EDUCATIONAL CHATBOT USING NLP

Project report

Submitted in Partial Fulfillment of the Requirements for the Award of Degree of

Bachelor of Technology

In

COMPUTER SCIENCE AND ENGINEERING

By

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SASI INSTITUTE OF TECHNOLOGY&ENGINEERING

(Approved by AICTE, New Delhi, Permanently Affiliated to JNTUK, Kakinada, and SBTET-Hyderabad, accredited by NAAC with 'A' Grade and NBA, ranked as "A" Grade by Govt. of A.P., Recognised by UGC 2(f) & 12(B))

Kadakatla, TADEPALLIGUDEM– 534 101

ACADEMIC YEAR 2023-2024

VISION AND MISSION OF INSTITUTE

VISION

Aspire to be a leading institute in professional education by creating technocrats to propel societal transformations through inventions and innovations.

MISSION

1. To impart technology integrated active learning environment that nurtures the technical & life skills..

2.To enhance scientific temper through active research leading to innovations & sustainable environment..

3. To create responsible citizens with highest ethical standards..

VISION AND MISSION OF DEPARTMENT

VISION

To elevate the department as a centre of excellence through the delivery of market-driven technologies that catalyse transformative impact on society.

MISSION

1. To provide comprehensive training to students in emerging technologies, with a specific focus on facilitating a smooth transition from concept to product development.

2. To create a research-friendly environment that sets the stage for innovations.

3. To produce professionals with a sense of strong values and ethics

PROGRAM OUTCOMES (POs)

Students in the Computer Science and Engineering program should, at the time of their graduation be in possession of:

PO1.Engineering Knowledge:

Apply knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2.Problem Analysis:

Identity, formulates, research literature, and analyses complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3.Design/ Development of Solutions:

Design solutions for complex engineering problems and design system components or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.

PO4. Conduct investigations of complex problems:

Using research-based knowledge and research methods including design of experiments, analysis, and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5.Modern Tool Usage:

Create, select and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6.The Engineer and Society:

Apply to reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional engineering practice.

PO7.Environment and Sustainability:

Understand the impact of professional engineering solutions in societal and environmental contexts and demonstrate knowledge of and need for sustainable development.

PO8.Ethics:

Apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practice.

PO9. Individual and Team Work:

Function effectively as an individual, and as a member or leader in diverse teams and multidisciplinary settings.

PO10.Communication:

Communicate effectively on complex engineering activities with the engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations and give and receive clear instructions.

PO11. Project Management and Finance:

Demonstrate knowledge and understanding of engineering and management principles and apply these to one's work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12. Life-long Learning:

Recognize the need for and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

1. Graduates will enhance workplace contributions by creating sophisticated computer applications that address the dynamic requirements of society.
2. Graduates will be research oriented and industry ready professionals with a sense of intellectual and social commitment.
3. Graduates will be highly professional with unquestionable integrity and ethics

COURSE OUTCOMES (COs)

CO1. Design and develop conversational interfaces with AI to eliminate the need for human intervention.

CO2. Collect and Generate ideas through literature surveys on current research areas which help to analyse and present to impart knowledge in different fields.

CO3. Impart knowledge of software & hardware to meet industry perspective needs and standards.

CO4. Create interest to research innovative ideas as lifelong learning.

CO5. Ability to work with a team, and enrich presentation and communication skills.

CO6. Create a platform that makes students employable.

EXPECTED OUTCOMES

PROGRAM OUTCOMES (POs)

PO1: Engineering Knowledge

PO2: Problem Analysis

PO3: Design/Development of Solutions

PO4: Investigate complex problems

PO5: Modern Tool Usage

PO6: The Engineer and Society

PO7: Environment and Sustainability

PO8: Ethics

PO9: Individual Team Work

PO10: Communication

PO 11: Life-long Learning

PO12: Project Management and Finance

PROGRAM SPECIFIC OUTCOME (PSOs)

1. Apply modern tools to analyze, design and develop computer programs/applications across diverse domains, addressing sustainability issues in society.
2. Ability to work as team in project management by professional communication and ethics

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CERTIFICATE

*This is to certify that the project work entitled "**EDUCATIONAL CHATBOT USING NLP**" is being submitted by **V. GANGA BHAVANI (20K61A05G9), K. MANASA LAKSHMI (20K61A0571), S.VENKATESWARA RAO (20K61A05F3), V. VENKAT SAI ANUHYA (19K61A05G8)** in partial fulfillment for the award of the degree of **BACHELOR OF TECHNOLOGY**, in **Computer Science and Engineering** to JawaharlalNehru Technological University, Kakinada during the academic year 2023 to 2024 is a record of Bonafide work carried out by them under my/our guidance and supervision. The results presented in this thesis have been verified and are found to be satisfactory. The results embodied in this thesis have not been submitted to any other University or Institute for the award of any other degree or diploma.*

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ABSTRACT

The growth of technologies like Artificial Intelligence (AI), Big Data & Internet of Things (IoT), etc. has marked many advancements in the technological world since the last decade. These technologies have a wide range of applications. One such application is “Chatterbot or “Chatbot”. Chatbots are conversational AIs, which mimics the human while conversing & eliminates the need of human by automating mundane tasks. In the study undertaken, we have created a chatbot in education domain & it is named as “College Chatbot”, This chatbot is a web-based application that analyses and understands user's queries and provides an instant and accurate response. Rasa technology is used to construct this chatbot. It's an open-source technology, which uses its two main packages i.e., Rasa Core & Rasa Natural Language Understanding (NLU) in order to build a Contextual AI Chatbot.

NLU is used to infer the intent and to extract the necessary entities from user input & the Rasa Core provides the output by building a probabilistic model with the help of Recurrent Neural Network (RNN). Evaluation of the model is done by getting a confusion matrix and performance measures like Precision, Accuracy & F1 Score which come out to be 0.628, 0.725 and 0.669 respectively on average basis. This chatbot's accuracy, lack of dependability on human resources, 24 x 7 accessibility and low maintenance creates various opportunities for its implementation. This conversational agent can not only be used in educational institutions but also in places where enquiry becomes a tedious task.

Keywords: Chatbot, Artificial Intelligence, Natural Language Processing,Rasa

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With gratitude,

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NOMENCLATURE

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CNN	-	Convolutional Neural Network
TSDR	-	Traffic Sign Detection and Recognition
ADAS	-	Autonomous Driving Assistance System
SVM	-	Support Vector Machine

CHAPTER 1

INTRODUCTION

1.1 PREAMBLE

In the ever-evolving landscape of education, traditional systems face persistent challenges, marked by a lack of personalization, engagement hurdles, and inefficiencies in information delivery. This study

introduces an Educational Chatbot with advanced language processing (NLP) to address problems in traditional education. By using cutting-edge technology, particularly AI, the aim is to create a more engaging and personalized learning experience. The project focuses on enhancing learning, reaching diverse users, and improving existing educational systems. The research will use a careful approach and sophisticated tools to design and implement an interactive Educational Chatbot. The ultimate goal is not just to solve current challenges but to usher in a new era of accessible and engaging learning experiences, fundamentally changing the educational landscape.

1.2 PROBLEM STATEMENT

In the realm of education, traditional systems frequently fall short in providing personalized support and fail to captivate students, resulting in diminished motivation and suboptimal learning outcomes. This Traditional education struggles to give personalized support, especially when students are researching colleges. They face difficulties finding information on admissions, fees, facilities, and more. To solve this, a smart educational chatbot, powered by Natural Language Processing (NLP), is introduced. This chatbot quickly gives students personalized insights about colleges, making research faster and learning more engaging. By using NLP, it aims to create an interactive and tailored learning environment, overcoming the limitations of traditional education and improving the overall educational experience.

1.3 NON-TECHNICAL DERIVATION

1.3.1 **From Manual to Automated**: Helping Rasa College Students

Imagine Rasa College before chatbots: students had to navigate a maze of emails, calls, and visits to the registrar's office for simple questions. Now, let's explore how automation could streamline this process:

1.3.2 Early Days (Paper & Phone):

- Students relied on physical brochures, handbooks, and bulletin boards.
- Questions went through professors, advisors, or administrative staff via phone or in-person.

1.3.3 Introducing Technology (Websites & Email):

- A college website provided basic information (course descriptions, deadlines)
- Email allowed students to directly contact specific departments.

1.3.4 The Rise of Chatbots (Automated Assistance):

- A chatbot becomes a virtual assistant on the college website (24/7 availability).
- Students can ask questions in a chat window and receive instant answers

1.4 EXISTING METHODOLOGY

In the existing system, if any student wants any information like College admissions, How many branches in college, Hostel fee structure, College fee structure, How many seats available for specific branch, About college environment, Available Specializations in a department like Data Science, Machine Learning in CSE , Infrastructure of college like labs, library, College placements, Internships and college professors, Special events that occur in our college i.e. college fests, College extra circular activities updates like annual day, sports events, technical events, Achievements of college, NIRF Ranking, Naas rating to college etc.., they have to go to the collage and meet the collage admin to know the all information about collage and fecilities after that they have to go to the admissions. This is the time taking process also performance decreases.

Drawbacks

- Complex user interface. Making user difficult to recognize the operations
- Late response to user due to highly dumped data set
- More processing time to process huge data

1.5 UNADDERSSED CHALLENGES

Identifying these challenges helps understand how the proposed method of an

Educational Chatbot with NLP capabilities aims to address them. Here no one implemented chatbots with RNN with Porter Stemming algorithms in machine learning.

1.5.1 Lack of Personalization

Traditional systems often offer a one-size-fits-all approach, failing to personalize learning experiences based on individual student needs, preferences, and learning styles.

1.5.2 Engagement Issues

Users frequently face challenges in staying engaged due to monotonous teaching methods or lack of interactive learning opportunities.

1.5.3 Inefficient Information Retrieval

Accessing specific and immediate information about colleges, courses, admission processes, or educational resources can be time-consuming and challenging.

1.5.4 Limited Accessibility

Not all students have equal access to quality education due to geographical, financial, or physical constraints. The goal is to create an intelligent, user-friendly system that addresses the limitations of traditional educational systems.

1.6 PROPOSED METHODOLOGY

The proposed system leverages the best of both rule-based and neural network-based approaches by integrating them into the Rasa framework. By combining rule-based engines and neural network-based models, the chatbot is capable of delivering user-like conversations while maintaining control and transparency over the conversational flow. Additionally, the system utilizes stemming algorithms in machine learning, such as the Porter stemming algorithm, to normalize words and retrieve their base forms, enhancing the understanding of user inputs.

