

AI-Powered University ChatBot

Motivation/problem statement

- An optimized university chatbot efficiently addresses FAQs about admissions, programs, and campus life, streamlining communication and saving staff time.
- By integrating this innovative solution, the university showcases its dedication to embracing modernity, accessibility, and student-focused services, thereby drawing in and retaining a diverse student population.
- **Problem Statement**

Currently, many universities rely on traditional methods such as phone calls, emails, and in-person consultations to manage inquiries. These methods are time-consuming, require significant human resources, and are prone to delays, especially during peak times such as admission periods or the start of new semesters. Additionally, these traditional methods do not provide 24/7 support, limiting accessibility for international students and those in different time zones.

Objectives

- Increase user engagement on the university website through an integrated chatbot, offering comprehensive information about academic programs, campus life, and contact details to prospective students.

Sub Objectives:

- Creating the architectural framework and wireframing the project from inception, with a focus on front-end development.
- Incorporating Gemini API Key for Real-Time Dynamic Response Generation
- Enhance Chatbot Performance through Predefined Prompt Utilization
- Implementing Scalability in the Chatbot Model Based on Latency, Accuracy, and Error Management Parameters.
- Deploying the Chatbot Model and checking Efficiency of the model.

Literature survey of Journal paper 1

PAPER TITLE: A Conversation-Driven Approach for Chatbot Management [1]

G. A. Santos, G. G. de Andrade, G. R. S. Silva, F. C. M. Duarte, J. P. J. D. Costa and R. T. de Sousa, "A Conversation-Driven Approach for Chatbot Management," in *IEEE Access*, vol. 10, pp. 8474-8486, 2022.

OBJECTIVE: The paper introduces the Chatbot Management Process (CMP) to improve user experiences with chatbots by effectively managing and evolving their content. Through implementing and managing the chatbot, the study validates CMP, aiming to enhance the chatbot's content through human-supervised analysis of user interactions.

METHODOLOGY: The methodology consists of three phases: manage, build, and analyze. In the manage phase, tasks like implementation and data analysis are conducted. The build phase involves updating chatbot content based on user interactions, while the analyze phase evaluates user satisfaction and chatbot performance. Clear roles are assigned to the chatbot team to ensure a systematic content management approach.

INFERENCE: The application of CMP on Evatalk resulted in reduced human hand-off rate, increased knowledge base examples, and stable or improved user satisfaction. This showcases CMP's effectiveness in improving chatbot performance and user experiences, underscoring the significance of human supervision in content management to address scalability, usability, and knowledge acquisition challenges

Literature survey of Journal paper 2

PAPER TITLE: Advanced NLP Models for Technical University Information Chatbots: Development and Comparative Analysis [2]

G. Attigeri, A. Agrawal and S. V. Kolekar, "Advanced NLP Models for Technical University Information Chatbots: Development and Comparative Analysis," in *IEEE Access*, vol. 12, pp. 29633-29647, 2024.

OBJECTIVE: The paper aims to solve the problem of accessing accurate university information for prospective students by introducing a chatbot on university websites. This chatbot, using advanced NLP models, offers round-the-clock assistance, ensuring students get precise information easily.

METHODOLOGY: The methodology comprises implementing and comparing five chatbot models using diverse technologies like neural networks and TF-IDF vectorization. It involves meticulous question preparation, semantic analysis, and processing queries of varying complexity. Integration of NLP and machine learning optimizes performance, with a comparative analysis guiding the selection of suitable technologies based on accuracy and scalability.

INFERENCE: Neural network-based models, particularly Hercules using sequential modeling, outperform TF-IDF and pattern matching. These chatbots offer accurate assistance 24/7, promoting reliance on trustworthy sources in counseling.

