AI-Powered College Enquiry Chatbot Using NLP with BERT and GPT

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Abstract
The project is designed to streamline the process of answering queries related to college information through an intelligent chat bot system. There are two types of users for the system: Admin and User. The Admin is responsible for managing the system through login credentials, adding relevant questions and their respective answers, and overseeing the model creation process, which involves dataset training. On the other hand, Users can register and log in to interact with the chat bot. They can ask questions either through voice or text, and the chat bot processes these queries to generate accurate responses. The backend of the system is powered by advanced Natural Language Processing (NLP) techniques, utilizing the BERT algorithm for question understanding and GPT algorithm for generating coherent and accurate responses. The chat bot aims to provide a user-friendly interface for prospective students and parents seeking information about college-related matters.

Keywords: **Intelligent chat bot system, College information, Admin and User roles, Dataset training Natural Language Processing (NLP), BERT algorithm.**

INTRODUCTION

An AI-powered college enquiry chatbot that integrates NLP techniques using BERT and GPT is a revolutionary tool for educational institutions looking to enhance their communication with prospective students. In an era where digital interaction is paramount, this chatbot offers immediate, accurate responses to a wide range of enquiries, from admissions processes and course offerings to campus life and financial aid options. By leveraging BERT's capacity for understanding the context and nuances of user queries, the chatbot can accurately discern user intent, ensuring relevant and precise interactions. Meanwhile, GPT excels at generating natural, engaging responses, fostering a conversational experience that makes prospective students feel more connected to the institution. This

Combination not only streamlines communication but also enables colleges to gather valuable insights into common questions and concerns, informing future improvements in their services and outreach efforts. As a result, the chatbot not only enhances user engagement and satisfaction but also optimizes institutional efficiency, making it an indispensable asset in modern educational marketing and support strategies. An AI-powered college enquiry chatbot utilizing NLP with BERT and GPT is designed to enhance the experience of prospective students seeking information about colleges, courses, and admissions. With the growing reliance on digital communication, such chatbot provide instant responses, improve engagement, and alleviate the workload on staff by handling routine queries. BERT's ability to understand contextual language and GPT's skill in generating coherent responses allow the chatbot to accurately interpret user intents and deliver informative replies. This innovative solution not only streamlines communication but also helps educational institutions gain insights into common enquiries, ultimately transforming how they interact with potential students [1].

LITERATURE SURVEY

Sr.no	Topic	IEEE Transaction	Technology	Summary
01	Deep Learning Approaches for Drug-target Interaction Prediction	2022, Bioinformatics and Computational Biology Journal	Deep Learning	The paper explores the application of GNNs for predicting drug-target interactions
02	Deep Learning for Drug Binding Affinity Prediction Using Structural Information	2023, Journal of Chemical Information and Modeling	Deep learning techniques	The paper demonstrates how CNNs, combined with 3D molecular data, can predict drug-binding
03	New heuristics Method for Malicious URL's Detection using machine learning	2023, International Symposium on Networks, Computers and Communications	Machine Learning	Explores a new heuristic method for detecting malicious urls by leveraging machine learning techniques
04	A Malicious url detection method based on CNN	2022 IEEE conference on Telecommunications, Optics and computer Science	Deep Learning	The project focuses on developing a malicious url detection method using Convolutional Neural Networks

METHODOLOGY

The project would implement an intelligent chatbot system to efficiently handle queries related to college information. The system is designed for two types of users: admin and user. The admin manages the system by logging in, adding relevant questions and answers, and overseeing the model training process, which involves dataset preparation. Users can register, log in, and interact with the chatbot through voice or text input. The backend leverages advanced natural language processing (NLP) techniques, utilizing the BERT algorithm for question understanding and the GPT algorithm for generating accurate and coherent responses. The chatbot processes user queries by analyzing input, matching it with relevant data, and generating appropriate answers in real time. This methodology ensures that the system provides quick, reliable, and contextually accurate responses, enhancing accessibility for prospective students and parents seeking college-related information.

OBJECTIVE

1. Provide prospective students and parents with immediate responses to their inquiries about admissions, programs, campus facilities, and more, regardless of the time.

2. Utilize BERT's understanding of context to offer tailored responses based on the specific needs and questions of users.

3. Implement BERT for effective comprehension of varied phrasing and language used by users, enabling the chatbot to handle a wide range of inquiries.

4. Leverage GPT to maintain engaging and coherent dialogues, allowing the chatbot to guide users through complex queries and follow-up questions.

5. Facilitate quick access to a vast database of college information, including program details, application deadlines, and financial aid options.