With the implementation of a web-based chatbot, students can conveniently access information about the college and its facilities anytime and anywhere with an internet connection. This eliminates the need for students to physically visit the college to obtain information, streamlining the process and improving accessibility.

Furthermore, the system benefits from reduced training time by utilizing pre-

trained neural network models and applying transfer learning techniques. By leveraging pre-existing knowledge and fine-tuning models for specific tasks or domains, the system can quickly adapt to new environments and deliver efficient performance.

Overall, the proposed system offers an advanced and efficient solution for providing information to students about college facilities. By combining various technologies and methodologies, including Rasa, stemming algorithms, and pre-trained neural networks, the system delivers a seamless and user-friendly experience while minimizing training time and maximizing accessibility.

1.7 AIM OF THE PROJECT

The aim of this proposed work is to design, develop, and implement an Educational Chatbot integrated with Natural Language Processing (NLP) capabilities and RNN with Porter Stemming algorithm in machine learning to revolutionize the educational experience.

The goal is to create an intelligent, user-friendly system that addresses the limitations of traditional educational systems by providing personalized assistance, enhancing engagement, and offering efficient access to educational resources and information.

1.8 OBJECTIVE OF THE PROJECT

It revolutionize learning experiences by providing personalized, accessible, and engaging educational support. By harnessing NLP, such chatbots aim to offer learners instant access to educational content, explanations, and resources in a conversational manner, thereby enhancing comprehension and retention. These chatbots adapt to individual needs and preferences, delivering tailored learning experiences while promoting continuous engagement and motivation through interactive elements and gamification. The objectives of the project are

- Here we are implementing chatbots by RNN with Porter Stemming algorithms in machine learning that accurately understands student queries related to colleges and universities.
- Develop a comprehensive knowledge base containing information on college admissions, fees, facilities, student life, and other relevant details.

- Design a user-friendly and intuitive web interface for the chatbot that provides a seamless and engaging user experience for students.
- Conduct user testing and feedback analysis to refine the chatbot and ensure its effectiveness in meeting student needs.

1.9 SIGNIFICANCE OF THE WORK

The significance of the proposed system lies in its ability to address several key challenges and improve the overall experience for students seeking information about college facilities:

1.9.1 Accessibility

By implementing a web-based chatbot, the system ensures that students can access information about college facilities anytime and anywhere with an internet connection. This enhances accessibility for students who may not have the means or time to physically visit the college.

1.9.2 Efficiency

The system streamlines the process of obtaining information by eliminating the need for students to go to the college and interact with administrative staff. Instead, they can quickly and easily access the information they need through the chatbot, saving time and effort.

1.9.3 Enhanced User Experience

With the integration of Rasa framework and stemming algorithms, the chatbot is capable of delivering user-like conversations and understanding natural language inputs more effectively. This results in a more intuitive and engaging user experience for students.

1.9.4 Reduced Training Time

Utilizing pre-trained neural network models and transfer learning techniques reduces the time required to train the system. This allows for faster deployment and adaptation to specific domains or use cases, improving efficiency and time-to-market.

1.9.5 Scalability

The proposed system can easily scale to accommodate a large number of users and handle a wide range of inquiries about college facilities. This

scalability ensures that the system can effectively meet the needs of students, even during peak periods.

Overall, the proposed system represents a significant advancement in providing information to students about college facilities. By leveraging cutting-edge technologies and methodologies, the system offers a more accessible, efficient, and user-friendly solution, ultimately enhancing the overall experience for students.

1.10 APPLICATIONS OF THE PROJECT

The project involving the development of an Educational Chatbot with NLP capabilities has a wide range of applications across various educational settings and user groups. The stemming algorithms will play a vital role in this chatbot with machine learning alogorithms like RNN. Some of the key applications includes the following are

1.10.1 Student Support and Assistance

Providing personalized learning support to students by offering explanations, resources, and guidance on academic topics and assignments, Assisting students in exam preparation, solving queries related to coursework, and offering study tips and materials.

1.10.2 College and Course Information

Offering immediate access to comprehensive information about colleges, admissions requirements, fees, available courses, and specialized programs, Assisting students in making informed decisions about their educational pathways, majors, or career choices.

1.10.3 Teacher and Educator Assistance

Providing resources, lesson plans, teaching aids, and suggestions for classroom activities to support educators in lesson preparation and delivery, Assisting educators in answering queries related to teaching methodologies, subject-specific information, or classroom management.

1.10.4 Parental Guidance and Support

Offering information to parents about their child's educational progress, school-related queries, educational methodologies, and ways to support their children's learning at home, providing resources and guidance on educational strategies for parents to facilitate

their child's learning journey. This will provide all resources like guiding the students like a parent and make student to choose a good path for their career.

1.10.5 Continuing Education and Lifelong Learning

Offering access to a wide range of courses, resources, and information for lifelong learners interested in self-improvement, skill development, or exploring new subjects, Catering to individuals seeking continuous learning opportunities regardless of age or educational background.

1.10.6 Administrative and Institutional Support

Assisting educational institutions in disseminating information about policies, events, academic calendars, and administrative procedures, providing support in managing inquiries from students, parents, and staff regarding various institutional matters.

1.10.7 Specialized Educational Programs and Support Services

Offering support and guidance for specialized educational programs, including language learning, special needs education, vocational training, and career counseling, Providing resources and information tailored to specific educational needs or programs.

1.10.8 Accessible Learning for Diverse Demographics

Enabling accessibility to education for individuals in remote areas or with limited access to traditional educational resources, catering to diverse learner demographics, including individuals with disabilities, by providing adaptable and inclusive learning materials and resources.

1.11 INITIAL ASSUMPTIONS

In the initial stages of a project involving the development of an Educational Chatbot with NLP capabilities, certain assumptions might be made to establish a foundational understanding and direction for the project. Here are some initial assumptions that could be

1.11.1 Access to Relevant Data Sources

Assuming access to comprehensive and accurate educational data sources, including

information about colleges, courses, admission requirements, educational materials, and relevant databases required to train and develop the chatbot's knowledge base.

1.11.2 Availability of NLP Tools and Frameworks

Assuming the availability of suitable Natural Language Processing tools, libraries, and frameworks that facilitate language understanding, processing, and generation for the development of the chatbot's conversational abilities.

1.11.3 User Engagement and Adoption

Assuming a positive reception and engagement from users (students, educators, parents, etc.) regarding the utilization of the Educational Chatbot, fostering active participation, feedback, and willingness to interact with the system.

1.11.4 Ethical and Legal Compliance

Assuming adherence to ethical guidelines and legal compliance concerning data privacy, user consent, and responsible AI usage throughout the development and deployment of the Educational Chatbot.

1.11.5 Feasibility of Integration

Assuming the feasibility of integrating the Educational Chatbot into existing educational systems or platforms, allowing for seamless interaction and compatibility with diverse educational environments.

1.11.6 User Interface and Experience

Assuming the successful design and implementation of an intuitive and user-friendly interface for the chatbot, ensuring ease of navigation, clarity of instructions, and a pleasant user experience.

1.11.7 Learning and Adaptability of the Chatbot

Assuming the chatbot's ability to learn from user interactions, adapt to diverse user queries, improve its responses over time, and continuously enhance its knowledge base through iterative learning processes. It outlines the procedures and file types that apps may utilize to communicate and request data.

1.11.8 Technical Infrastructure

Assuming the availability of necessary technical infrastructure, such as servers,

databases, and computing resources required for the development, deployment, and maintenance of the Educational Chatbot system.

1.11.9 Communication and Collaboration

Assuming effective communication and collaboration among the project team members, stakeholders, and relevant parties involved in the development and implementation of the chatbot. The implementation of this Educational Chatbot system and its development, deployment and maintenance were done by these parties. It involves machine learning, problem-solving, natural language understanding, and perception.

1.12 LIMITATION OF THE WORK

- The chatbot's web-based nature necessitates consistent internet connectivity for users to access information, which may limit accessibility in areas with poor connectivity.
- Despite advanced natural language understanding capabilities, the chatbot may struggle with accurately interpreting complex queries or providing precise responses, leading to user frustration or misinformation.
- Regular updates and maintenance are essential to ensure the chatbot remains up-to-date with accurate information about college facilities, and failure to do so may result in outdated or incorrect responses being provided to users.

1.13 ORGANIZATION OF THE REPORT

The remainder of the chapter is laid out as follows.

Chapter-1: This chapter provides an introduction, problem statement, project goal, methodology, work significance, and conclusion.

Chapter-2: This chapter offers a review of the literature as well as a comparison of several methods.

Chapter-3: This chapter provides System Requirements such as Hardware Tools, Communication Interfaces, and Software/Hardware Requirements.

Chapter-4: This chapter consists of System design, including System Architecture

Chapter-5: This chapter contains the implemented and how it will be approach of the project.

Chapter-6: This chapter provides experimental results, project outcome and comparison with the existing approaches.

Chapter 7: This chapter provides conclusion and future enhancement of the project.

1.14 SUMMARY

This chapter includes a brief introduction to an overview of the project. And this chapter deals with the identifying problem statement, estimating the objective of the project, a brief introduction about the methodology used in the project, the significance of the project, organization of the project which includes the output of every chapter introduction. The next chapter is the literature review which discusses various journal papers to obtain the specific problem statement by analyzing all the relevant work and information mentioned in that reference paper to understand the present problem statement existing in that area

CHAPTER 2

LITERATURE SURVEY

2.1 PREAMBLE

The purpose of the literature survey is to obtain a clear understanding of the existing problem in the particular area of the domain. By clearly understanding all the previous development and their works will provide the best way to obtain the perfect problem statement existing in the present situation.

The following section summarizes the history and methods of those works which are done previously, highlighting the strengths and weakness of each method. In the literature survey, several methods had been proposed for Chatbots. Among the most recently published works are those presented as follows:

2.2 RELATED WORK

The implementation of this Educational Chatbot is done based on the papers which are described below. These papers are all about the chatbots which were already implemented and are very helpful in many sectors.

The Chen li *et al* [1] introduced as a humanized task-oriented dialogue system for industrial robots. The system is designed to assist with manufacturing tasks and enhance user experience. It incorporates conversation strategies and small talk principles for natural and engaging interactions. The document presents the IRWoZ dataset, which is the first industrial-oriented dialogue corpus. The core algorithm for the dialogue system is likely based on pre-trained language models and transformer architectures, as is common in many modern natural language processing (NLP) applications. Future work includes expanding the IRWoZ dataset to cover more industrial domains and tasks and coherence

of dialogues generated by ToD4IR. Finally, the system holds promise for improving human-robot interactions in manufacturing settings through natural and task-oriented dialogue [1].

