SIT305 Task3.1C

Report

Ways of harnessing Llama 2 and similar LLMs

In the development of the Quiz App, integrating Llama2 or similar large language models can significantly enhance functionality and user experience. These models can be used to automatically generate quiz questions, create personalized study plans based on user performance, and provide intelligent grading with detailed feedback.

- Automatic Question Generation System

  An automatic question generation system can be developed using large language models or similar, which enhance the efficiency and scalability of educational content creation within the Quiz App. This system is designed to analyse and learn from the sentence structures, semantic patterns, and logical frameworks of existing question banks. By understanding these underlying patterns, the LLM can generate new, high-quality question templates that closely mimic human-authored content. By incorporating subject tags (e.g., Chemistry, Biology) and difficulty levels, the system can generate new question templates tailored to specific topics. To further personalize the learning experience, a difficulty adaptation mechanism is integrated. This mechanism dynamically adjusts the complexity of generated questions in response to the user's real-time performance—for instance, increasing the difficulty after a series of correct answers, or simplifying questions if the user is struggling.

- Personalized Learning Schedule

  A personalized learning schedule can be developed by analysing users' quiz performance data, including accuracy rates and response times. From this data, the system can generate multi-dimensional user profiles using tags that reflect learning patterns, strengths, and areas for improvement. Based on these profiles, the system applies spaced repetition theory like SuperMemo algorithm, to optimize content review intervals.

  The system can further decompose broader learning objectives into manageable daily tasks. The LLM interprets the user's learning goals and adapts the schedule dynamically, ensuring that the user is consistently engaging with material at the right difficulty and at optimal review times. This approach aims to improve long-term retention and create a more efficient, personalized learning experience.

- Intelligent Grading and Feedback

  The Quiz App incorporates an intelligent grading and feedback system to improve assessment accuracy and provide more effective learning support. For objective questions, such as multiple-choice questions, the system performs direct answer

matching to determine correctness. For subjective questions, LLMs are employed to extract key concepts from the user's response and compare them with model answers using semantic similarity analysis. This allows for more nuanced grading that accounts for variations in expression while still evaluating the core understanding of the topic.

In cases of repeated errors, the system conducts knowledge tracing to identify potential learning gaps or "knowledge breakpoints." Based on this analysis, it then recommends targeted practice exercises to help the user strengthen specific weak areas, thereby supporting more focused and effective learning.

Integrating large language models such as Llama2 can significantly enhance the educational value and user experience of the Quiz App. This AI-powered learning platform holds strong potential for both commercial and educational applications, offering more intelligent, personalized, and scalable solutions for modern education.