited if the two reviews are not conclusive. Only papers that are deemed to be satisfactorily novel and technically sound by the program committee will be accepted.

4 WORKSHOP FORMAT

The workshop will be held in person and will include interactive sessions and online resources to support ongoing collaboration. The workshop will consist of paper presentations, panel discussions, and group activities to facilitate the exchange of ideas and promote collaborative learning as follows:

- Paper Presentations: 20 minutes for each paper.
- Invited Talks: We intend to have 5-7 speakers to present their expert insights.
- Panel Discussions: Panel discussion sessions are intended to explore various heated topics related to the implementation of AI in education, ongoing initiatives, and projects.
- Poster Sessions: Optional for papers that could not fit into the main session - Allow breakout rooms.

5 INTENDED AUDIENCE

The workshop is intended for researchers and practitioners in the areas of data mining, NLP, HCI, machine learning, educational technology, and other related fields. Participants will benefit from the opportunity to learn about the latest research and developments in the use of LLMs and adaptive learning systems, as well as engage in a collaborative design and prototyping activity.

6 EXPECTED OUTCOMES

The expected outcomes of the workshop include a better understanding of the potential of LLMs and adaptive learning for personalized education systems, a review of the current state-of-the-art, identification of challenges and opportunities, and recommendations for future research and practice. Additionally, we expect to identify potential collaborations and partnerships that can lead to the development of more robust LLMs and adaptive learning systems, as well as prototype designs for new LLM-based systems in educational settings.

7 WORKSHOP ORGANIZERS

- Qingsong Wen, Head of AI Research & Chief Scientist at Squirrel Ai Learning.
- Jing Liang, Co-Founder of Squirrel Ai Learning.
- Carles Sierra, Professor and Director of the Artificial Intelligence Research Institute (IIIA) of the Spanish National Research Council (CSIC).
- Rose Luckin, Professor of Learner Centred Design at the UCL Knowledge Lab.
- Richard Tong, Chief Architect of Squirrel Ai Learning.
- Zitao Liu, Dean of Guangdong Institute of Smart Education, Jinan University.
- Peng Cui, Associate Professor with tenure in Tsinghua University.
- Jiliang Tang, University Foundation Professor in the computer science and engineering department at Michigan State University.