The another author Liang Zhang *et al*[2] proposed a model that combines retrieval-based and generation-based methods to improve the fluency and informativeness of chatbot responses. The RP model consists of a prototype selector, a generation-based polisher, and

a polished response filter. The prototype selector retrieves contextually similar prototypes, the generation-based polisher refines the draft response using the retrieved prototypes, and the polished response filter ensures high-quality responses. The paper presents experimental results using a large-scale Chinese dialog corpus, demonstrating that the proposed RP model outperforms both retrieval-based and generation-based models in terms of relevance, establishing a new state-of-the-art relevance score. Overall, the paper provides a novel approach to response generation for chatbots, addressing key challenges in diversity and contextual relevance. The proposed RP model shows promising results in improving the quality of chatbot responses, with potential implications for enhancing user experience in chatbot communication.

Likewise the author Nina Evans *et al*[3] proposed a comprehensive analysis of the role of chatbots in digital business transformation. The research aims to summarize the current state of research on chatbots, identify their role in digital business transformation, and suggest areas warranting further attention. The systematic literature review included 74 high-quality journal research papers, and the findings are organized to provide insights into the research focus, applications, methodologies used, and bibliometric aspects. The research focuses on user perceptions of chatbots, communication, customer service, performance, satisfaction, and learning. It also identifies various applications of chatbots, such as customer service, marketing, and internal processes. The authors employed a rigorous methodology for paper selection, including exclusion criteria based on content, language, quality, and availability of full text. The research impact was assessed using citations and Almetric Attention Score, providing insights into the reach and influence of the included publications. Overall, the paper provides valuable insights for scholars and practitioners, offering a comprehensive overview of the current state of research on chatbots and their implications for digital business transformation. It serves as a valuable resource for identifying research topics, methodologies, influential publications, and publication outlets in the field of chatbots and digital business transformation.

The Sachin Kolekar *et al* [4] and his team from Zeal College of Engineering & Research, Pune, India, presents a comprehensive study on the development of a chatbot system to streamline day-to-day operations in restaurants. The research aims to address the growing need for automation in the restaurant industry to enhance customer satisfaction and improve operational efficiency. The paper discusses the use of IBM Watson's API to create,

train, and deploy AI and ML models for various purposes, with a focus on reducing the workload of restaurant staff. The chatbot system is designed to handle tasks such as ordering, reservations, and FAQs at the reception, thereby allowing the staff to focus on other important aspects of their routine. The study also highlights the use of the Naïve Bayes algorithm to find the most correct answer to user queries by determining the probability of intent. Additionally, the paper outlines the non-functional requirements, performance requirements, safety requirements, and security requirements of the chatbot system.

Similarly the author Xi Yu Leung and Han Wen [5] explores customers' perceptions and behaviors when using chatbots in restaurant takeout orders. The study uses a lab experiment with a 3x2 between-subjects experimental design to compare three ordering methods (phone, online, and chatbot) in quick-service and full-service restaurants. The study finds that phone and online ordering are both better than chatbot ordering in terms of satisfaction and behavioral outcomes. The phone ordering method elicited the best social presence and cognitive attitudes, while the online ordering method generated the highest order amounts. The study also found that chatbot ordering is better suited for use in quick-service restaurants due to their simpler menus. The paper provides valuable insights for restaurant practitioners into designing and adopting chatbots effectively. The study uses statistical techniques such as MANOVA, correspondence analysis, and chi-square test for data analysis.

The author Shubham Parmar *et al*[6] published in the International Journal of Scientific Research in Computer Science and Engineering and Information Technology, Volume 5, Issue 2, March-April 2019, discusses the implementation of an intelligent chatbot system in the hotel industry. The authors present a system that includes three main areas of the restaurant: The Server, the Kitchen, and the Cashier counter, and utilizes wireless technology to connect these areas. The system allows for customizable online food ordering using a web-based application, enabling customers to place orders from their smartphones. Additionally, the system keeps track of customer records, customizes

the menu, and stores updated menu information and order details in a database. The paper emphasizes the use of AI in restaurants to enhance customer service and improve the overall food service experience. It discusses how AI-enabled chatbots can handle tasks such as managing reservations, responding to guest inquiries, and customizing orders, thereby freeing up staff to interact with customers. The authors also highlight the importance of

measuring customer satisfaction in the hotel industry and the need for service providers to understand and meet guests' expectations to achieve maximum satisfaction and build a strong customer base. The paper references various related works, including studies on natural language processing (NLP), natural language understanding (NLU), and natural language generation (NLG). It also discusses the use of AI, deep learning, and machine learning in chatbot development.

The Ranci Ren *et al* [7] published in the International Journal of Scientific Research in Computer Science and Engineering and Information Technology, Volume 10 december-2022 .The paper focuses on evaluating and enhancing the usability of a UML class diagram chatbot (SOCIO V1) through a series of three experiments. The study compares SOCIO V1 with an updated version of Creately, considering usability, effectiveness, and user satisfaction. Involving 87 participants organized into 29 teams, the research adopts a within-subject crossover experimental design. SOCIO V1 exhibits better scores for effectiveness and satisfaction compared to the updated Creately. The study emphasizes the importance of considering user feedback for enhancing real-time collaboration tools.

The Xipei Ren *et al* [8] published in the International Journal of Scientific Research in Computer Science and Engineering and Information Technology volume , 29 June 2020 . The paper introduces Consult AI, a conversational agent assisting occupational health physicians in consultations. An experiment involving eight occupational physicians in a simulated 30-minute consultation explores Consult AI's impact on doctors' workflow and user experiences. The study addresses two main questions: a) How does Consult AI support doctors' workflow? b) How do different chatbot interaction styles influence doctors' experiences? Positive results indicate Consult AI's effectiveness in facilitating information access, guiding consultations, and providing decision-making references. The paper identifies design opportunities, emphasizing the integration of conversational interfaces as unobtrusive collaborators and the need for robust data infrastructure in occupational health services.

The Al-Hanouf *et al* [9] published in the International Journal of Scientific Research in Computer Science and Engineering and Information Technology volume , 06 January 2021. The paper introduces a dialogue system for booking flight tickets in Arabic, combining data-driven and rule-based approaches in a pipeline system architecture. Users can interact with the system using text messages, and the system incorporates a self-feeding

mechanism to continuously improve its performance over time.The study evaluates the system's effectiveness and ease of use through two stages of participant testing. The study identifies and addresses errors made by users, suggesting improvements such as user hints, error message clarity, and integration with existing booking systems. Future plans involve connecting the system with external booking systems, enabling voice message support, and addressing user confusion regarding the system's identity in interactions.

The Vidya Gundlapalli *et al*[10] published in the International Journal of Scientific Research in Computer Science and Engineering and Information Technology volume , 25 May 2021.Automate literature review for COVID-19 research to address workflow challenges of healthcare professionals. Use Domain-Specific Topic Model (DSTM) for latent knowledge patterns, and evidence-based filtering for article classification. Evaluate KnowCOVID-19 effectiveness using CORD-19 dataset. Use of TF-IDF for advanced information retrieval. Extend application to other healthcare areas beyond COVID-19 by adapting the system for various research domains.

The Salvatore *et al*[11] published in the International Journal of Scientific Research in Computer Science and Engineering and Information Technology volume , 16 February 2021. The paper aims to predict the magnitude of future stock price variations for individual companies in the S&P 500 index using a machine learning approach. Feature engineering is performed using the generated lexicons to capture statistical indicators associated with companies and industries. The proposed machine learning approach is designed to be explainable, allowing for an analysis of the white-box behind the classifier. The methodology is considered generalizable and extendable to other stock markets, news sources, or different classifiers. The paper acknowledges limitations and suggests future improvements, including the integration of semantic features and exploration of neural network approaches.

The F. Ohata *et al* [12] published in the International Journal of Scientific Research in Computer Science and Engineering and Information Technology volume 10 , 1 October 2022. Modular pipeline based on natural language processing (NLP) and machine learning (ML) methods. Combinations of text feature extraction methods and learning algorithms using real-world data to obtain the most suitable solution. The existing idea of the paper revolves around the development of a text classification methodology to

assist a technical support system. Pipeline based on natural language processing (NLP) and machine learning (ML) .

The Silvia T. Acuna *et al* [13] published in the International Journal of Scientific Research in Computer Science and Engineering and Information Technology volume 10,10 May,2022. The methodology used in the study follows the guidelines of the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) framework. The paper presents a systematic mapping study that critically analyzes 90 primary studies from five different aspects related to text generation using deep neural network models. Text generation using deep neural network models. It identifies a wide variety of languages that have been the focus of text generation research, including Chinese, Bengali, Arabic, Russian, Korean, Slovak, Spanish, Czech, German, and Macedonian

The Qinghua Zheng *et al* [14] published in the International Journal of Scientific Research in Computer Science and Engineering and Information Technology volume 7, 25 April 2020. The paper proposes the use of learning log data and visual analytics techniques to investigate the impact of learner support services on student engagement in online learning environments. The paper investigates the impact of learner support services on student engagement in online learning environments. Impact of learner support services on student engagement in online learning environments. It discusses the use of two online learner support services and their impact on student. It identifies significant differences in student engagement based on the usage of online learner support services, indicating that students who used these services were more engaged in online learning.

The Paula Maddigan *et al* [15] proposed the study focuses on using Large Language Models (LLMs) to convert natural language queries into data visualizations (NL2VIS).It confirms that LLMs are effective in this NL2VIS task when supported by well-engineered prompts. It provides an overview of the paper's structure and organization. These LLMs are pre-trained deep learning models based on transformer architectures. Future research could focus on conducting user studies and obtaining feedback from end-users to assess the real-world usability and user-friendliness of NL2VIS systems like Chat2VIS.

The above contains all information about all types of chatbots. Here we are providing all the important data that gives simple and clear idea about the papers. Now there are some comparison tables below to know all about the chatbots and its related types. These chatbots

are very popular in these days for helping the users by giving instant responses. It identifies significant differences in student engagement based on the usage of online learner support services, indicating that students who used these services were more engaged in online learning. The comparison tables are described below. These tables contains comparison of methods used in various chatbot implementation, Existing systems, Unique findings and Features.

