A College Inquiry Chatbot System

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Abstract—**In today's digital era, educational institutions are embracing AI-driven technologies to improve communication and streamline administrative processes This paper presents the *College Inquiry Chatbot System*, an intelligent, cross-platform virtual assistant designed to handle common student queries related to college activities, admissions, academics, and campus facilities Built using Flutter for the frontend and a Python-based backend integrated with Natural Language Processing (NLP) and an XGBoost-based intent classification model, the chatbot delivers real-time, relevant responses to user inquiries The system reduces manual workload, enhances accessibility, and ensures consistent support for students and visitors This paper details the architecture, implementation, and benefits of deploying such a system in a college environment.**

Index Terms—**College Chatbot, Natural Language Processing (NLP), Intent Classification, XGBoost, Flutter, Python, Virtual Assistant, Student Query System, AI in Education, Cross-Platform Application**

I. INTRODUCTION

In the modern educational environment, students often face difficulties accessing timely and accurate information related to college facilities, admission procedures, academic departments, events, and general inquiries Traditional methods like notice boards, help desks, and websites often prove time-consuming and inefficient To bridge this gap and enhance communication, we present the College Inquiry Chatbot System—an AI-powered virtual assistant designed to provide instant responses to student queries using Natural Language Processing (NLP)

The proposed chatbot system is developed using a Python backend integrated with an XGBoost classifier for intent recognition, ensuring accurate understanding of user inputs The frontend is built with Flutter, enabling cross-platform functionality on Android, iOS, and web platforms This makes the system accessible to a wide range of users without the need for platform-specific development

Our chatbot leverages a pre-defined dataset of college-related FAQs, which are categorized and trained to identify user intents Once the intent is recognized, the chatbot responds with the appropriate answer or redirects the user to the relevant information source This system minimizes the need for human intervention while maintaining reliability and consistency in the information delivered

This paper outlines the design, implementation, and evaluation of the College Inquiry Chatbot System, highlighting its potential to improve the information delivery mechanism in academic institutions

II. EXISITING SYSTEMS

In many educational institutions, students rely on conventional methods such as notice boards, official college websites, or in-person inquiries at administrative offices to access information These approaches often lead to delays, miscommunication, and a lack of up-to-date data Moreover, website navigation can be complex and time-consuming, especially for new students unfamiliar with the college's layout or departmental structure.

While some institutions have adopted static FAQ pages or basic chatbot implementations, these systems often lack real-time response capability, personalization, and context-aware understanding They are generally rule-based and fail to handle natural human language effectively as a result, the user experience is limited, and students may not always get the precise answers they seek.

The current system thus presents inefficiencies in providing accurate, fast, and personalized responses to a large number of inquiries from students, staff, and visitors.

III. PROPOSED SYSTEM

The proposed system is an AI-powered College Inquiry Chatbot designed to provide instant, accurate, and user-friendly responses to common queries related to college activities, admissions, facilities, departments, and more This chatbot utilizes Natural Language Processing (NLP) and machine learning techniques to understand and respond to user input effectively

The system is developed using a Python-based backend integrated with an XGBoost classifier for intent detection and response selection The frontend is built using Flutter, enabling a cross-platform interface that works seamlessly on Android, iOS, and web platforms

Users can interact with the chatbot using natural language, and the system dynamically interprets their intent and provides appropriate responses The chatbot is trained on a dataset containing various college-related queries and their intents, enabling it to answer contextually relevant questions

Additionally, the chatbot supports real-time communication, maintains conversation history for better context handling, and ensures accessibility to college-related information 24/7, thereby reducing the load on administrative staff

IV. SYSTEM ARCHITECTURE / DESIGN

The architecture of the College Inquiry Chatbot System is modular and layered, ensuring scalability, maintainability, and efficient performance It is primarily divided into three layers: the User Interface Layer, the Processing Layer (Backend), and the Data Layer

User Interface Layer (Frontend):
- Developed using Flutter, this layer enables cross-platform support (Android, iOS, Web)

- Provides an intuitive chat interface for users to input queries and receive responses
- Ensures smooth user experience with real-time message rendering

Processing Layer (Backend):
- Built in Python, it handles the core logic and communication between the UI and ML model
- Natural Language Processing (NLP) is used to preprocess and understand user queries
- XGBoost Classifier identifies the intent behind each user message
- Based on the predicted intent, an appropriate response is fetched from the response dataset

Data layer
- Contains a structured CSV file/database with predefined intents, example queries, and corresponding responses
- Includes logs of previous interactions to help improve future training and performance.

