

AI-Powered Smart Education Bot for Personalized Academic Guidance

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Abstract: In today's rapidly evolving educational landscape, students often face overwhelming choices when selecting academic streams that align with their aspirations and abilities. The lack of personalized guidance exacerbates this challenge, leading to indecision and mismatched career paths. To address this pressing need, the "SMART EDUCATION BOT" project leverages the power of generative artificial intelligence to offer tailored educational recommendations. This Python-based system integrates a robust AI-powered chatbot with a user-friendly front-end developed using the Flask framework. Students can interact with the chatbot by asking questions, and the system intelligently analyzes their queries to provide personalized suggestions for suitable educational streams. By blending advanced AI with a seamless user experience, this project aims to revolutionize how students navigate their academic journeys, ensuring informed and confident decision-making.

Keywords: AI-Powered Chatbot, Generative AI, Gemini API.

I. INTRODUCTION

In today's fast-paced world, students are often overwhelmed with the numerous educational and career choices available to them. The process of selecting the right academic path has become increasingly complex due to the diversity of fields and disciplines, along with the rising importance of making the right decision early on. With the traditional methods of career counseling being either outdated, time-consuming, or generalized, many students struggle to find personalized advice that aligns with their unique skills and aspirations. The absence of an easily accessible platform that can deliver customized guidance in a quick, efficient, and user-friendly manner exacerbates this issue, leading to confusion and indecision at a critical stage in their academic journey.

The "SMART EDUCATION BOT" system aims to revolutionize the way students access career and educational advice. By integrating cutting-edge AI technology, this platform offers a streamlined and interactive approach to career counseling. Powered by the Gemini API and a Python-based chatbot, the system understands students' queries in natural language, processes their preferences, and provides accurate, tailored recommendations for both technical and non-technical educational streams. This intelligent platform simplifies the decision-making process, ensuring that students receive personalized guidance based on their individual needs, eliminating the stress and uncertainty commonly associated with career planning. Through its user-friendly design, the system makes career counseling more accessible and effective, offering students a valuable tool to confidently navigate their future educational paths.

II. LITERATURE REVIEW

Robertson, James, et al. Using cloud computing, the author presents a flexible approach to solve complex systems problems. Promoting “rapid experimentation” and collaboration on problems such as recursive algorithm implementation, deep learning, and inference in neural networks has enabled inherent advantages over existing computing frameworks. Leveraging the cloud to implement shared responsibility security models, serverless architectures, and high-performance virtual machines, aspects of the AI lifecycle including build, deploy, and monitor have resulted in an adaptable and scalable computing framework that is not only disruptive to the current computing paradigm but also promotes enhanced and productive collaboration. [1]

Nath, Anindita, et al. The author introduces GENEVIC, an AI-driven chat framework that tackles this challenge by bridging the gap between genetic data generation and biomedical knowledge discovery. Leveraging generative AI, notably ChatGPT, it serves as a biologist’s “copilot.” It automates the analysis, retrieval, and visualization of customized domain-specific genetic information, and integrates functionalities to generate protein interaction networks, enrich gene sets, and search scientific literature from PubMed, Google Scholar, and arXiv, making it a comprehensive tool for biomedical research. In its pilot phase, GENEVIC is assessed using a curated database that ranks genetic variants associated with Alzheimer’s disease, schizophrenia, and cognition, based on their effect weights from the Polygenic Score (PGS) Catalog, thus enabling researchers to prioritize genetic variants in complex diseases. As a prototype, GENEVIC is set to advance genetic research, enabling informed medical decisions. [2]

Dwivedi, Anupam, et al. This research presents the development and implementation of an AI-Driven School Management System, a comprehensive React-based web application designed to transform educational administration and enhance student performance analytics. The primary aim of this system is to streamline administrative tasks, improve navigation efficiency within the application, and provide sophisticated analytical tools that leverage AI to monitor and predict student performance trends. The methodology employed involves the integration of React for dynamic user interface design, coupled with advanced AI algorithms that process and analyze student data for actionable insights. [3]