2.3 COMPARISON TABLES

2.3.1 Methods and Accuracy

TABLE 2.1: METHODS/ALGORITHMS AND ACCURACY

Sno	Authors and Year	Method/Algorithm	Accuracy
1.	Xiaochun Zhang et al [2022]	RNN	78.0
2.	Yan Yang et al [2023]	LSTM	77.0
3.	Nina Evans et al [2021]	SLR Method	65.0
4.	Nancy Tyagi et al [2021]	Naïve Bayes	69.0
5.	Han Wen et al [2023]	DNN	64.0
6.	Megha Meshram et al [2023]	RNN	73.0
7.	Silvia T. Acuña et al [2022]	RNN	75.6
8.	Gabriele Spina et al [2023]	LSTM	79.0
9.	Al-Hanouf et al [2021]	LSTM	78.0
10.	Vidya Gundlapalli et al [2021]	DSTM	67.0
11.	Sergio Consoli et al [2021]	Random Forest	60.5
12.	Fatima, Noureen et al [2022]	RNN	77.0
13.	Ohata et al [2022]	NLP pipeline	72.7
14.	Qinghua Zheng et al [2023]	DB SCAN	76.7
15.	Maddigan et al [2023]	CNN	75.0

The above table is all about the methods and algorithms used in all reference papers.The RNN means Recurrent Neural Network, LSTM means Long-Short Term Memory, SLR means System Literature Review Method, CNN means Convolutional Neural Network, DNN means Deep Neural Network and DBSCAN means Density-Based Spatial Clustering of Applications with Noise and also Random Forest, Naïve Bayes NLP pipeline are used.

2.3.2 Existing Solutions and Unique Findings

TABLE 2.2: EXISTING SOLUTIONS AND UNIQUE FINDINGS

Authors	**Existing solutions**	**Unique Findings**
Xiaochun et al [2022]	pre-trained language models like gpt2, gpt2-large, gpt2-xl.	a task-oriented dialogue system for industrial robots, and IRWoZ dataset.
Yan et al [2023]	Manual processes, static web interfaces	Uncovers chatbots' underutilized potential for digital transformation
Nina et al [2021]	Chatbot frameworks such as Microsoft Bot Frameworks was used for educational chatbots	Capable of handling misspellings and lack of diacritics in Vietnamese
Nancy et al [2021]	IBM Watson Assistant, Microsoft Bot Framework	Voice-Activated Systems, Integration with IoT Devices
Han et al [2023]	Restaurant chatbot-like mobile apps or websites to facilitate online ordering, reservations.	augmented reality (AR) or virtual reality (VR), Contactless Ordering and Payment
Megha et al [2023]	Wireless Technology Integration, Online Food Ordering System	Integration of Chatbot in Three Restaurant Areas
Silvia et al [2022]	SOCIO V1 incorporates natural language communication with web-based tool.	positive feedback for quick responses.
Spina et al [2023]	Integrating ConsultAI into occupational health services,	contributes insights into integrating conversational interfaces.
Al-Hanouf et al [2021]	Wit.ai is a platform that allows developers to integrate NLP into their applications.	A combination of data-driven and rule-based approaches.
Vidya et al [2021]	The document presents an evaluation of KnowCOVID-19	Effective Evidence-Based Filtering, Crowdsourcing and

	using the CORD-19 dataset.	Social Filtering Enhancements.
Sergio et al [2021]	Machine Learning model using Decision Trees to predict stock price variations.	model explainability, and competitive evaluation
Fatima et al [2022]	text generation in the English language has been more exploited in literature than in any other language	text generation using deep neural network models

The table covers a range of topics in natural language processing and technology applications. It discusses the use of pre-trained language models like GPT-2 in task-oriented dialogue systems and emphasizes chatbots' transformative potential in digital processes. Examples include educational chatbots, restaurant applications, and integration with wireless technologies. The table also touches on conversational interfaces in occupational health services, NLP integration using Wit.ai, and evaluates KnowCOVID-19 with the CORD-19 dataset. Additional topics include machine learning for stock price prediction, text generation in English literature, TF-IDF representation, and strategies for enhancing student engagement in online learning environments. The overall focus is on showcasing the diverse applications and advancements in natural language processing technologies. Overall, the table paints a rich tapestry of applications and advancements in the field, showcasing the multifaceted nature of natural language processing technologies.

2.3.3 Features Comparison

TABLE 2.3. SUMMARY OF FEAUTURES USED

AUTHOR	**Real-time Feedback**	**Progress Tracking**	**24/7 Availability**	**Career Guidance**	**Multilingual Support**
Xiaochun et al [2022]	✓	✓	×	✓	×
Yan et al [2023]	✓	✓	×	×	×
Nina et al [2021]	✓	✓	×	×	×
Nancy et al [2021]	×	×	×	✓	×
Han Wen et al	✓	✓	×	×	×

[2023]					
Megha et al [2023]	✓	✓	×	×	×
Silvia et al [2022]	✓	✓	×	×	×
Gabriele et al [2023]	×	×	×	✓	×
Al-Hanouf et al [2021]	✓	✓	✓	×	✓
Vidya et al [2021]	✓	✓	×	✓	×
Sergio et al [2021]	✓	✓	×	✓	✓
Fatima et al [2022]	×	×	×	×	×
Ohata et al [2022]	×	×	×	×	×
Qinghua et al [2023]	×	×	✓	×	×
Maddigan et al [2023]	×	×	✓	×	×

The above table gives information about all the features needed to implement the chatbots and which features are need to be added to the existing chatbot.

2.4 GAP IDENTIFIED FROM THE LITERATURE SURVEY

The exploration of existing research revealed a gap in educational support tools,prompting the aim to develop an Educational chatbot. This chatbot intends to offer personalized, accessible, and engaging learning support through tailored assistance and interactive conversations. It aims to address the lack of personalized and interactive learning experiences for students, educators, and stakeholders in the educational ecosystem. The objective is to provide personalized learning by adapting to individual needs, foster dynamic engagement through interactive conversations that clarify concepts

and offer real-time feedback, and enhance accessible and efficient learning by tailoring the educational journey for each student. Overall, the literature survey highlighted a need for a more interactive, personalized, and accessible educational support system, leading to the development of the Educational chatbot.

2.5 SUMMARY

The synthesis of a comprehensive literature survey focusing on the educational chatbot domain reveals an array of crucial advancements and challenges in this transformative technology. The analysis spans across a spectrum of publications, each contributing significant insights into the evolution and potential of educational chatbots, symbolizing a pivotal shift in traditional educational paradigms. As educational systems strive for enhanced engagement and personalized learning experiences, the emergence of chatbots stands as a progressive response to these challenges. The exploration of literature underscores the imperative nature of personalized learning experiences, illuminating the limitations inherent within conventional educational systems. Existing methodologies often lack the adaptability required to cater to diverse learning styles and individual needs, necessitating the infusion of innovative solutions to bridge this gap. Emphasis is placed on leveraging Natural Language Processing (NLP) and machine learning techniques, akin to convolutional neural networks (CNNs) in driver fatigue studies, to enhance chatbots' interpretative abilities. These advancements aim to facilitate interactive engagement and adaptive learning experiences within educational settings.

Furthermore, a critical emphasis emerges on the chatbot's role in complementing rather than replacing traditional educational frameworks. Studies advocate for an integrated approach, aiming to augment the efficiency and engagement within established systems. Insights from various papers highlight the significance of breaking barriers to accessibility and empowering learners to navigate their learning journeys autonomously, mirroring the focus on real-time warnings for drivers in fatigue detection studies.

Challenges in the development of intelligent educational chatbots parallel those encountered in fatigue detection technologies, such as accuracy issues in facial recognition or occlusions, urging the need for more nuanced algorithms and robust methodologies. The call for personalized algorithms resonates strongly, echoing the need to address individual variability in learning patterns and preferences. Multi-modal integration, non-intrusive methods, and standardized performance metrics emerge as crucial facets for

comprehensive educational chatbot systems, akin to their significance in fatigue detection systems.

In conclusion, the collective findings emphasize the pivotal role of personalized, multi-modal, and real-time educational chatbots in revolutionizing the educational landscape. Addressing identified gaps can usher in more accurate, and widely accepted educational technologies, fostering a more adaptive, engaging, and personalized learning environment for students across diverse educational settings

CHAPTER 3

SYSTEM REQUIREMENTS

3.1 PREAMBLE

The previous chapter describes about the Literature review related to the various chatbot developed in different ways using NLP with various approaches and the various research papers and journals with their existing solutions and unique findings. This chapter describes the usage of different kinds of tools used and variety of different requirements to develop the proposed system. The chatbot is a web-based application that analyses and understands user's queries and provides an instant and accurate response. This work provides the all information about software tools, hardware tools and different System requirements like software and hardware requirements of the system.

3.2 SOFTWARE REQUIREMENTS

Operating System	: Windows 7/8/10
Programming Language	: Python
Libraries	: Flask, Pandas, Mysql.connector, Os, Smtplib, Numpy
IDE/Workbench	: PyCharm, VS-Code
Technology	: Python 3.6+
Server Deployment	: Xampp Server
Database	: MySQL

3.2.1 Flask

Flask library, which is a popular Python web framework used for building web applications. Flask provides tools and libraries for tasks such as URL routing, request handling, template rendering, and more, making it easier to develop web applications in Python.

3.2.2 Pandas

Pandas is a powerful open-source data manipulation and analysis library for Python. It provides data structures and functions to efficiently manipulate and analyze structured data. With functionalities for data cleaning, merging, and statistical analysis, Pandas is a

cornerstone for data scientists and analysts working with tabular data in Python.

3.2.3 Mysql.connector

Mysql.connector is a Python module that provides a standardized database driver interface for connecting to MySQL database servers. It is used to establish connections, execute SQL queries, and manage database interactions from within Python scripts or applications.

3.2.4 Numpy

NumPy is a fundamental package for scientific computing in Python. It provides support for large, multi-dimensional arrays and matrices, along with mathematical functions to operate on these arrays. NumPy is a fundamental library in the Python scientific computing ecosystem and is often used in conjunction with other libraries like SciPy, pandas, and Matplotlib. NumPy is a fundamental library in the Python scientific computing ecosystem and is often used in conjunction with other libraries like SciPy, pandas, and Matplotlib.

3.2.5 PyCharm

PyCharm itself is an IDE (Integrated Development Environment) used for writing, editing, and running Python code. For Educational Chatbot, PyCharm is just a tool you can use to write the Python code for your project.

3.2.6 VS-Code

Visual Studio Code (VS Code) is a free source-code editor made by Microsoft for Windows, Linux, and macOS. It's widely used in the software development community due to its lightweight yet powerful features, extensive language support, and a vast ecosystem of extensions.