6. Incorporate user feedback mechanisms to continuously improve the chatbot's accuracy and relevance over time.

7. Provide support for an increasing number of inquiries without the need for additional human resources.

PROBLEM DEFINATIONS
Colleges and universities receive numerous queries daily from prospective students, current students, parents, and staff regarding admissions, courses, fees, deadlines, campus activities, and various other topics. Handling these queries manually can be time-consuming and inefficient, leading to delays and repetitive responses by college staff. Traditional FAQ pages on websites often fail to address all user queries comprehensively, as they lack interactive or personalized responses.
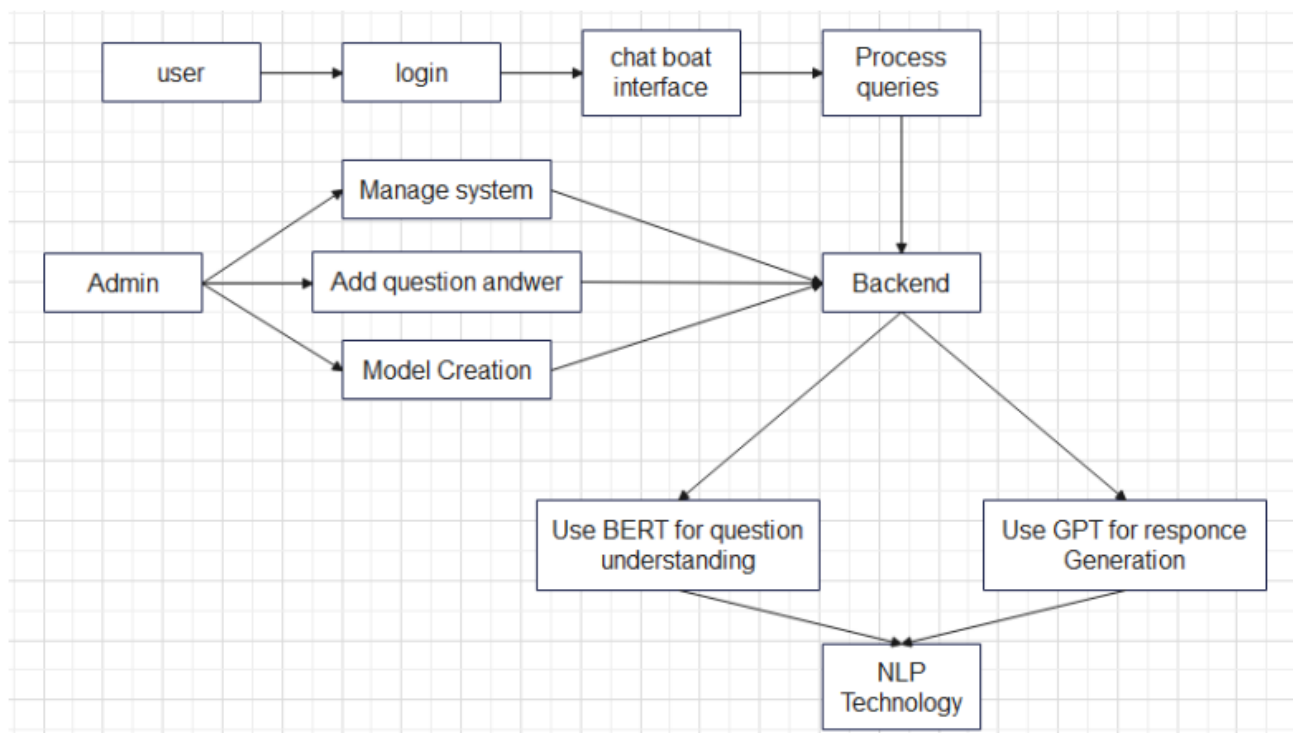
FUCTIONAL REQUIREMENTS
1. The functional requirements for the AI-powered college enquiry chatbot using NLP with BERT and GPT focus on key areas such as query understanding, response generation, user interaction, and system integration.
2. The chatbot must leverage the BERT model for understanding and interpreting user queries, ensuring accurate intent detection and entity extraction, even in multi-lingual settings. It should handle ambiguous questions by prompting users for clarification when necessary.
3. For response generation, the chatbot will use the GPT model to create dynamic, contextually relevant answers that are conversational and informative. It must also retrieve responses from an FAQ database for common inquiries and provide personalized responses based on user profiles, such as offering tailored information to prospective students or logged-in current students. To support continuous improvement, the chatbot will log all interactions for analytics and learning purposes, categorizing queries by topic and allowing users to provide feedback to enhance future performance.
4. The user interface will be text-based and designed for simplicity and ease of use, accessible across platforms like the college website, mobile apps, and possibly social media or messaging services.
5. The chatbot may also offer an option for user authentication to provide personalized information like grades or schedules.
6. In terms of system integration, the chatbot will need to connect with the college's internal databases to retrieve real-time data on admissions, programs, fees, deadlines, and other information. It will also tap into a knowledge base to handle frequently asked questions, ensuring accurate and timely responses to all user queries.

