AI-Powered Conversational Assistant for Admission Automation in Government Educational Platforms

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Abstract: The Admission Guru project is an AI-powered assistant integrated into the Rajasthan Education Department's website to simplify admission-related processes for engineering and polytechnic institutes. It provides instant, accurate responses to queries on eligibility, college options, fees, scholarships, and placements using advanced NLP and AI technologies. Accessible 24/7, the multilingual assistant supports English and Hindi, ensuring inclusivity for diverse users. By automating responses to frequently asked questions, it reduces administrative workload and enhances efficiency. Admission Guru streamlines the admission process, improves user satisfaction, and serves as a transformative tool in Rajasthan's educational ecosystem.

1 INTRODUCTION

In government administrative departments, officers often encounter queries requiring reference to specific rule books and their interpretations. This can be a time-consuming and error-prone process, especially when the information is scattered across various documents and languages. Our proposed solution aims to streamline this process by developing a Assistant system that assists officers in providing accurate and contextually relevant information based on government rules and regulations. The feedback for this system comes from real-time interactions with officers and administrators who frequently deal with regulatory queries. They have expressed that answering these queries often relies on their experience and familiarity with the rules, which can be challenging and time-consuming. Various rules and regulations must be consulted, and interpreting them accurately is crucial to ensure compliance and informed decision-making. Officers have reported that the current process is tedious and can lead to delays in administrative functions.

2 OBJECTIVES

Students and parents in Rajasthan face difficulties in accessing accurate, up-to-date information about departmental vacancies, eligibility criteria, and scholarship opportunities. The existing system is fragmented, complex, and hard to navigate, leading to confusion, delays, and missed opportunities. A solution is needed that simplifies the admission process, centralizes all relevant information, and is accessible and user- friendly for all users.

3 LITERATURE REVIEW

The rise of digital solutions has transformed education, with chatbots emerging as efficient tools for automating processes, addressing inquiries, and enhancing accessibility. In the context of student admissions, the Admission Guru chatbots leverages natural language processing (NLP) and artificial intelligence (AI) to deliver real-time, multilingual support for students and parents. Chatbots utilize NLP to interpret user inputs and generate relevant responses, as detailed by Jurafsky and Martin (2019) in Speech and Language Processing. While NLP

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facilitates language comprehension, implementing it for Indian languages like Hindi introduces challenges such as tokenization, syntax parsing, and semantic analysis (Sharma & Verma, 2021). These challenges are critical for creating inclusive, multilingual systems.

Shah and Singh (2020) underscore the role of chatbots in streamlining administrative workflows and providing round-the-clock support for admission-related queries. Tools like the Google Gemini API enable context- aware interactions and real-time data integration, essential for systems like Admission Guru. Frameworks like Streamlit further enhance user engagement by offering responsive, interactive interfaces (Kaushik & Gupta, 2022). The scalability and reliability of chatbots are essential, particularly during admission peak periods. Cloud-based infrastructures ensure high traffic handling without compromising performance (Kaushik & Gupta, 2022). Voice- enabled features and predictive analytics improve accessibility and personalize user experiences by anticipating frequently asked questions (Shah & Singh, 2020; Sharma, 2021).

Security and privacy are vital for protecting sensitive user data. Russell and Norvig (2021) advocate encryption protocols and ethical AI practices to ensure user trust. Analytics also play a crucial role in identifying performance gaps, refining chatbot capabilities, and improving user engagement (Kaushik & Gupta, 2022).

4 METHODOLOGY

4.1 Existing System

The admission process as shown in figure 1 begins with Step 1, where applicants are required to attend the Parent Orientation and secure the application form. In Step 2, applicants must submit all the Admissions Requirements to the Admissions Office. At this stage, admission personnel will contact the applicant to schedule the entrance test. Moving to Step 3, applicants need to pay the processing fee at the cashier and complete the Entrance Test. After three (3) working days, applicants must contact the Admissions Office to obtain their test results, as outlined in Step 4. If successful, the admissions personnel will call the applicant to schedule an interview in Step 5. Finally, in Step 6, applicants receive their Acceptance Letter and proceed to enrolment.

