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AI-Powered Student Assistant Chatbot

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Abstract **-** The increasing number of questions in the admission process of engineering and polytechnic colleges under the Department of Technical Education, is making it impossible for institutions to manage queries using traditional methods. To enhance communication and provide relevant information, centrally developed AI-enabled chatbots can be used to act as virtual assistants. The chatbot will automatically answer questions related to admissions, eligibility, fees, scholarships, courses, hostel facilities, and placement times. The chatbot, available 24/7, will reduce the workload of employees, enhance user experience, and provide insights to improve services. With machine learning, the system can adapt and improve its performance based on user interaction and provide accurate and relevant information. Chatbots not only improve response time but also eliminate the need for human intervention in solving many problems. In addition, the design of the education system will ensure the dissemination of information in every school, equality and accuracy. Thanks to natural language processing, which allows multilingual support, chatbots will make the inquiry process more efficient and effective by providing access to a wider audience, thus allowing students and participants to make their own decisions.

Key Words: AI-powered chatbot, 24/7 virtual assistant, Admission inquiries, Automation, Multilingual support

1. INTRODUCTION

The admission process for engineering and polytechnics under the Department of Technical Education, is a significant opportunity for students, parents and other stakeholders. During this time, more questions have been asked regarding admission, eligibility criteria, fees, scholarships, hos tel facilities, courses and placements. Currently, these questions are managed through traditional methods like phone calls, emails or visiting someone at the university which can be time-consuming, ineffective and cumbersome. Universities often struggle to keep up with the volume of questions, affecting response time, consistency and overall user experience. This has implications for the universities who need to dedicate their efforts to address these questions as well as for the stakeholders who are looking for timely and accurate information. To solve these problems and improve the communication process as a whole, it is proposed to create AI-powered chatbots in the middle. The chatbot will act as a virtual assistant that provides instant, automatic answers to frequently asked questions (FAQs) about accreditation and other educational issues 24/7. The system will make the process of asking more questions easier by leveraging cutting-edge technologies such as artificial intelligence (AI), machine learning (ML), and natural language processing (NLP) to instantly understand and respond to users needs, user-friendly, and scalable.

2. LITERATURE SURVEY

[1] A Chatbot Solution to Manage Student Questions About Payments and Enrollment in University : This paper explores the design and implementation of a chatbot aimed at answering common questions from university students about payment processes and enrollment procedures. The chatbot serves as an automated assistant, available 24/7, to streamline responses to frequently asked questions, reducing administrative workload and enhancing student support. By utilizing natural language processing (NLP), the chatbot can understand and respond to queries in real time, covering topics such as tuition fees, payment deadlines, installment options, enrollment criteria, and registration steps. This solution not only improves accessibility to university services but also demonstrates how AI-driven chatbots can enhance user experience by providing immediate, reliable information.

[2] Assessing the Impact of Chatbot-Human Personality Congruence on User Behavior : A Chatbot-Based Advising System Case- This study examines how aligning a chatbot's personality with that of its users influences user engagement, satisfaction, and behavior in an advising context. It focuses on a chatbot developed to provide academic and career guidance, exploring whether personality congruence—when the chatbot's personality traits match those of the user—leads to more positive interactions and outcomes. The research suggests that users tend to be more responsive, trustful, and willing to follow advice when the chatbot's tone, language, and behavior reflect their own personality characteristics. The findings underscore the importance of personalization in AI systems, revealing that personality-aligned chatbots can improve user experience, increase engagement, and potentially lead to more effective advisory interactions in educational settings.

[3] An Overview on Generative AI a Scale With Edge Cloud Computing- This paper discusses the potential of combining generative AI with edge-cloud computing architectures to enable scalable, efficient processing of AI tasks. Generative AI, which creates new data—such as text, images, or audio—based on learned patterns, demands high computational power, especially when scaled for broader

applications. Edge-cloud computing offers a solution by distributing processing across edge devices (closer to users) and cloud servers (for centralized, high-power computing). This hybrid setup reduces latency, enhances data security, and allows real-time AI processing in diverse locations. The paper highlights practical applications of this framework, such as personalized content creation and enhanced data privacy, and examines the technical challenges, including data synchronization, model optimization, and resource allocation, to support generative AI at scale. This overview demonstrates how edge-cloud computing can make generative AI more accessible, efficient, and responsive in real-world scenarios.

[4] A Systematic Review of Chatbots - This paper provides a comprehensive analysis of chatbot technology, covering its evolution, applications, and the latest advancements in artificial intelligence that have enhanced chatbot capabilities. The review categorizes chatbots based on their design—such as rule-based or AI-driven—along with the primary sectors in which they are applied, including customer service, healthcare, education, and entertainment. Key findings emphasize the impact of natural language processing (NLP) and machine learning on improving chatbot accuracy, user experience, and interaction quality. The paper also explores challenges such as handling complex queries, privacy concerns, and biases in chatbot responses. By consolidating existing research, this systematic review offers insights into the benefits and limitations of current chatbot technology, highlighting areas for future innovation and improvements to meet the growing demands for automated, reliable, and conversational AI assistants across various industries.

