

Development and Optimization of a Backend System Based on Large Language Models (LLM) for Personalized Responses in Chatbot Counseling Services

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ABSTRACT

Mental health problems among university students are a global issue that continues to increase, including in Indonesia. This vulnerability increases due to academic pressure, social transitions, and the demands of independence. This study develops a counseling chatbot system based on Large Language Models (LLMs) integrated with an adaptive backend architecture to generate personalized, contextual, and continuous responses. The system development includes knowledge base construction, LLM fine-tuning using culturally relevant Indonesian data, and performance evaluation. The results show a significant improvement, with training accuracy increasing from 0.6 to 0.85 and validation accuracy from 0.5 to 0.79 after optimization and regularization. Testing with 58 users resulted in an acceptance rate of 87.38%, indicating high satisfaction with the system's responses and usability. Improvements in the AI model and backend enhance personalization, response consistency, and interaction management efficiency. The system implementation provides a positive impact on the accessibility of mental health services that are faster, anonymous, and easy to access, making it an effective and sustainable digital counseling solution.

Keywords: Mental health, counseling chatbot, Large Language Model (LLM), response personalization, artificial intelligence, university students.