Issues in Information Systems
Volume 26, Issue 3, pp. 413-420, 2025

DOI: https://doi.org/10.48009/3_iis_2025_2025_133

Enhancing university education with AI: a Telegram bot leveraging RAG and external APIs for secure knowledge retrieval

Vadim Bashurov, *Comtrade, bashurov@mail.ru*
Paul Safonov, *Saint Cloud State University, safonov@stcloudstate.edu*

Abstract

This paper presents a novel AI-powered Telegram bot designed to enhance university information services by securely integrating external AI capabilities with institutional private data. The system leverages Retrieval-Augmented Generation (RAG) to transform structured university data (faculty profiles, schedules, lecture notes) into vectorized embeddings, which are dynamically retrieved and combined with responses from a general-purpose AI API (e.g., GPT-4). This hybrid approach ensures accurate, context-aware answers while preserving data privacy — raw institutional information is never exposed directly to third-party systems. Implemented at Comtrade University, the bot demonstrates significant outperforming standalone AI models for domain-specific questions. Key innovations include a scalable pipeline for embedding private data, seamless Telegram-based access, and cost-efficient prompt engineering via RAG. The solution addresses critical challenges in educational technology: balancing AI augmentation with data security and providing 24/7 conversational access to institutional knowledge. We discuss architectural decisions, privacy safeguards, and empirical results, offering a replicable framework for other universities.

Keywords: retrieval-augmented generation (RAG), educational chatbots, telegram API, LLM vector embeddings, hybrid AI systems, privacy in EdTech

Introduction

The integration of artificial intelligence (AI) into higher education has accelerated in recent years, offering transformative potential for administrative efficiency, personalized learning, and student engagement (Baker et al., 2021). However, two critical challenges persist:

1. **fragmented access** to institutional knowledge (e.g., schedules, faculty contacts, lecture materials), often siloed across disparate platforms
2. **privacy risks** associated with deploying third-party AI tools on sensitive university data.

While large language models (LLMs) (Blank, 2023) like GPT-4 excel at general-purpose tasks, their inability to natively access private, domain-specific information limits their utility in educational contexts. To bridge this gap, we present a secure, scalable solution: a Telegram-bot that dynamically combines the generative capabilities of external AI APIs with a university's private data through Retrieval-Augmented Generation (RAG) (Lewis et al., 2020). Our system transforms structured institutional data (faculty directories, course schedules, lecture notes) into vector embeddings, which are retrieved contextually during user interactions and fused with AI-generated responses. This approach ensures real-time accuracy.