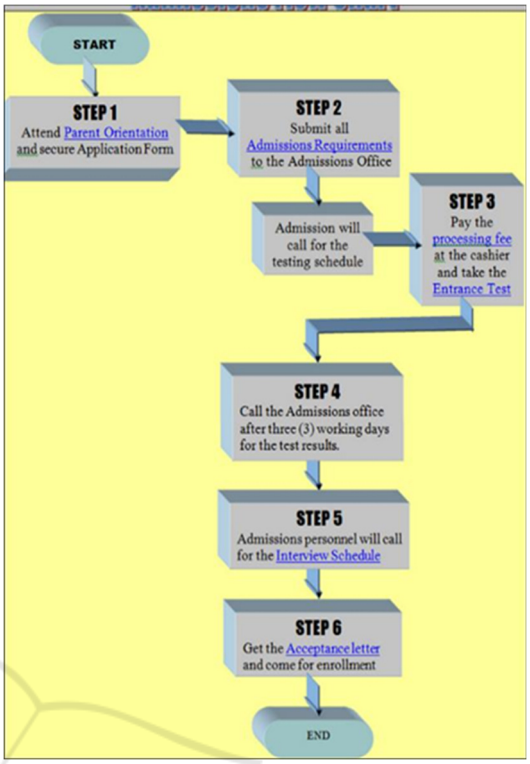

Figure 1: Existing System Block Diagram.

This process involves approximately six steps, including two interactions (test and interview) and a three-day waiting period for test results. By following these steps, applicants efficiently complete the admission process.

Pros of Existing System: The structured admission process offers clarity and transparency, with clear expectations at each step. Parent orientation ensures families are informed, while the entrance test and interview maintain academic standards by admitting qualified candidates. The defined timeline, including a three-day waiting period, helps both applicants and the admissions office prepare for subsequent steps.

Cons of Existing System: The admission process involves delays, multiple interactions, and waiting periods, causing anxiety for applicants. The three-day wait for test results adds uncertainty. Applicants must manage several steps independently, which can be overwhelming. Additionally, the process lacks flexibility for those requiring special accommodations, reducing accessibility for diverse applicants.

4.2 Proposed System

4.2.1 User Interface of Prototype

Currently, the Admission Guru chatbot is hosted on Streamlit Community Cloud (figure 2), a cloud based platform that enables easy deployment and access to web applications. This deployment choice makes the chatbot publicly accessible to users via a provided link, allowing anyone with an internet connection to interact with the assistant. The use of Streamlit Community Cloud eliminates the need for users to install any software locally, simplifying the process of accessing the chatbot. Users can directly access the chatbot through a browser, providing a seamless experience for anyone looking for admission-related information, no matter where they are located.

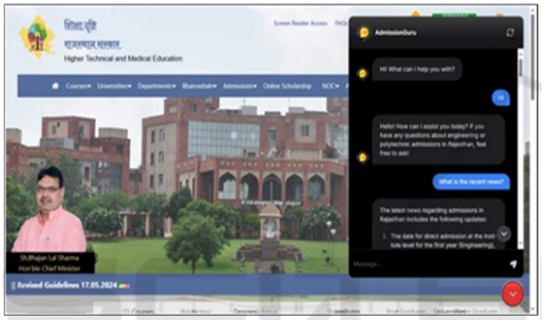

Figure 2: Streamlit Cloud App Ui.

The cloud-based deployment also ensures that the chatbot is available around the clock. Since the chatbot is hosted in the cloud, there is no dependency on local systems or infrastructure. This means that users can engage with the bot at any time, whether it's during regular office hours or outside of them. Figure 3 shows the Admission Guru UI in Website.