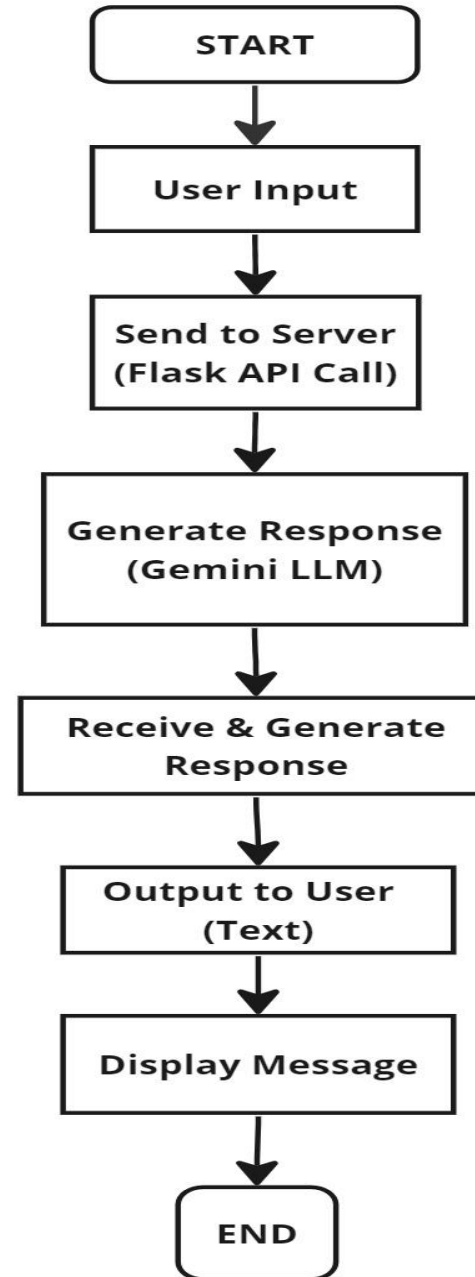
Summary of literature survey

| Paper Details Author & Year | Title | Problem Addressed | Methodology/Tools used | Final Outcomes | Gaps identified |
|-------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Prabha M, Saraswathi P , KaruppasamyM, JansiRani M , Dharshana V, Gomathi Keerthana R S. [2023] | Student Chabot for University Admission using Artificial Intelligence [3] | The inefficiencies of the traditional university admission process by introducing a chatbot that streamlines inquiries, saving time and resources for both students and administrations. | It utilizes a JSON database and Flask web application framework, along with HTML, CSS, and JavaScript for user interaction. | Provides users with 24/7 accessibility, quick responses, and personalized information, thereby enhancing the efficiency of the admission process. | Scalability, robustness, feedback mechanisms, comparative analysis, ethical considerations. |
| Bhavika R. Ranoliya , Nidhi Raghuwanshi, Sanjay Singh. [2017] 16-08-2024 | Chatbot for University Related FAQs [4] | The paper proposes a university-specific chatbot to address the inefficiency of traditional customer service methods by providing efficient and accurate responses to user queries. | AIML, Latent Semantic Analysis, general queries, welcome messages, pattern matching, template-based responses, similarities between words, specific service-based questions. | Implemented chatbot, virtual assistant, university-related FAQs, prompt, accurate responses, queries, admission processes, university services, academic information, campus activities, user experience, relevant information | Potential gap: Lack of detailed evaluation or user feedback on the chatbot's effectiveness and satisfaction, alongside a suggestion for future research on incorporating LSA with AIML to improve natural language processing |

