

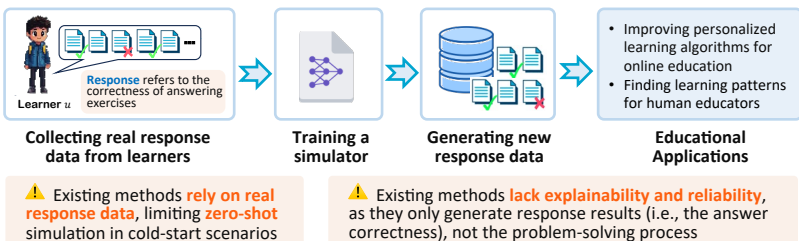
Agent4Edu: Generating Learner Response Data by Generative Agents for Intelligent Education Systems

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The first exploration of **simulating human learning** with **LLMs**

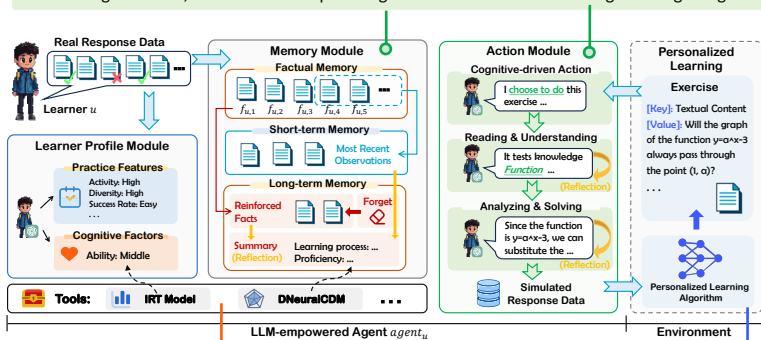
Introduction: Human Learning Simulation



Our Solution: Agent4Edu

A personalized learning simulator powered by LLMs

Explainability: Detailed simulation of human behaviors in understanding, analyzing, and answering exercises, as well as the implicit cognitive mechanisms of learning and forgetting



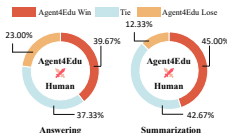
Reliability: Accurate capture of learning abilities using LLMs (e.g., GPT-4) and human ability measurement tools, where LLMs improve **generalizability** for **zero-shot simulations**

Interactivity: Interaction with personalized learning environments

Experiments

Model	ACC \uparrow	F1-score \uparrow	ROUGE-3 \uparrow
KES	50.11	58.32	25.77
DKVMN	64.39	76.70	37.24
EERNN	65.72	76.06	43.55
SAKT	65.52	78.33	31.09
DAISIM	65.63	78.25	31.72
Agent4Edu (GPT-3.5-turbo)	66.70	79.84	37.97
Agent4Edu (GPT-3.5-turbo) ₁₀₀	65.40	78.72	35.14
Agent4Edu (GPT-4) ₁₀₀	66.51	79.53	34.86

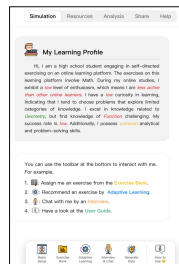
Accurate Question-Answering Response Simulation



Zero-shot Simulation vs. Human

Testing length is 5			
Model	F1-score	F1-score+	Imp.
FSI	80.11	82.39	+2.28
KLI	79.45	81.84	+2.39
MAAT	81.77	81.97	+0.20

Enhancing Personalized Learning Algorithms



We have developed a **website** for **interactive learner simulation**, integrated with **Agent4Edu**.

Conclusion: Agent4Edu can simulate human learning **reliably, explainably, and interactively**

Weibo Gao is currently on the **job market** in the research area of **LLM-based Agent** and **User Modeling**. Please contact him if you are interested.

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Full Paper

Project Code