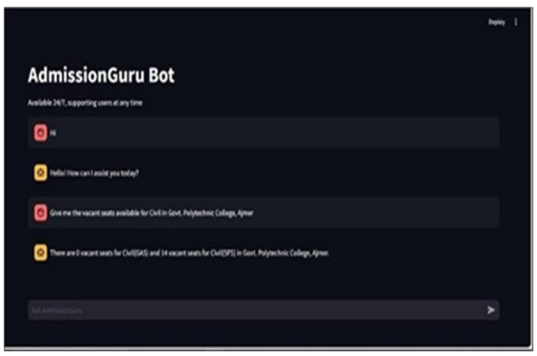

Figure 3: Admission Guru UI in Website.

When a user clicks the chat icon, a popup window appears with a simple, intuitive chat interface. The layout is minimalistic and responsive, keeping the user focused on the conversation. At the bottom, a text input field allows users to type their queries, which can be submitted via the "Enter" key or a button. The chatbot responds instantly, displaying answers in a clear, conversational format. The messages are shown chronologically for easy understanding. Visual elements, such as avatars or speech bubbles, may be included to make the interaction feel more natural and engaging for users. Figure 4 gives the Data-Flow Diagram.

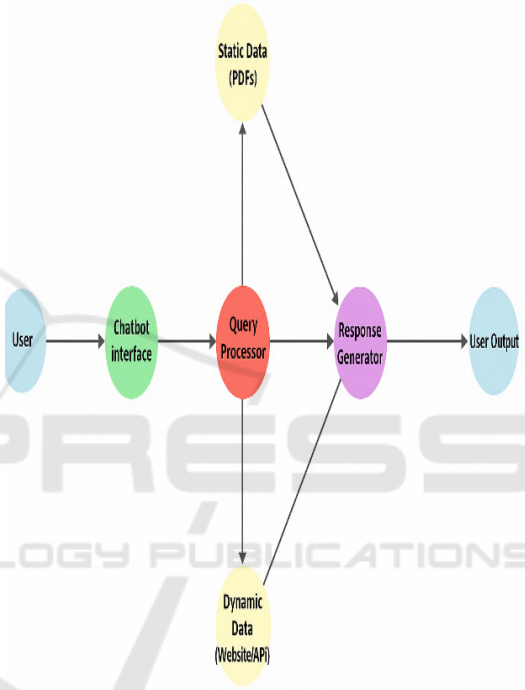

Figure 4: Data-Flow Diagram.

Upon clicking the icon, a popup window will appear, displaying a simple and user-friendly chat interface where users can type their queries and view the assistant's responses in a conversational format. After submitting a query, the chatbot will instantly display relevant answers retrieved in real-time from live website data and multiple PDF documents, processed via the Gemini API. If a query cannot be answered, it will provide a fallback response, encouraging the user to refine their question or try another query. Implementation Stack is shown in figure 5.

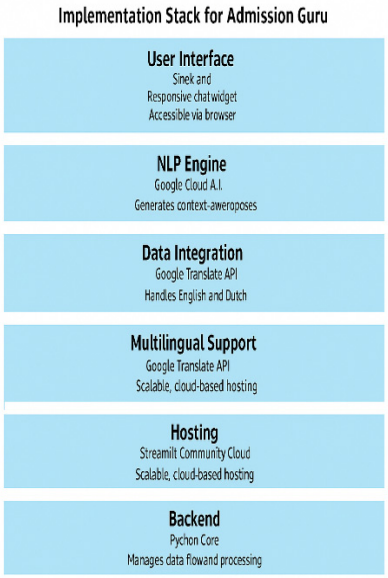

Figure 5: Implementation Stack.

It allows for rapid development of interactive web applications with minimal effort. Streamlet's simplicity makes it a perfect choice for building intuitive, user-friendly interfaces that don't require extensive frontend development expertise. For the Admission Guru assistant, Streamlit is used to create the chat interface where users can input their queries and receive responses from the AI- powered assistant.