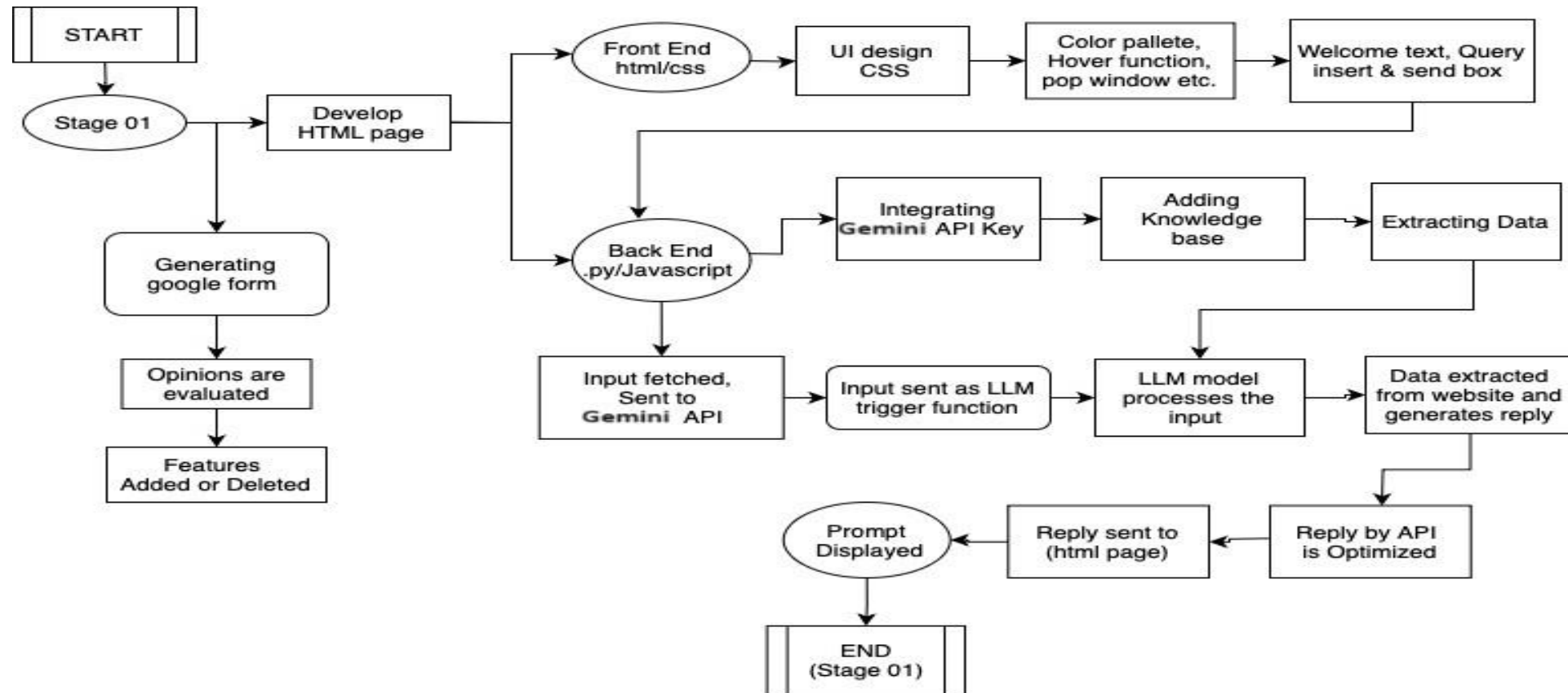
Summary of literature survey (cont..)

| Paper Details Author & Year | Title | Problem Addressed | Methodology/Tools used | Final Outcomes | Gaps identified |
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| Ashlin Deepa R N, Sai Sravya Thumati, Sandhya Reyya. [2022] | An Efficient Deep Learning Based Chatbot for GRIET [5] | The paper addresses the need for a chatbot solution to efficiently provide users with relevant information about GRIET amid challenges in accessing information on the institute's website, particularly during the pandemic. | Using deep learning techniques and text preprocessing, with data collection, organization, employing NLTK in Python for preprocessing, and Deep Neural Network architecture with ReLU activation, L2 regularization, and SGD optimizer. | GrietBot's 86% training accuracy underscores its proficiency in handling user queries and accessing pertinent GRIET information,improving website user experience catering to current students, and anyone interested in GRIET details. | GrietBot's scalability, robustness under varying loads, handling complex queries, and user interaction aspects like feedback mechanisms and continuous learning. |
| Sandhya Reyya, Janapriya S, Sarulatha M, Dr .G.R. Hemalakshmi [2023] | College Enquiry Chatbot [6] | The paper addresses the need for an AI chatbot specialized in handling higher education inquiries due to the increasing demand for accessible information in college admissions. | Uses NLP algorithms, particularly Chatterbot, for chatbot development. It adopts a client-server web application model with Flask server managing HTTP requests. Chatbot training is enabled by Chatter Bot's features. | The chatbot efficiently handles college admission queries, course details, eligibility criteria, and streamlines processes for users and administrators, minimizing manual intervention and delivering prompt, accurate responses. | Voice-based interactions, multilingual support, broader information coverage on subjects, placements, scholarships, and improved precision and speed in response predictions. |