Donvir, Anujkumarsinh, et al. This research explores the integration of serverless computing and Generative AI in modern application development, highlighting the potential benefits of this convergence. Serverless computing offers scalability and cost efficiency by abstracting infrastructure management, while Generative AI, exemplified by tools like GPT-4, enhances productivity by assisting in ideation, prototyping, and code generation. The study compares two applications of similar complexity one developed traditionally and the other using these technologies. The results indicate a significant reduction in development time, improved efficiency, and automatic scalability in the AI-assisted application. [4]

Şerban, Camelia, et al. The paper proposes a software application component using Alexa smart speaker, that integrates different services (Amazon Web Services, Microsoft Services) for a proper virtual environment platform, for both students and teachers. It addresses the main concerns of the current educational system, and provides a smart solution through the use of Artificial Intelligence



based tools. The proposed approach not only achieves unifying data and knowledge-share mechanisms in a remotely mode, but it also brings a good learning experience, increasing the effectiveness and the efficiency of the learning process. [5]

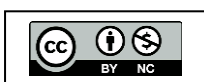
Ali, Omar, et al. The current review recommends the use of ChatGPT as a complementary teaching-learning aid including the need to afford customized and optimized versions of the tool for the teaching fraternity. The study addresses an important knowledge gap as to how AI models enhance knowledge within educational settings. For instance, the review discusses a range of AI-related effects on learning from the need for creative prompts, training on diverse datasets and genres, incorporation of human input and data confidentiality and elimination of bias. The study concludes by recommending strategic solutions to the emerging challenges identified while summarizing ways to encourage wider adoption of ChatGPT and other AI tools within the education sector. The insights presented in this review can act as a reference for policymakers, teachers, technology experts and stakeholders, and facilitate the means for wider adoption of ChatGPT in the Education sector more generally. [6]

Sun, Heng, et al. This paper creates an intelligent MRM system based on cloud service, providing a brand-new intelligent MRM solution. Through cloud service and artificial intelligence (AI), the proposed system relies on intelligent algorithms to realize automatic, comprehensive, and quick identification, review, tagging, storage and query of videos and images in media resources. The research findings can effectively improve the quality of college teaching and enhance the value of media resources. [7]

Lee, Daniel, et al. This paper reviewed a study conducted by researchers at a leading university in Australia surveyed 30 of their teaching staff, drawn predominantly from their teaching academy, and interviewed eight of them regarding the impact of AI on HE. Data were analyzed using the procedures of Inductive Thematic Analysis and revealed a lack of any homogenous sentiment around AI in HE and much ambiguity regarding best practice regarding recent technological developments. The results indicate concerns exist around concepts relating to academic integrity. [8]

Naveen, Kumar KR, This paper aims to provide an overview of cloud computing, how it is used in data-driven intelligent systems, and how AI services can be integrated into the cloud. It begins by discussing the different types of cloud computing, including public, private, and hybrid clouds. It then discusses the key benefits of using cloud computing for data-driven intelligent systems, including scalability, cost savings, and speed. It also examines the potential challenges associated with cloud computing, including security and availability. The chapter then looks at the use of AI services in the cloud, from machine learning algorithms to natural language processing. It explains how these services are utilized in the cloud, the advantages they offer, and the potential challenges associated with them. [9]

Nguyen, Ha, the author has designed a cloud-based, self-learning module that provides consensus results among established, state-of-the-art pathway analysis techniques to provide students and researchers with necessary training and example materials. The training module consists of five Jupyter Notebooks that provide complete tutorials for the following tasks: (i) process expression data, (ii) perform differential analysis, visualize and compare the results obtained from four differential analysis methods (limma, t-test, edgeR, DESeq2), (iii) process three pathway databases (GO, KEGG and



Reactome), (iv) perform pathway analysis using eight methods (ORA, CAMERA, KS test, Wilcoxon test, FGSEA, GSA, SAFE and PADOG) and (v) combine results of multiple analyses. We also provide examples, source code, explanations and instructional videos for trainees to complete each Jupyter Notebook. [10]

III. METHODOLOGY

The Edu Cloud Admin Console with an AI-powered chatbot aims to assist students in making informed decisions about their educational and career paths. The system aims to utilize a Python-based AI chatbot powered by the Gemini API to deliver personalized suggestions for suitable educational streams. First, students will access the system via a user-friendly interface built with Flask, where they can input their queries related to educational streams, career options, and course suggestions. Upon receiving a query, the system will process the student's input using the Gemini AI API, enabling the chatbot to understand and respond intelligently.