The application is embedded into the website, and the chat interface allows for seamless, real-time conversations. Streamlit also supports the addition of multilingual capabilities, ensuring that users can interact with the assistant in both Hindi and English, with potential for more languages in the future. The platform's flexibility allows the chatbot to be scalable, handling varying user traffic during peak periods, such as the admission season. Figure 6 shows the system architecture block diagram.At the core of the architecture is the AI Processing Layer, powered by the Google Gemini API. This layer handles natural language processing (NLP) tasks, including intent recognition, context understanding, and response generation. It ensures that user queries, whether simple or complex, are accurately interpreted and addressed. 29 The AI Processing Layer interacts with a structured Data Management System, which currently comprises PDF documents containing frequently asked questions and answers related to admissions. In the future, this layer will integrate with live data from the Department of Technical Education, Rajasthan's website to provide real-time updates and insights.

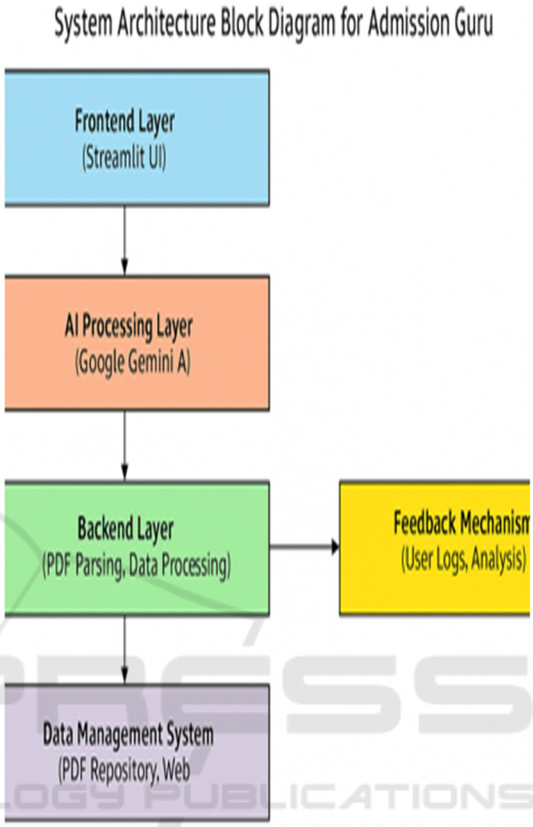

Figure 6: System Architecture Block Diagram.

5 RESULTS

In terms of the methods or algorithms used to solve the problem, ChatGPT-3.5 implements the rational roots theorem five out of six times and Cardano's formula once. ChatGPT-4 attempts to provide a solution by using the rational roots theorem, a graphical solution, and a code snippet in python 66.7%, 16.7%, and 16.7% of the time, respectively. Finally, Gemini AI uses factor lists five times and the rational roots theorem once. All the implemented methods or algorithms can correctly lead to a right answer; thus, it could be said that the chatbots have chosen a proper way to give an answer. Figure 7 shows the Comparison Chart.