3.2.7 Python 3.6+

Python 3.6+ refers to Python versions 3.6 and higher, including versions like 3.7, 3.8, 3.9, and beyond. When a software or library mentions Python 3.6+, it means that it requires Python version 3.6 or any later version within the 3.x series. Using Python 3.6 or higher is recommended for new projects and for compatibility with the latest features and improvements in the Python language and standard library.

Python is a general-purpose interpreted, interactive, object-oriented, and high-level programming language. It was created with the aid of using Guido van Rossum at some point in 1985- 1990. Like Perl, Python supply code is likewise to be held below

the GNU General Public License (GPL). Python is a high-level, interpreted, interactive, and object-oriented scripting language. Python is designed to be tremendously readable. It makes use of English key phrases often while different languages use punctuation, and it has fewer syntactical buildings than different languages.

- Python is Interpreted – Python is processed at runtime with the aid of using the interpreter. You no longer want to assemble your software earlier than executing it. This is much like PERL and PHP.
- Python is Interactive – You can take a seat down at a Python activate and have interaction with the interpreter immediately to jot down your programs.
- Python is Object-Oriented – Python supports the Object-Oriented style or technique of programming that encapsulates code within objects.
- Python is a Beginner's Language – Python is a great language for beginner level programmers and supports the development of a wide range of applications from simple text processing to WWW browsers to games.
- Characteristics of Python Python is very easy to learn the language as compared to other languages like c, c#, JavaScript, Java, etc.
- Python language is freely available on the official website and you can download it from the www.python.org website.
- It provides very high-level dynamic data records and supports dynamic type checking.
- Portable, Python can run on a wide variety of hardware platforms and has the same interface for all programs.

3.2.8 Xampp Server

Using XAMPP for an educational chatbot can be suitable for certain scenarios, especially if you're developing the chatbot as a web application and need a local server environment to host it. XAMPP is a free and open-source cross-platform web server solution stack package developed by Apache Friends, consisting mainly of the Apache HTTP Server, MariaDB database, and interpreters for scripts written in the PHP and Perl programming languages.

3.3 HARDWARE REQUIREMENTS

Processor	- I5/Intel Processor
RAM	- 8GB (min)
Hard Disk	- 128 GB
Key Board	- Standard Windows Keyboard
Mouse	- Two or Three Button Mouse
Monitor	- Any

3.3.1 Processor (CPU)

The processor should be capable enough to handle real-time processing of chat interactions, video feed processing from the camera, and graphics rendering for SVGA. A modern multi-core processor such as an Intel Core i5 or equivalent AMD processor would be suitable.

3.3.2 Operating System

The chatbot can run on various operating systems, including Windows, macOS, or Linux. Ensure compatibility with the chosen OS and any specific software dependencies.

3.4 SUMMARY

This chapter introduced the software and hardware requirements of the system. The above requirements are required for the successful implementation of the project. Python is the programming language chosen for the implementation of document running based on similarity for better implementation and accurate results using most Jupiter notebooks. A system with the 64-bit Windows operating system and an Intel core Processor device. The hardware requirements are the basic ones that are required for the execution of any regular python script

CHAPTER 4

SYSTEM DESIGN

4.1 PREAMBLE

The process of defining a system's modules, components, interfaces, and data to meet predetermined requirements is known as system design. The goal is to offer comprehensive data and knowledge about the system and its constituent parts.

4.2 INTRODUCTION

In the realm of educational chatbots powered by Natural Language Processing (NLP) and utilizing the Rasa framework, input design holds paramount importance. Input here refers to the queries, statements, or commands users input into the chatbot to seek information, guidance, or assistance regarding various educational topics. Efficient input design in this context revolves around optimizing the chatbot's ability to understand and respond accurately to user queries, thus enhancing the overall learning experience. Key considerations in input design for an educational chatbot include:

- The design should focus on capturing user queries effectively to fulfill their educational needs.
- NLP techniques integrated into the chatbot should enable it to comprehend the semantic meaning of user inputs, allowing for more contextually relevant responses
- Input design should take into account the diverse needs and preferences of users, allowing for personalized interactions.
- Input interfaces should be designed to be intuitive and user-friendly, guiding users in formulating clear and concise queries.
- The input design should incorporate mechanisms for providing feedback to users, such as suggestions for refining their queries or clarifications on misunderstood inputs

4.2.1 Objectives for Input Design

The objectives of input design for an educational chatbot are:

- To design intuitive and user-friendly conversational interfaces for data input.

- To streamline input processes and minimize the volume of input required from users.
- To devise effective methods for capturing user queries and input data.
- To design input interfaces, including chatbot conversation flows, message formats, and input prompts, that facilitate seamless interaction between users and the chatbot, promoting engagement and clarity.
- To implement validation checks and input controls within the chatbot framework

4.2.2 Output Design

During output design, developers focus on tailoring the information presented to users in a manner that effectively facilitates learning and meets their educational needs. Key objectives of output design for an educational chatbot include:

- The output design should deliver information and responses that directly address the user's educational queries or requirements
- Output interfaces should be designed with the end user in mind, ensuring that the information presented aligns with their learning objectives, preferences, and comprehension levels.
- The output design should strike a balance in providing sufficient information to meet the user's needs without overwhelming them with excessive details or content.
- Output should be presented in a format that is conducive to learning and comprehension.
- Output should be delivered promptly to users to support timely decision-making and learning progress.

4.3 ARCHITECTURE

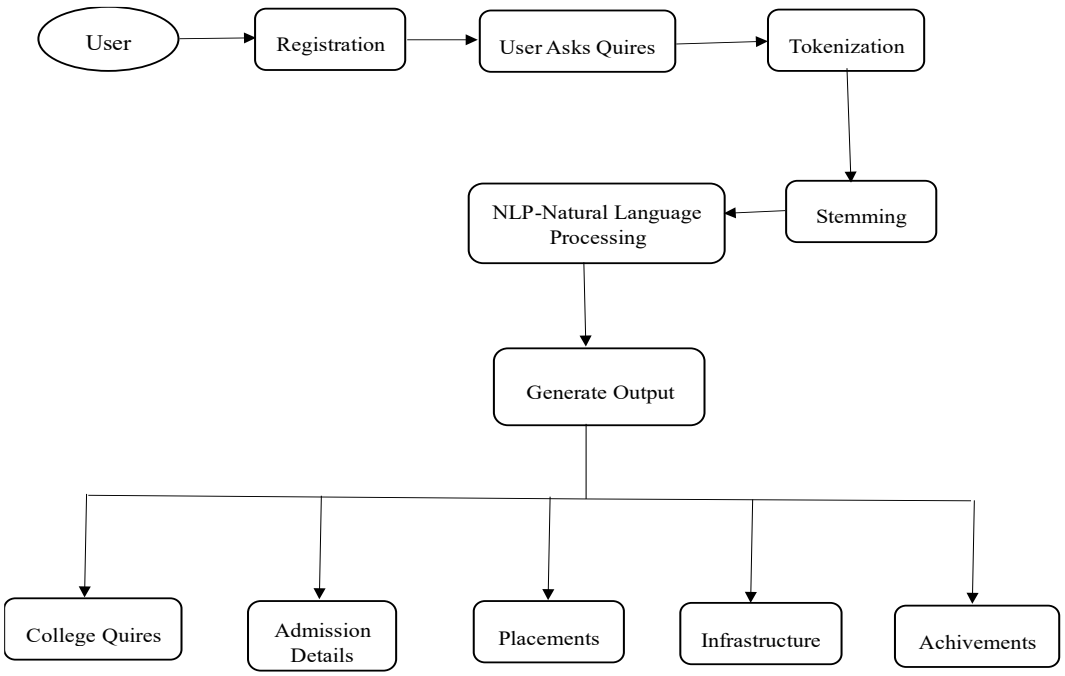


Figure 4.1: Architecture of Educational Chatbot

4.3.1 **User Registration:** The process begins with user registration, where the user presumably creates an account with the system.

4.3.2 **User Queries:** Once registered, the user can then pose college-related queries to the system.

4.3.3 **System Preprocessing:** The system preprocesses the user's query, likely performing tasks such as tokenization (splitting the query into words or phrases) and stemming (reducing words to their base form).

4.3.4 **NLU (Natural Language Understanding):** Next, the NLU component attempts to understand the intent and meaning of the user's query.

4.3.5 **Training:** The NLU model is likely trained on a dataset of college-related queries and corresponding responses.

4.3.6 **Testing:** The system undergoes testing to ensure its accuracy in understanding and responding to user queries.

4.3.7 **RASA Neural Networks:** The system may leverage RASA, an open-source framework for building chatbots, powered by neural networks.

4.3.8 **Output Generation:** Based on the processed query and its understanding of the user's intent, the system generates a response.

4.3.9 **Knowledge Base:** The system appears to rely on a knowledge base that includes information on college placements, infrastructure, environments, achievements, and admission details.

4.3.10 **End:** The process ends with the system delivering its response to the user's query.

Overall, the architecture of Rasa chatbot is modular and flexible, allowing developers to build powerful conversational AI applications that can understand natural language inputs, manage complex dialogues, and provide meaningful responses. It leverages multiple components, including user registration, query preprocessing, natural language understanding, and a knowledge base to deliver its functionalities