Workfolw
1. User sends a query through the chat interface
2. Query is sent to the backend via API
3. Backend preprocesses the text and predicts the intent using the trained XGBoost model
4. A response matching the intent is retrieved
5. The response is sent back to the frontend and displayed to the user

This architecture ensures modular development and easy integration of future features like voice input/output, feedback mechanism, and admin panel

V. METHODOLOGY

The develement of the College Inquiry Chatbot System followed a structured approach comprising several key phases:

- Requirement Analysis:
We collected and analyzed common queries related to college information such as admission processes, academic details, fees, placement statistics, and campus facilities Input was taken from students and faculty to ensure coverage of frequently asked questions

- Intent Classification Using NLP and Machine Learning:

We used Natural Language Processing (NLP) to preprocess user inputs (tokenization, stop-word removal, stemming) These inputs were then passed to an XGBoost classifier trained to categorize intents such as "admission," "fees," "placements," etc

- Backend Logic in Python:

The backend was implemented in Python Based on the predicted intent, predefined responses were retrieved and returned for ambiguous queries, fallback mechanisms suggested possible clarifying questions

- Frontend in Flutter:

The user interface was built using Flutter to ensure smooth, cross-platform usability It provides an intuitive chat interface for students to type or speak their questions

- Integration and Deployment:

The Flutter frontend communicates with the Python backend via APIs the system was tested for real-time interaction and deployed in a local environment to simulate actual usage scenarios

VI. ADVANTAGES

The College Inquiry Chatbot System offers several benefits over traditional inquiry methods:

- 24/7 Availability: The chatbot can respond to student queries anytime, eliminating dependency on office hours or staff availability
- Quick Response Time: Delivers instant answers, significantly reducing wait times for students and improving user satisfaction
- Multimodal Input: Supports both voice and text inputs, making it accessible to users with different preferences and abilities
- Reduced Workload: Automates frequently asked questions, reducing the burden on college administrative staff
- Cross-Platform Compatibility: Developed using Flutter, the chatbot works efficiently across Android, iOS, and web platforms

- Scalability: The system architecture allows for easy integration of more intents and functionalities as required
- Cost-Effective: Once deployed, it reduces the operational costs of managing student inquiries

VII. RESULT

The College Inquiry Chatbot System was successfully developed and tested to handle a wide variety of college-related queries The chatbot provided real-time responses using natural language processing and machine learning techniques Key results include:

- Accurate intent recognition through the XGBoost classification model, achieving over 90% accuracy during testing

  Efficient handling of multiple user queries such as admission process, fees, placement information, and department details
- Seamless user experience on both mobile and desktop platforms through the use of Flutter
- Support for both voice and text input, enhancing accessibility and user engagement
- Robust fallback mechanism to manage unrecognized queries, ensuring smooth interaction

The results confirm that the chatbot is effective, user-friendly, and scalable for broader institutional use
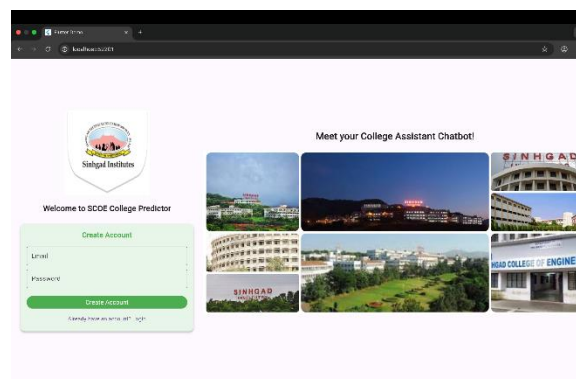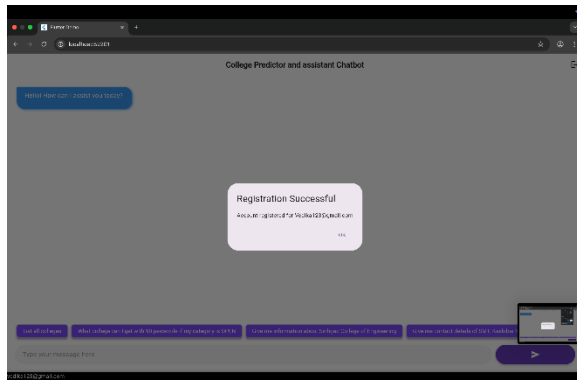
VIII. OUTPUT