GPT focus on key areas such as query understanding, response generation, user interaction, and system integration.
2. The chatbot must leverage the BERT model for understanding and interpreting user queries, ensuring accurate intent detection and entity extraction, even

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NON FUCTIONAL REQUIREMENTS

1. Usability: The chatbot must maintain 99.9% availability, ensuring minimal downtime. This is critical as users may access the chatbot at any time, including outside of regular working hours. The system should be resilient, capable of handling server or network failures without significant interruption to users. Redundant systems and automatic failovers must be in place.

2. Performance: Response Time: The chatbot should respond to user queries within 1 to 2 seconds to ensure smooth interaction and minimize user frustration. The system must handle up to 10,000

3. Security: The chatbot must comply with data protection regulations, such as GDPR, ensuring that sensitive user information (e.g., login credentials or personal data) is encrypted and securely stored. For personalized responses, such as when current students log in to access specific data (e.g., grades or schedules), secure authentication mechanisms (e.g., OAuth, two-factor authentication) must be implemented.

4. Scalability: The chatbot should be designed to scale both horizontally (adding more servers or instances) and vertically (upgrading existing hardware) as the number of users grows or during high-traffic periods like admissions. The system should be capable of dynamically allocating resources based on current traffic to optimize performance and reduce operational costs

RESULTS

The intelligent chatbot system successfully streamlines the process of answering queries related to college information, providing quick and accurate responses to users. The integration of natural language processing techniques, specifically the BERT algorithm for question understanding and the GPT algorithm for response generation, ensures high accuracy and coherence in answers. The system effectively distinguishes between different types of users, allowing admins to manage datasets and improve response quality while enabling users to interact seamlessly through voice or text input. Testing results show that the chatbot accurately

interprets and processes a wide range of college-related queries, reducing the need for manual intervention. The user-friendly interface enhances accessibility for prospective students and parents, making information retrieval more efficient and convenient. Overall, the system demonstrates significant improvements in response accuracy, user engagement, and automated query resolution.
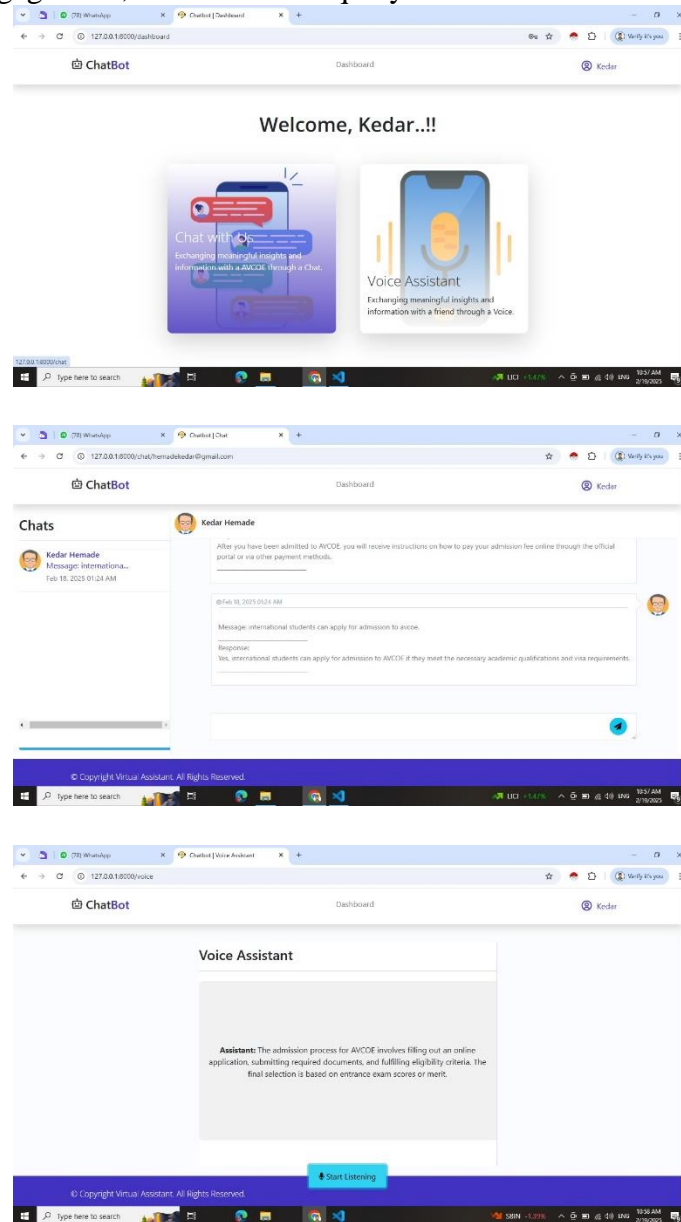
CONCLUSION