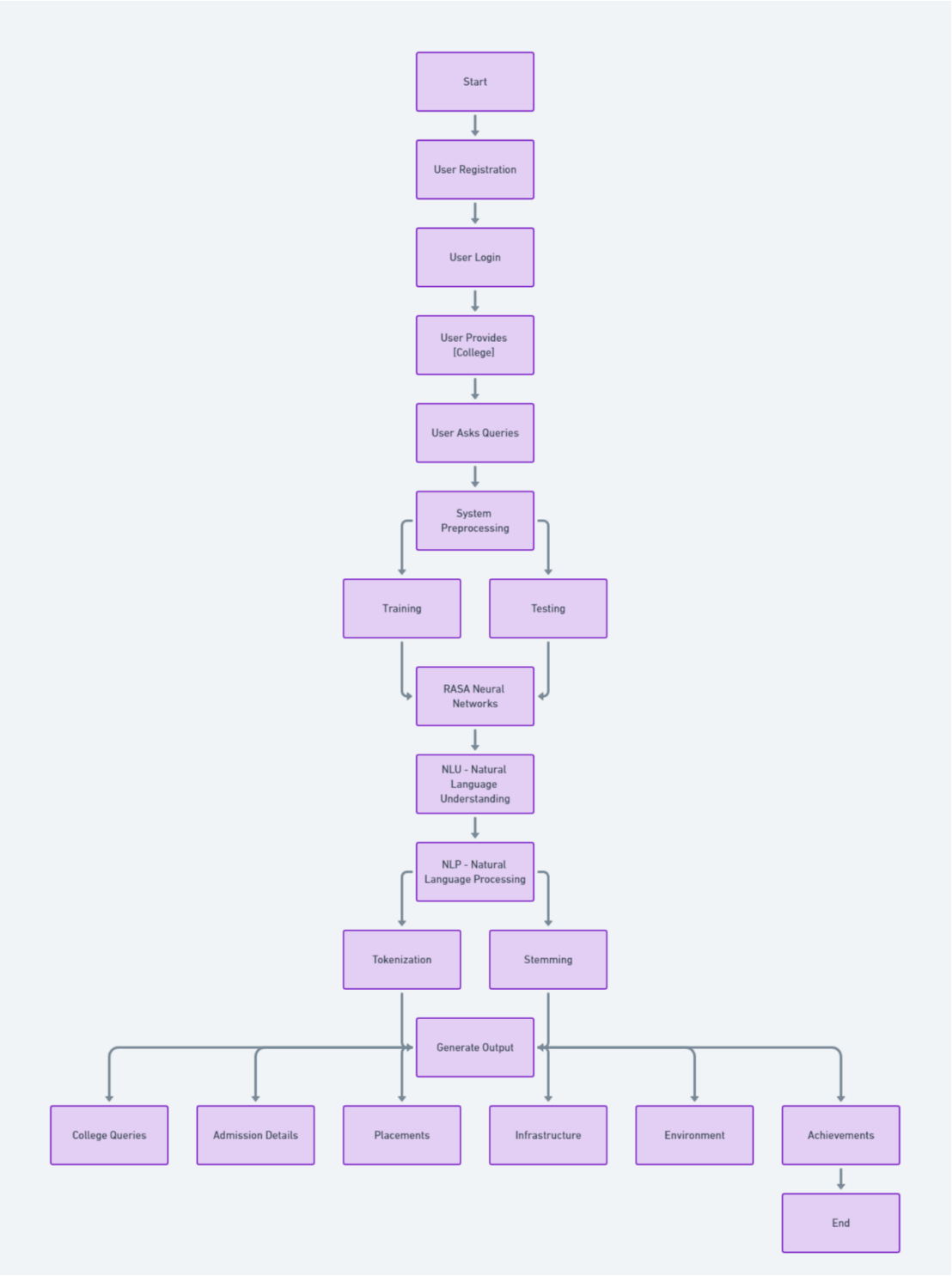


Figure 4.2: Block Diagram of Educational Chatbot

4.4 UML DIAGRAMS

4.4.1 Use Case Diagram

A use case diagram in the Unified Modeling Language (UML) is a type of behavioral diagram defined by and created from a Use-case analysis. Its purpose is to present a graphical overview of the functionality provided by a system in terms of actors, their goals (represented as use cases), and any dependencies between those use cases. The main purpose of a use case diagram is to show what system functions are performed for which actor. Roles of the actors in the system can be depicted.

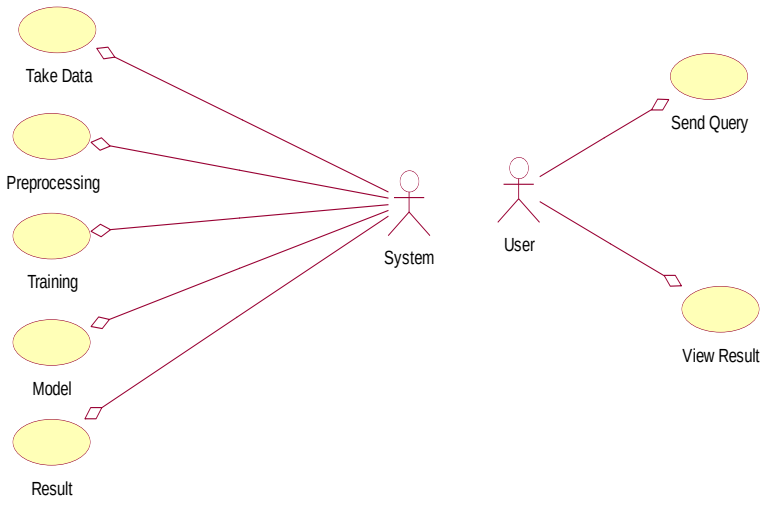


Figure 4.3: Use Case Diagram of Educational Chatbot

4.4.2 Class Diagram

In software engineering, a class diagram in the Unified Modeling Language (UML) is a type of static structure diagram that describes the structure of a system by showing the system's classes, their attributes, operations (or methods), and the relationships among the classes. It explains which class contains information.

Figure 4.4: Class Diagram of Educational Chatbot

4.4.3 Sequence Diagram

A sequence diagram in Unified Modeling Language (UML) is a kind of interaction diagram that shows how processes operate with one another and in what order. It is a construct of a Message Sequence Chart. Sequence diagrams are sometimes called event diagrams, event scenarios, and timing diagrams.

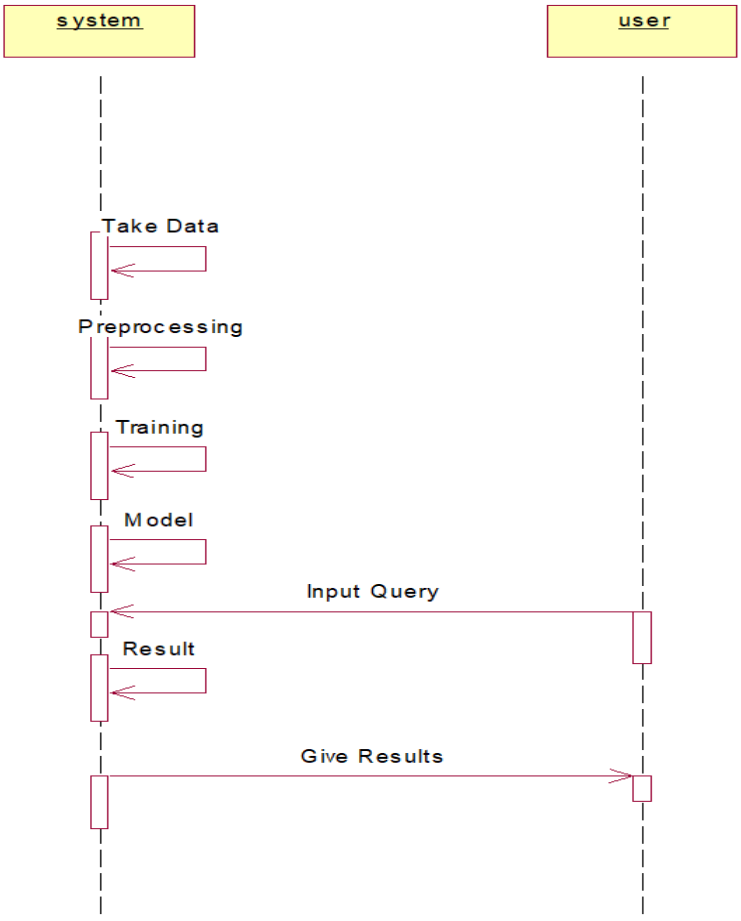


Figure 4.5: Sequence Diagram of Educational Chatbot

4.4.4 Collaboration Diagram:

In collaboration diagram the method call sequence is indicated by some numbering technique as shown below. The number indicates how the methods are called one after another. We have taken the same order management system to describe the collaboration diagram. The method calls are similar to that of a sequence diagram. But the difference is that the sequence diagram does not describe the object organization whereas the collaboration diagram shows the object organization.

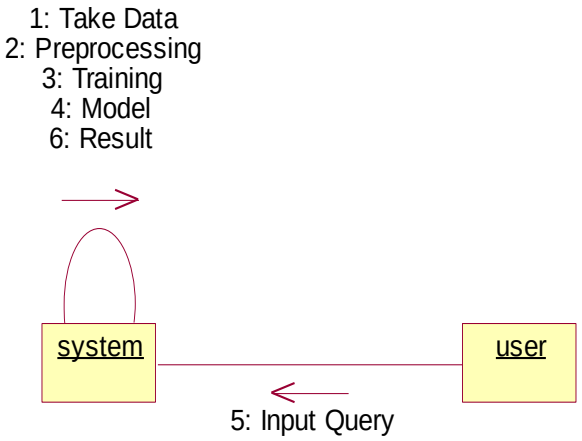


Figure 4.6: Collaboration Diagram of Educational Chatbot

4.4.5 Deployment Diagram

Deployment diagram represents the deployment view of a system. It is related to the component diagram. Because the components are deployed using the deployment diagrams. A deployment diagram consists of nodes. Nodes are nothing but physical hardware used to deploy the application.

Figure 4.7: Deployment Diagram of Educational Chatbot

4.4.6 Activity Diagram

Activity diagrams are graphical representations of workflows of stepwise activities and actions with support for choice, iteration and concurrency. In the Unified Modeling Language, activity diagrams can be used to describe the business and operational step-by-step workflows of components in a system. An activity diagram shows the overall flow of control.