[5] Tracking ChatGPT Research : Insights From the Literature and the Web - This paper analyzes recent developments and trends in research surrounding ChatGPT, OpenAI's advanced language model, by reviewing scholarly literature and web-based resources. It explores how ChatGPT has influenced various fields, from natural language processing to applied AI in sectors like customer support, education, and content creation. The review categorizes ChatGPT's capabilities, including language understanding, context retention, and response generation, while also addressing limitations like sensitivity to input phrasing, issues with factual accuracy, and ethical concerns such as misuse and bias. Additionally, it highlights how ChatGPT is shaping AI-related discussions across both academic and online platforms, sparking debates on the implications of increasingly human-like conversational AI. The paper concludes by identifying key research gaps and potential advancements that could make ChatGPT and similar models more reliable, ethical, and adaptable for diverse real-world applications.

3. OBJECTIVES

1. To develop an AI-powered chatbot for 24/7 real-time assistance on admission-related queries.
2. To improve accessibility of information on admissions, fees, scholarships, and eligibility.
3. To automate responses to common inquiries, reducing staff workload.
4. To enhance user experience with an intuitive, multi-device interface supporting text and voice.
5. To integrate real-time data on seat availability, fees, and deadlines.
6. To gather insights from user interactions to improve chatbot responses.

4. PROBLEM STATEMENT

Engineering and polytechnic colleges face a surge in admission-related inquiries during the enrollment period, covering topics like eligibility, fees, and placements. Current methods of handling these inquiries via phone, email, or in-person are time-consuming for both stakeholders and staff. To address this, an AI-powered chatbot can provide 24/7 support, automating responses to common questions, reducing staff workload, and improving access to information for prospective students and their families.

5. METHODOLOGY

1. Effective data retrieval with NLP and BERT : This uses advanced NLP BERT to infer context and intent from user queries. Fine-tuning BERT on domain-specific datasets enables this chatbot to be useful in retrieving correct information on topics like admissions, fees, scholarships, and placements. It uses semantic search for precise answers, thereby ensuring improved efficiency in query resolution. BERT-based voice assistant will make accessibility more accessible for English and then also Hindi and other regional languages.

2. User-Centric Conversational Interface Design : This algorithm integrates BERT for natural language understanding and creates an intuitive interface. The chatbot dynamically adapts to user input and offers personalized suggestions through contextual responses. KNN-based recommendations refine the user experience by analyzing query patterns and providing relevant options. The multilingual and responsive design ensures ease of access across platforms.

3. Automated Query Resolution Using KNN : The query resolution algorithm combines BERT for feature extraction and KNN for classification. User queries are converted into vector representations, and KNN matches them to predefined categories, enabling rapid response retrieval. For ambiguous or complex queries, the system escalates to human staff. This hybrid approach reduces the workload on administrators while maintaining high accuracy in automated responses.

4. Interaction Data Analytics and Optimization : This algorithm analyzes interaction data to optimize the performance of the chatbot. BERT embeddings enable clustering of similar queries, uncovering patterns in user behavior. These insights guide updates to the chatbot's FAQ database, improving relevance and efficiency. Feedback integration ensures continuous learning, enhancing the system's ability to meet user needs over time.

5. Multilingual Support with mBERT : The multilingual algorithm uses mBERT to understand and respond to queries in multiple languages. Language detection determines the user's input language, and mBERT processes the query directly in that language while preserving the context. This ensures that the chatbot is able to interact seamlessly with diverse users, which further expands the accessibility and utility of the chatbot in multilingual regions.

6. SYSTEM ARCHITECHTURE

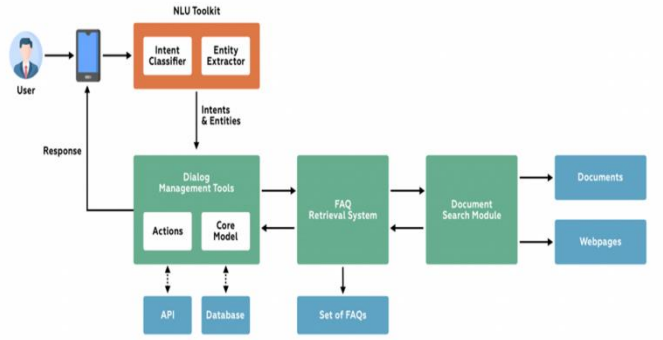

Fig. System Architechture for ChatBot

7. CONCLUSION

The AI-driven chatbot created for engineering and polytechnic institutes provides an efficient, centralized platform for handling admission-related queries. Through automation, the chatbot answers common questions on topics such as admissions, fee structures, scholarships, and placements, significantly improving access to essential information. This solution reduces the workload on administrative staff and saves time for students, parents, and other stakeholders. With its Natural Language Processing (NLP) capabilities, the chatbot ensures smooth, user-friendly interactions in multiple languages and across various devices. Additionally, it generates data insights for the Department of Technical Education, helping them continually refine and enhance their services.

8. REFERENCES

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