AI chatbot Functional Flow chart



Chatbot Development Stages



Specifications of each block

Front End:

- HTML webpage/website.
- Chabot's UI/UX interface using CSS styling.
- Display prompt answer by redirecting the result() function.

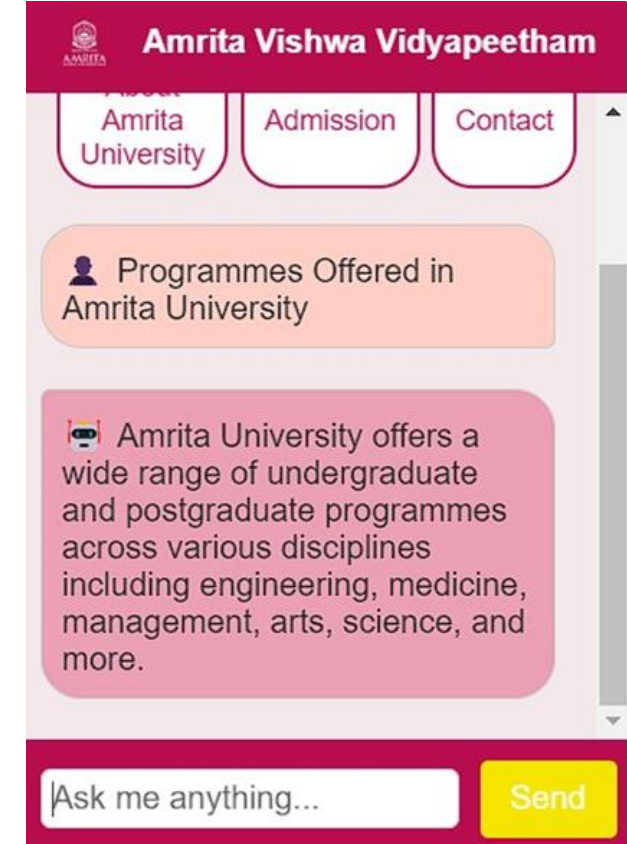
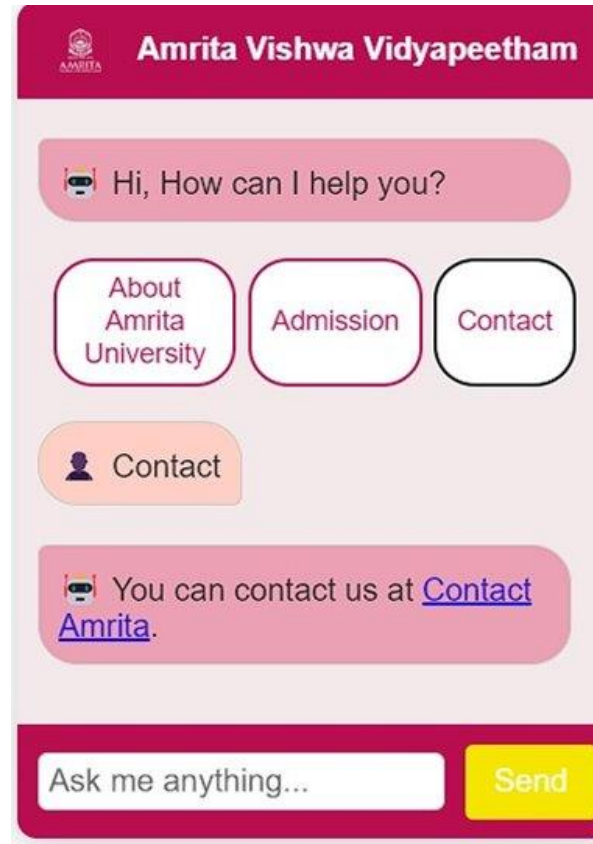
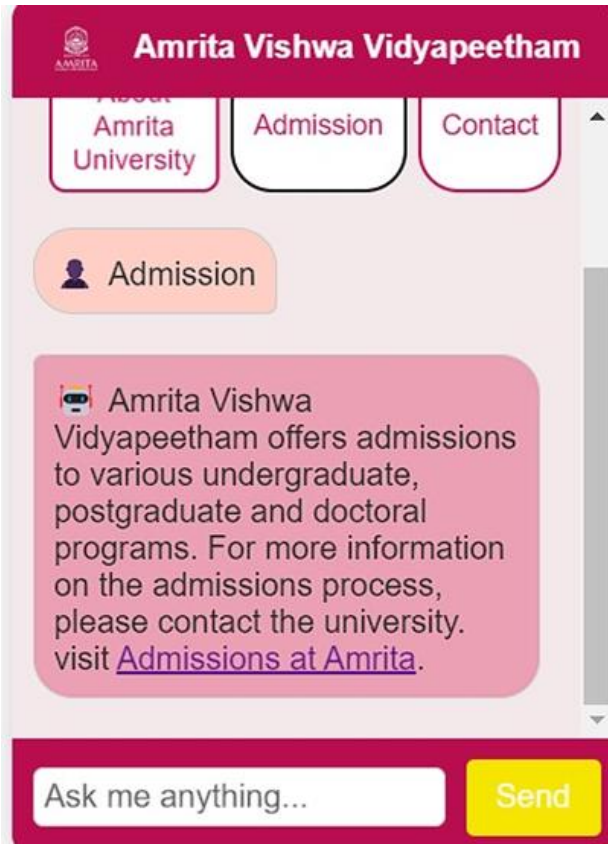
Back End:

- LLM model to process user input

Partial Results and Analysis



Partial Results and Analysis



Partial Results and Analysis

- **1. Predefined Queries:** The chatbot achieves high accuracy and performance for predefined queries, demonstrating a strong understanding of well-defined information.
- **2. New Queries (95% Accuracy):** The chatbot maintains a good level of accuracy (95%) for new queries, indicating its ability to adapt and learn from unseen data.
- **3. Complexity & Latency:** Query processing time (latency) increases noticeably as queries become more complex. This suggests the need for further optimization for handling intricate user requests.
- **4. Performance Correlation:** The project demonstrates a clear correlation between query complexity and response time. Simpler queries result in faster, more accurate responses with minimal latency.
- **5. Optimization Potential:** The findings reveal an opportunity to optimize the chatbot's processing capabilities for handling complex queries while maintaining high accuracy and reducing latency.

Applications

- **Student Admissions and Enrollment:** Answer frequently asked questions (FAQs) about application deadlines, program details, financial aid, and admissions procedures.
- **Current Student Support:** Provide information on course registration, academic resources, financial aid updates, campus events, and important deadlines.
- **Alumni engagement:** Collect updates from alumni, promote alumni events, and facilitate mentorship opportunities for current students.
- **Campus navigation:** Help students find buildings, classrooms, or other resources on campus.
- **Lost and found:** Report lost items and connect students with the lost and found office.
- **Campus news and updates:** Provide students with important announcements and updates from the university.

Conclusion

- 1. User Interface Development: we have successfully developed the UI for the chatbot, allowing users to interact with the system.
- 2. Backend Integration: integrated the backend code with the frontend HTML webpage. This integration will enable seamless communication between the UI and the underlying language model.
- 3. Local Website Cloning: Our next step is to clone the university's website to a local environment & integrate the AI chatbot
- 4. We aim to deliver a robust and user-friendly AI chatbot solution that seamlessly integrates with university's website, providing students, faculty & staff with a valuable resource for accessing information and receiving personalized assistance.

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