

Faculty Project Information

Multi-LLM Orchestration Framework for Gaokao-Oriented AI Problem Solving and Decision Support	
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Research Field:	Automated Algorithm Design, Machine Learning, Optimization
Brief Description	
<p>This project aims to develop a novel multi-LLM orchestration framework specifically designed for Gaokao preparation. The system will dynamically coordinate multiple existing language models to solve complex exam problems and provide personalized university/major decision support. We establish a strategic partnership with a proven Turkish AI education startup. This startup has successfully deployed a university entrance exam platform serving approximately 500,000 active users. Their system provides two core functionalities: AI-powered problem solving for exam questions and AI-driven preference analysis for university/major selection decisions. Our collaboration begins with an initial prototype phase based on their production-tested architecture.</p> <p>During this phase, we will collect and process Chinese educational data under their technical supervision. This ensures methodological rigor while adapting the system to Chinese language patterns, Gaokao question formats, and local educational requirements. The prototype phase validates data collection methodologies, user interaction patterns, and baseline system performance within the Chinese context. Following successful validation, we will integrate our core research innovation: a China-specific multi-LLM orchestration framework. Unlike existing monolithic approaches that rely on single language models, our system will dynamically coordinate multiple existing LLMs adapted to our Chinese educational data.</p> <p>The system will intelligently route tasks across heterogeneous models based on problem complexity, subject domain, computational constraints, and pedagogical requirements. This architectural innovation targets several key improvements: superior cost efficiency by routing simpler tasks to more efficient models while reserving larger models for complex reasoning; improved response accuracy through matching problems to</p>	

models with appropriate capabilities and domain specialization; reduced latency via intelligent workload distribution; and maintained pedagogical effectiveness while optimizing computational resource utilization. The research transforms the supervised prototype into a foundation for genuine technical differentiation. Our academic innovation in LLM coordination addresses practical challenges in China's educational AI landscape. The project creates a strong technical foundation that could support future practical applications in educational technology.

Expected Outcome(s)

- A peer-review publication with a potential patent
- A cloud-based functional prototype.

Requirements for Student Applicants

- Strong programming skills in Python and experience with machine learning / deep learning frameworks (PyTorch/TensorFlow)
- Background in artificial intelligence, machine learning, or computer science with understanding of LLM architectures
- Experience with data processing, pipeline development, and system integration
- Familiarity with cloud computing platforms and distributed systems
- Ability to work in cross-cultural research environments and communicate technical concepts clearly
- Interest in educational technology applications and AI systems research

Additional Requirements for the Project

- Cloud computing resources (GPU instances) for model training, inference, and orchestration experiments