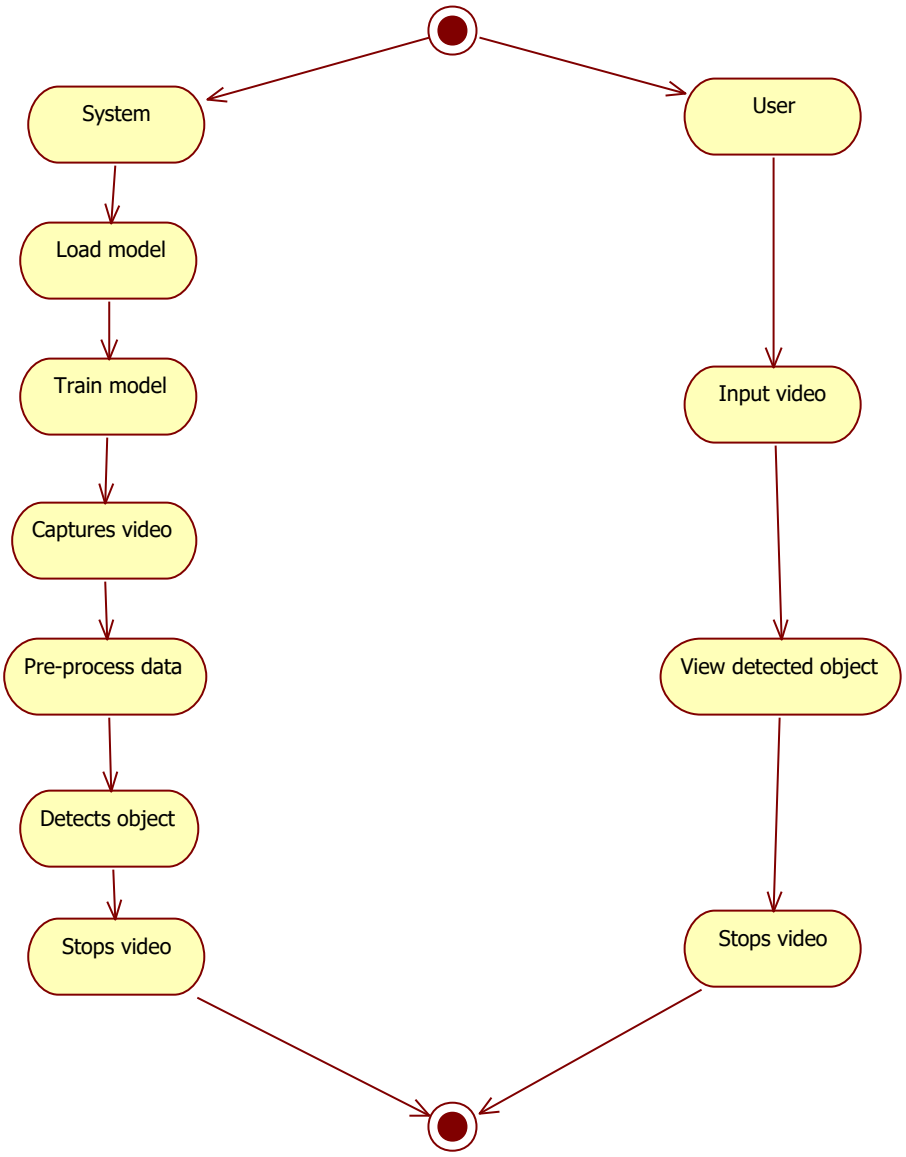


Figure 4.8: Activity Diagram of Educational Chatbot

4.4.7 Component Diagram

A component diagram, also known as a UML component diagram, describes the organization and wiring of the physical **c**omponents in a system. Component diagrams are often drawn to help model implementation details and double-check that every aspect of the system's required function is covered by planned development.

Figure 4.9: Component Diagram of Educational Chatbot

4.4.8 ER Diagram

An Entity–relationship model (ER model) describes the structure of a database with the help of a diagram, which is known as Entity Relationship Diagram (ER Diagram). An ER model is a design or blueprint of a database that can later be implemented as a database. The main components of E-R model are: entity set and relationship set

An ER diagram shows the relationship among entity sets. An entity set is a group of similar entities and these entities can have attributes. In terms of DBMS, an entity is a table or attribute of a table in database, so by showing relationship among tables and their attributes, ER diagram shows the complete logical structure of a database. Let’s have a look at a simple ER diagram to understand this concept.

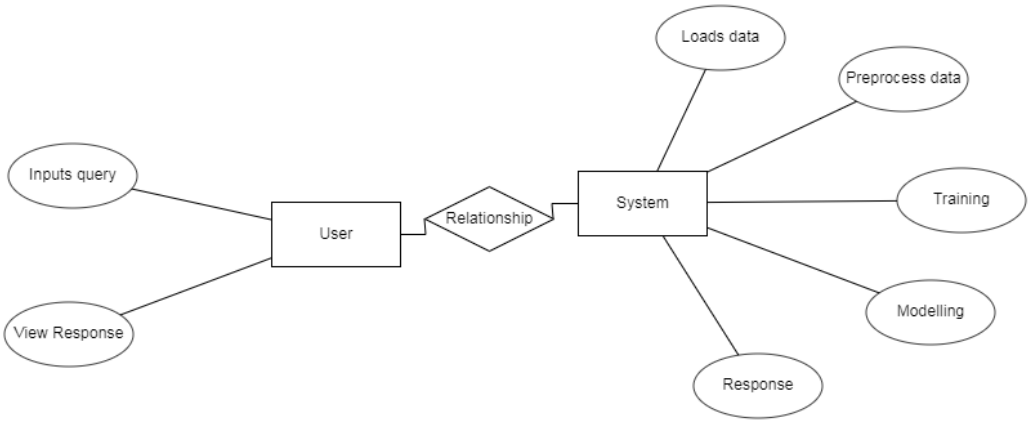
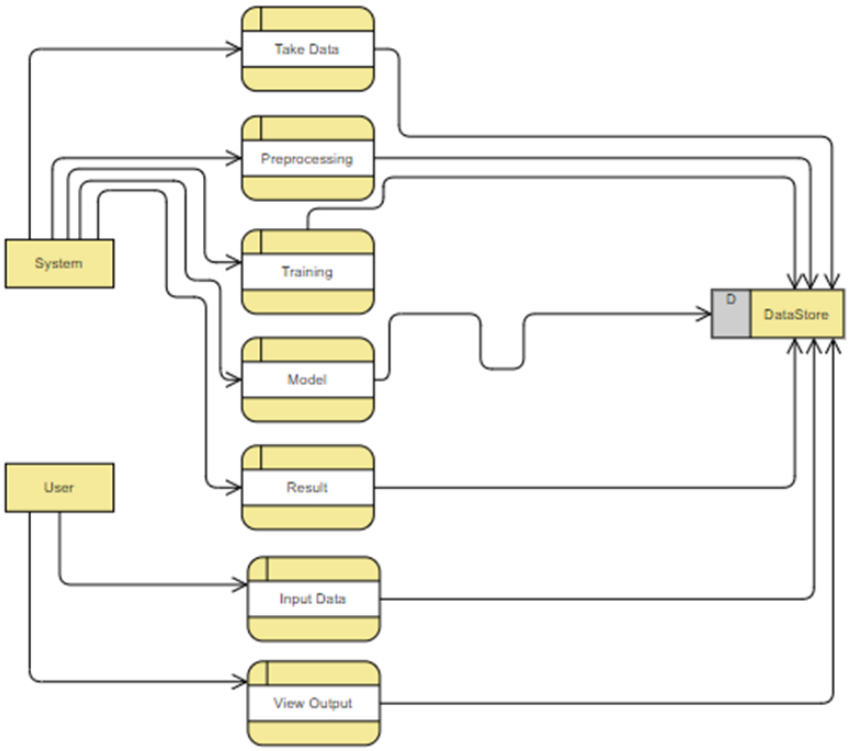


Figure 4.10: ER Diagram of Educational Chatbot.

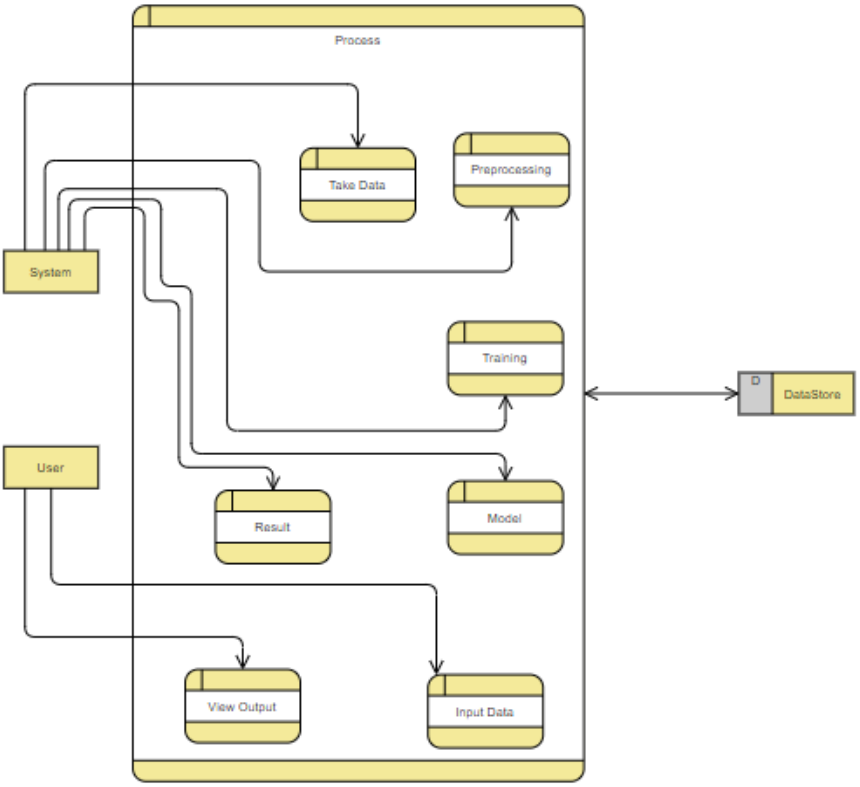
4.5 DFD DIAGRAM

A Data Flow Diagram (DFD) is a traditional way to visualize the information flows within a system. A neat and clear DFD can depict a good amount of the system requirements graphically. It can be manual, automated, or a combination of both. It shows how information enters and leaves the system, what changes the information and where information is stored. The purpose of a DFD is to show the scope and boundaries of a system as a whole. It may be used as a communications tool between a systems analyst and any person who plays a part in the system that acts as the starting point for redesigning a system.

4.5.1 Level 1 Diagram



4.5.2 Level 2 Diagram



4.6 SUMMARY

This chapter deals with the system design. System architecture, data flow diagrams, use case diagrams, and sequence diagrams are all included. System architecture is a conceptual framework that describes the organisation, behaviour, and system parts that will cooperate to construct the whole system. Data movement from one phase to another is shown using a data flow diagram. This project has only a system architecture diagram. The next chapter describes the implementation details like modules or steps in implementation and proposed approach, techniques, and equations.

CHAPTER 5

METHODOLOGY

5.1 PREAMBLE

The previous chapter discussed system design, including system architecture, Data flow diagrams, and UML diagrams. The execution of the system used in the project and its various components are the topics covered in this chapter. To make things easier to comprehend, the modules are divided up and their techniques are quickly described.

5.2 PROPOSED METHOD

5.2.1 Data Preprocessing

During the data preprocessing phase for NLP tasks, various essential steps are undertaken. Firstly, the text is cleaned by removing special characters, emojis, and irrelevant symbols. Next, tokenization is performed to break down the text into individual words or tokens, followed by converting it to lowercase for uniformity. Stemming or lemmatization is then applied to reduce words to their root forms, and common stop words are removed to enhance analysis accuracy.

