

DOI <https://doi.org/10.30525/978-9934-26-597-6-67>

ALGORITHM FOR INTEGRATING A VIRTUAL ASSISTANT INTO A MOBILE APPLICATION FOR STUDYING STOCHASTIC MODELING METHODS

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Received 12 March 2025, www.isma.lv

Abstract

This paper presents an algorithm for integrating a virtual assistant into the **SimuLearn** mobile application for studying stochastic modeling methods. The virtual assistant, based on the OpenAI API, performs key functions such as answering user queries, explaining theoretical concepts, assisting with complex calculations, and providing personalized learning recommendations. The developed system ensures easy access to educational materials, enhances learning quality, and facilitates student interaction with the educational platform.

Keywords: virtual assistant, machine learning, modeling, artificial intelligence, mobile learning

1 Introduction

With the rapid advancement of artificial intelligence (AI) technologies, various aspects of human activity are increasingly influenced by AI. Recommendation systems, virtual and voice assistants, chatbots with natural language processing (NLP), video identification, and generative systems are just a few examples of AI applications. Higher education has not been an exception, as many universities adopt AI and machine learning technologies to process vast amounts of student data, analyze behavioral patterns, and generate personalized recommendations [1, 2].

This paper presents the development of an algorithm for integrating a virtual assistant, based on OpenAI, into a mobile application for studying stochastic modeling methods.

2 Literature review

Many fields are increasingly utilizing Virtual Personal Assistants (VPA) [1-3].

Study [1] analyzes the motivations, challenges, and opportunities related to AI implementation in banking customer service. The authors examine the integration of AI in Banka Kombētare Tregtare, where a virtual assistant processed 80% of customer inquiries, improving service quality and reducing staff workload.

In [2], the authors propose a personal assistant designed to optimize users' daily tasks, improving human-computer interaction through voice commands and NLP. The assistant is built on Python, NLP, SpeechRecognition API, and integrates with external services. Its architecture includes interface modules, command interpretation, task execution, and data management via SQLite.

Study [3] presents a hybrid virtual assistant for the legal sector, based on information retrieval and knowledge graphs. The system processes legal inquiries, provides precise responses, and helps users find relevant legal provisions. Results indicate that integrating these technologies significantly improves legal consulting efficiency.

Article [4] describes the development of a cross-platform mobile application for a virtual voice assistant tailored for students. It employs AI, NLP, machine learning, and speech recognition technologies. The app is built using Dart and the Flutter framework, supporting voice commands, text analysis, and speech synthesis.

3 Mobile application architecture

The Higher School of Information Technology at Turan University is conducting research on the "Development of a Digital Educational Platform for Data Modeling, Analysis, and Forecasting" (registration number 0124RKD0116, commissioned by Turan-StartApp). As part of this research, the authors are developing a mobile version of the SimuLearn learning system for studying stochastic modeling methods [5].

The mobile application includes the following sections:

Registration Section – Users can register using email or phone number.

Authorization Section – Registered users can log in via email and password.

User Profile Section – Displays user progress and stores personal data.

Modeling Methods Section (Figure 1) – Allows users to conduct simulation modeling using various input data.

Virtual Assistant Section – Users can ask questions and receive step-by-step explanations of complex calculations.

Theoretical Section – Contains theoretical materials on computer modeling topics.

"Test Yourself" Section – Enables users to take quizzes to assess their knowledge.

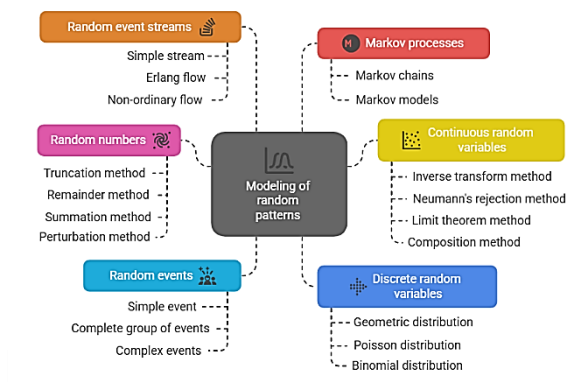


Figure 1. Modeling methods module

4 Algorithm for integrating the virtual assistant

To assist students in learning stochastic modeling methods, the authors developed a personal virtual assistant based on the OpenAI API, enabling the integration of ChatGPT capabilities into the mobile application.

The virtual assistant performs several key functions (Figure 2):

- Answers user queries;
- Explains theoretical concepts;
- Assists in performing complex calculations;
- Provides personalized learning recommendations.

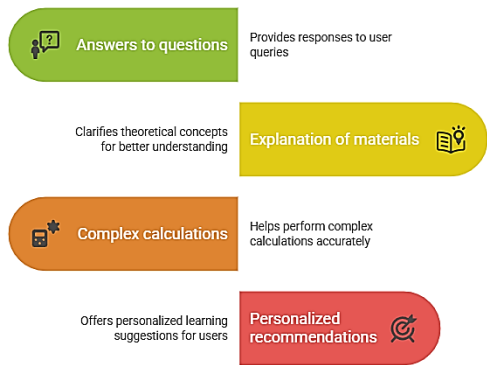


Figure 2. VPA Functions

The VPA integration algorithm into the SimuLearn mobile application included several critical steps to ensure functionality, security, and system performance (Figure 3).

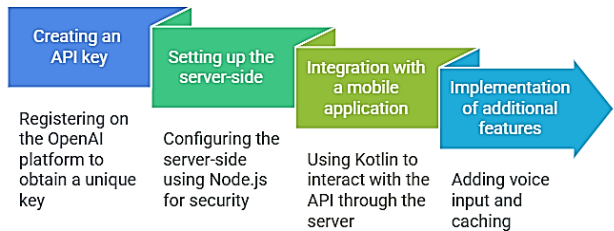


Figure 3. VPA integration process into the Simulearn mobile application

Figure 4 shows a student's dialogue with a virtual personal assistant.

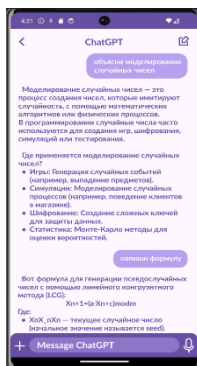


Figure 4. Personal virtual assistant

5 Conclusions

The developed algorithm for integrating a virtual assistant into the SimuLearn mobile application proves effective in an educational environment. The integration of OpenAI API automated student query responses, simplified the study of complex concepts, and personalized the learning process. The findings indicate that the virtual assistant enhances student engagement and improves material comprehension. This approach can be adapted for other educational platforms and disciplines requiring interactive learning experiences.

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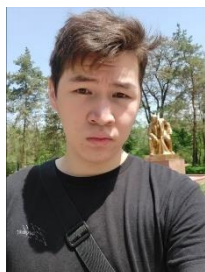
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