FLOW CHART:

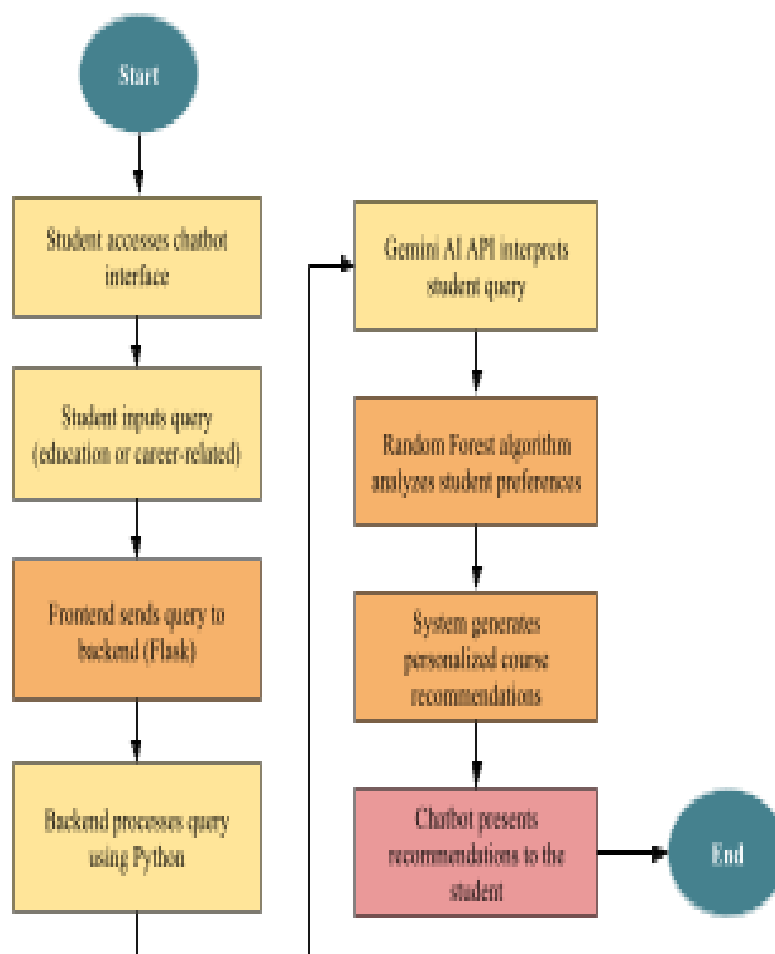


Figure 1: Revolutionizing Educational Counseling: A Generative AI-Based Smart Bot

Based on the query context, the backend will leverage a Random Forest algorithm to provide personalized course recommendations, offering both technical (e.g., engineering, medical) and non-technical (e.g., arts, business) options tailored to the student's profile. The chatbot will continuously refine its responses, helping students explore suitable educational paths. The aim of the project is to simplify the decision-making process for students by offering accurate, data-driven career and educational advice while demonstrating the efficiency and adaptability of generative AI in educational systems.

IV. SYSTEM REQUIREMENT

SOFTWARE REQUIREMENT: Python Software IDE

MODULES USED: Flask systems with AI services." Data-Driven Systems and Intelligent Applications (2024): 72-118.

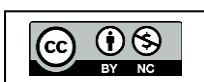
VI. CONCLUSION

The Edu Cloud Admin Console project utilizing an AI-powered for consensus pathway analysis using GO, KEGG and Reactome." chatbot provides a dynamic and personalized approach to guiding students in their educational and career choices. By integrating cutting-edge technologies such as the Gemini AI API and Random Forest algorithms, the system efficiently analyzes student inputs and offers tailored recommendations for both technical and non-technical courses.

The user-friendly interface, built with Flask and modern web technologies like HTML, CSS, and JavaScript, ensures seamless interaction for students, while the backend efficiently processes queries and delivers insightful suggestions. This system not only enhances the decision-making process for students but also bridges the gap between their interests and suitable educational streams, empowering them with the necessary guidance to make informed choices about their future. Through this project, the combination of AI, machine learning, and intuitive design contributes to the development of a smart, accessible platform that fosters student success and career development.

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