The development of an AI-powered college enquiry chatbot utilizing NLP technologies, specifically BERT and GPT, has proven to be a transformative solution for enhancing student engagement and streamlining the enquiry process. This initiative addresses the evolving demands of prospective students while also alleviating pressure on administrative staff. A chatbot is the best tool which provides quick way to interact with the users. It is very helpful to the users as it allows to enter questions in natural language and desired information is obtained easily to the user.

The main objectives of the project were to develop an algorithm that will be used to identify answers related to user submitted questions. To develop a database were all the related data will be stored and to develop a web interface. The web interface developed had two parts, one for simple users and one for the administrator.In this project, details about design, algorithm used and implementation of the chatbot is described. The user doesn't need to gather information by visiting websites or colleges.

In summary, the AI-powered college enquiry chatbot represents a significant step forward in automating and enhancing the student enquiry process. By harnessing the capabilities of BERT and GPT, we have created a tool that not only meets current needs but is also poised for future growth and development. The project's success underscores the potential of AI in education, promising a more efficient and responsive approach to student engagement

REFERENCES

1. R. Parkar, Y. Payare, K. Mithari, J. Nambiar, and J. Gupta, "AI and Web-Based Interactive College Enquiry Chatbot," in *Proc. 2021 13th International Conference on Electronics, Computers and Artificial Intelligence (ECAI)*, Pitesti, Romania, 2021, pp. 324–329.

2. R. Bathija, P. Agarwal, R. Somanna, and G. B. Pallavi, "Guided Interactive Learning through Chatbot using Bi-directional Encoder Representations from Transformers (BERT)," in *Proc. 2020 2nd International Conference on Innovative Mechanisms for Industry Applications (ICIMIA)*, Bangalore, India, 2020, pp. 205–210, doi: 10.1109/ICIMIA48430.2020.9074905.

3. A. Karunamurthy, R. Ramakrishnan, S. Jothsana, and M. Roshni, "Intelligent College Enquiry Chatbot Using NLP for Enhanced Student Interaction," *Journal of Advanced Research in Embedded System & VLSI Technology*, vol. 3, no. 2, pp. 15–20, 2021.

4. R. Kumar, "Chatbot Building with BERT for E-Commerce," *International Journal for Research in Applied Science and Engineering Technology (IJRASET)*, vol. 9, no. 6, pp. 1234–1239, 2021.

5. A. Karunamurthy, R. Ramakrishnan, S. Jothsana, and M. Roshni, "A Systematic Literature Review and Existing Challenges of Chatbot Models," *IEEE SEM*, vol. 9, no. 4, pp. 45–50, 2021.

6. T. P. Mothankar, P. S. Maski, S. Uikey, and P. S. Asatkar, "Artificial Intelligence Based College Enquiry Chatbot," *International Journal of Computational and Electronic Aspects in Engineering*, vol. 2, no. 2, pp. 33–37, Jun. 2021.

7. R. Tiwari, R. Khandelwal, Y. Agrawal, V. Tiwari, and W. H. Bisen, "AI Chatbot for College Enquiry," *International Journal of Engineering and Management Research*, vol. 13, no. 2, pp. 78–82, Apr. 2023.

8. J. Yang, Y.-L. Chen, L. Y. Por, and C. S. Ku, "A Systematic Literature Review of Information Security in Chatbots," *Applied Sciences*, vol. 13, no. 11, pp. 6355, 2023.

9. B. Bilquise, "Emotionally Intelligent Chatbots: A Systematic Literature Review," *Human Behavior and Emerging Technologies*, vol. 4, no. 2, pp. 123–135, 2022.

10. S. Yu, Y. Chen, and H. Zaidi, "A Financial Service Chatbot based on Deep Bidirectional Transformers," *arXiv preprint arXiv:2003.04987*, 2020.