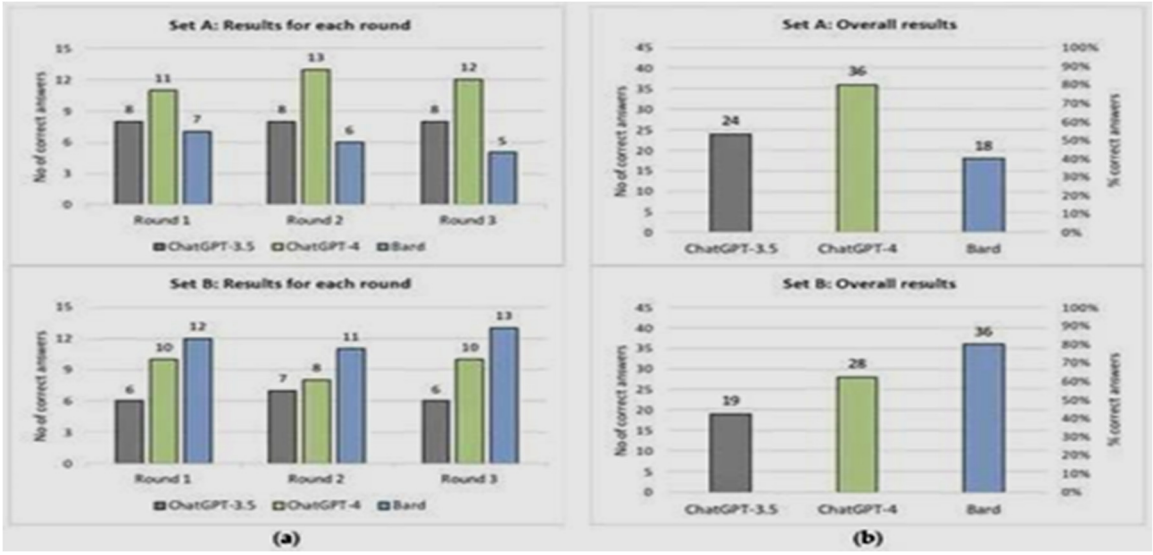

Figure 7: Comparison Chart.

6 CONCLUSIONS & FUTURE ENHANCEMENT

6.1 Conclusions

The Admission Guru project, developed as an inbuilt admission assistant for the Rajasthan Education Department's website, has successfully fulfilled its objective of streamlining the admission process for students and parents. By integrating features such as viewing department vacancies, scholarship details, and admission guidelines, we have significantly enhanced user experience. The design thinking process allowed us to empathize with the target audience, define their pain points, ideate solutions, prototype the assistant interface, and test its functionalities to ensure it meets the needs of students, parents, and educational administrators.

Our approach began by understanding the challenges faced by users in navigating the traditional admission process. These challenges included lack of timely information, complexity in finding relevant department vacancies, and confusion regarding scholarship opportunities. By directly addressing these issues, Admission Guru was designed to provide real-time, easily accessible information in a user-friendly interface. The prototype was validated with a set of test users, receiving positive feedback regarding its simplicity and efficiency in guiding them through the admission journey.

We also incorporated continuous feedback loops, using real-world data to refine the system's functionalities and ensure that the platform remains intuitive and effective. As a result, students and parents are now able to access critical admission details seamlessly, making the overall process more transparent and less stressful. Educational administrators benefit from the tool as well, since it automates many manual processes, reducing the workload and enhancing operational efficiency. However, while Admission Guru has successfully met its initial objectives, there is always room for improvement. The foundation laid in this project can be further expanded upon to integrate more advanced features and improve the user experience even more.

6.2 Future Enhancement

The future of Admission Guru holds exciting possibilities. There are several enhancements that could elevate the tool to new levels of usefulness for both users and administrators.

Multilingual Support: As Rajasthan is a diverse state with a multitude of languages spoken, adding multilingual support could make Admission Guru more accessible to a wider audience. This feature would enable users from different linguistic backgrounds to interact with the platform in their preferred language. Integration with Other Systems: Admission Guru could be integrated with other education management systems to provide a more comprehensive service. For example, linking the

assistant to databases that track students' academic performance and other eligibility criteria could automate the admission process even further.

Mobile Application: While the tool is accessible via the website, a dedicated mobile application could be developed to allow users to easily access the platform on the go. Given the high mobile penetration in Rajasthan, this could increase the tool's adoption among students and parents.

AI-Powered Guidance: Incorporating AI to provide personalized advice could enhance the user experience. The assistant could analyze a student's preferences, academic history, and eligibility to recommend specific departments, courses, and scholarships.

User Feedback Mechanism: Adding a robust user feedback mechanism would allow continuous improvement. Users could report issues or suggest new features, helping the development team prioritize future updates based on real user needs.

Enhanced Analytics for Administrators: The platform could provide educational administrators with more detailed insights and analytics regarding admissions, such as trends in application volume, preferred departments, and common queries. This could help streamline decision-making and resource allocation.

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