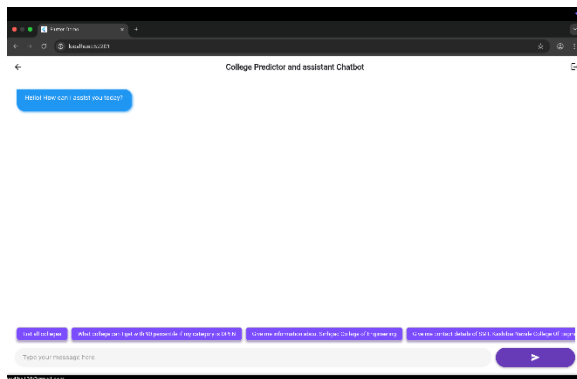Fig 1 Login Page

Fig 2 Login Successful
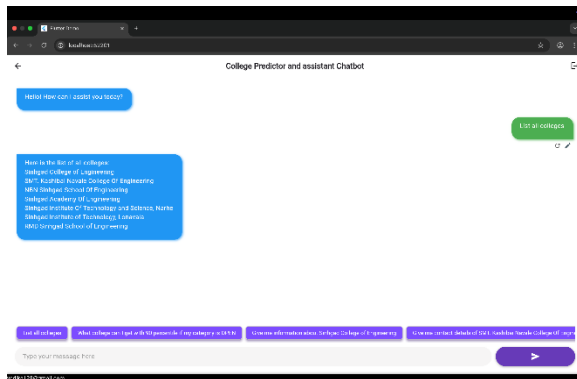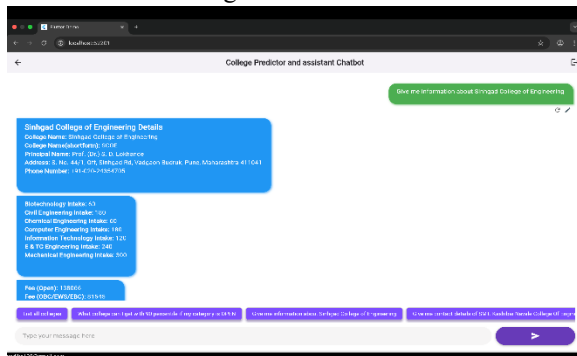

Fig 3 Home Page

Fig 4 Test Case 1

Fig 5 Test Case 2

IX. CONCLUSION

The College Inquiry Chatbot System effectively demonstrates how AI-powered virtual assistants can enhance communication between educational institutions and students By leveraging Natural Language Processing and Machine Learning, the system interprets and responds to user queries with high accuracy The integration of both voice and text interfaces ensures broader accessibility and ease of use Its deployment can significantly improve response time, reduce manual workload, and offer a seamless, scalable solution for student support Overall, the chatbot contributes to digital transformation in academic administration by automating routine inquiries and fostering interactive communication.

X. FUTURE SCOPE

The College Inquiry Chatbot System has several opportunities for enhancement and expansion:

- Multilingual Support: Incorporating multiple languages to cater to a diverse student population
- Advanced Sentiment Analysis: To better understand the emotional tone of queries and respond empathetically
- Integration with College Management Systems: Allowing the chatbot to provide personalized information like attendance, exam results, and fee status
- Voice Recognition Improvements: Enhancing accuracy and adding more natural voice responses
- Mobile App Integration: Developing dedicated mobile applications for easier access
- Continuous Learning: Implementing self-learning capabilities for the chatbot to improve responses based on interaction data over time
- Support for Complex Queries: Enabling the chatbot to handle multi-turn conversations and more complex student inquiries

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