5.2.2 NLU and NLP Algorithm

When approaching Natural Language Understanding (NLU) and Natural Language Processing (NLP) tasks, an algorithmic framework is employed to effectively analyse and interpret human language. Specifically, Rasa Neural Networks play a crucial role in this process. These models are trained on large datasets to learn the nuances of human language, enabling them to accurately classify intents and extract entities from user messages. By leveraging the power of Rasa Neural Networks within the NLU and NLP algorithmic framework, robust and contextually aware conversational AI systems can be developed to effectively interact with users in natural language.

5.2.3 Query Comparison

In designing an algorithm for comparing user queries with existing data to produce relevant responses, several crucial steps are involved. Initially, the user query should undergoes preprocessing, followed by tokenization to break down the query into smaller components. Stemming or lemmatization is then applied to reduce words to their root forms

for standardization. Next, the algorithm identifies the most relevant responses based on similarity scores and returns them to the user as potential matches. This approach facilitates effective communication and information retrieval by generating relevant responses through the comparison of user queries with existing data.

5.2.4 Model Training

Utilize Rasa's neural network architecture for training the NLU and NLP models. Train the model on the annotated training data to learn the mapping between user queries and intents/entities. Create training data for the Rasa chatbot by annotating user queries with intents and entities. Intents represent the purpose or goal of the user's query, while entities are specific pieces of information within the query.

5.2.5 Response Generation

Once the intent has been classified and relevant entities have been extracted from user queries using Rasa's neural network architecture, the next step is to generate appropriate responses based on this information. By combining predefined response templates with dynamic data querying, the chatbot can generate appropriate and informative responses that cater to a wide range of user inquiries in the educational domain.

5.2.6 Deployment

Integrate Rasa backend code with frontend using RESTful APIs for communication between the chatbot and users.The Actions Folder, endpoints.yml, config.yml, and domain.yml files in a Rasa project are crucial components used for integrating Rasa with a frontend.

5.2.7 Fine-tuning and Optimization

After implementing the initial algorithm for integrating advanced NLP techniques with Rasa's neural network capabilities If necessary, further fine-tuning of the model can be achieved through iterative adjustments to its architecture or hyperparameters. This iterative process allows for experimentation with different configurations to optimize the model's performance in understanding and responding to user queries accurately.

5.3 DESCRPTION

5.3.1 Natural Language Processing

Natural language processing (NLP) is a subfield of linguistics, computer science, and artificial intelligence concerned with the interactions between computers and human language, in particular how to program computers to process and analyse large amounts of

natural language data. The result is a computer capable of "understanding" the contents of documents, including the contextual nuances of the language within them. The technology can then accurately extract information and insights contained in the documents as well as categorize and organize the documents themselves. A chatbot is an NLP software that can simulate a conversation (or a chat) with a user in natural language through messaging applications, websites, mobile apps or through the telephone. Natural language understanding is a subset of NLP that classifies the intent, or meaning, of text based on the context and content of the message. The difference between NLP and NLU is that natural language understanding goes beyond converting text to its semantic parts and interprets the significance of what the user has said.

5.3.2 Rasa

Rasa provides open source natural language processing to turn messages from your users into intents and entities that chatbots understand. Based on lower-level machine learning libraries like Tensorflow and spaCy, Rasa provides natural language processing software that's approachable and as customizable as you need. Get up and running fast with easy to use default configurations, or swap out custom components and fine-tune hyperparameters to get the best possible performance for your dataset. Rasa is the most flexible and transparent solution for conversational AI—and open source means you have complete control over building an NLP chatbot that really helps your users. Rasa is a robust platform that includes natural language understanding and open source natural language processing. It's a full toolset for extracting the important keywords, or entities, from user messages, as well as the meaning or intent behind those messages. The output is a standardized, machine-readable version of the user's message, which is used to determine the chatbot's next action.

5.4 Data Collection

Data collection for a Rasa chatbot focused on college-related inquiries involves gathering information from various sources, with the goal of creating a comprehensive dataset that covers a wide range of topics relevant to students, faculty, and staff. Some common methods used in data collection include:

- **Website Scraping:** Utilizing web scraping techniques to extract information from college websites, such as course details, admissions criteria, faculty profiles, campus facilities, events, and contact information. Websites like https://www.sasi.ac.in/ can

provide valuable data for training the chatbot.

- **Crowdsourcing:** Engaging students, faculty, and staff members to contribute questions, feedback, and suggestions for the chatbot. This approach ensures that the chatbot's dataset reflects the diverse needs and interests of its users.
- **Manual Data Collection:** Conducting interviews, surveys, or focus groups to gather insights into common inquiries and concerns within the college community. This method allows for the collection of qualitative data that may not be readily available online.

5.4.1 Data Pre-Processing

Data preprocessing is crucial for preparing data for training a Rasa college chatbot, especially when considering intents and utilizing techniques like the Porter stemming algorithm. Here's a breakdown of common preprocessing techniques tailored for such a chatbot:

- **Tokenization and Porter Stemming**: Tokenization involves breaking down text into individual words or tokens. After tokenization, apply the Porter stemming algorithm to reduce words to their root form, helping the chatbot understand variations of the same word. For example, "studying" and "study" would both be stemmed to "studi."
- **Stopword Removal**: Remove common words that do not carry significant meaning, such as "the," "is," "are," etc. This helps focus on keywords that are more relevant to the intent of the user's query.
- **Lowercasing**: Convert all text to lowercase to ensure consistency and simplify text processing. This prevents the model from treating words like "College" and "college" differently.
- **Normalization**: Normalize text by removing punctuation marks, special characters, and numerical digits. This ensures that the chatbot focuses on linguistic patterns and disregards irrelevant symbols.
- **Intent Labeling**: Assign each user query or input to a specific intent category, such as "Admissions," "Courses," "Facilities," "Events," etc. This helps the chatbot understand the user's purpose and respond accordingly.
- **Data Augmentation**: Generate additional training data by paraphrasing existing questions or introducing variations in wording. This expands the dataset

and helps the chatbot generalize better to different user inputs.

- **Data Balancing**: Ensure that each intent category has a balanced representation in the training data to prevent bias towards dominant intents. This involves collecting a sufficient number of examples for each intent.
- **Data Cleaning**: Remove any noise or irrelevant information from the dataset, such as HTML tags, URLs, or formatting artifacts from scraped web content.

Overall, the pre-processing By these preprocessing techniques, the dataset for training the Rasa college chatbot can be effectively cleaned, structured, and labeled with intents, enabling the chatbot to understand user queries and provide accurate responses. Additionally, incorporating the Porter stemming algorithm helps in handling variations of words, enhancing the chatbot's ability to recognize and respond to diverse user inputs.

5.4.2 Data Splitting

For a Rasa college chatbot, dividing the dataset into training and testing sets is essential for evaluating the performance of the trained model accurately. Here's how this process can be applied:

- **Dataset Splitting**: Divide the collected dataset into two distinct groups: the training set and the testing set. The training set comprises a majority of the data and is used for training the chatbot's machine learning models, including natural language understanding (NLU) and dialogue management. The testing set is kept separate and is used exclusively for evaluating the performance of the trained model.
- **Training Set Usage**: The training set is utilized to estimate parameters, train models, and develop feature sets for the chatbot. Various machine learning algorithms and techniques are applied to the training data to create models capable of understanding user intents, extracting entities, and generating appropriate responses.
- **Testing Set Usage**: Once the models are trained using the training set, they are tested using the separate testing set to assess their performance. The testing set provides an objective evaluation of the model's ability to generalize to unseen data and accurately classify user queries into the correct intent categories. Performance metrics such as accuracy, precision, recall, and F1-score are

calculated based on the model's predictions on the testing set.

5.4.3 Training Data

- **Training Data Format** : Rasa uses YAML as a unified and extendable way to manage all training data, including NLU data, stories and rules. You can split the training data over any number of YAML files, and each file can contain any combination of NLU data, stories, and rules. The training data parser determines the training data type using top level keys. The domain uses the same YAML format as the training data and can also be split across multiple files or combined in one file. The domain includes the definitions for responses and forms. See the documentation for the domain for information on how to format your domain file.
- **NLU Training Data** : The goal of NLU (Natural Language Understanding) is to extract structured information from user messages. This usually includes the user's intent and any entities their message contains. You can add extra information such as regular expressions and lookup tables to your training data to help the model identify intents and entities correctly.
- **Entities** : Entities are structured pieces of information inside a user message. For entity extraction to work, you need to either specify training data to train an ML model or you need to define regular expressions to extract entities using the Regex Entity Extractor based on a character pattern.
- **Stories** : A story is a representation of a conversation between a user and an AI assistant, converted into a specific format where user inputs are expressed as intents (and entities when necessary), while the assistant's responses and actions are expressed as action names. While writing stories, you do not have to deal with the specific contents of the messages that the users send. Instead, you can take advantage of the output from the NLU pipeline, which lets you use just the combination of an intent and entities to refer to all the possible messages the users can send to mean the same thing. It is important to include the entities here as well because the policies learn to predict the next action based on a combination of both the intent and entities (you can, however, change this behavior using the use entities**.**
- **Rules** : Rules are great to handle small specific conversation patterns, but

unlike stories, rules don't have the power to generalize to unseen conversation paths. Combine rules and stories to make your assistant robust and able to handle real user behavior. If you can't decide whether to write a story or a rule to implement a certain behavior, see the best practices for Writing Conversation Data. Rules can then be added to the rules section of your training data. To indicate that a rule can apply at any point in a conversation, start with the intent which starts the conversation and then add the actions which your assistant should perform in response to that.

- **Domain** : The domain defines the universe in which your assistant operates. It specifies the intents, entities, slots, responses, forms, and actions your bot should know about. It also defines a configuration for conversation sessions. The domain can be defined as a single YAML file or split across multiple files in a directory. When split across multiple files, the domain contents will be read and automatically merged together.

5.4.4 Training the Model

Training the dataset in Rasa involves preparing the data and training the NLU (Natural Language Understanding) and dialogue management models using the Rasa framework. Here's a step-by-step guide on how to train the dataset in Rasa:

- **Train NLU Model:** Use the Rasa NLU trainer to train the NLU model based on the prepared training data and configured pipeline. **'rasa train nlu'**
- **Train Dialogue Management Model**: Train the dialogue management model using the Rasa Core trainer, which learns to predict the next action based on the current conversation state and available stories.**' rasa train core'**
- **Evaluate Model**: Evaluate the trained models' performance using validation data or interactive testing. Use the Rasa interactive learning mode to simulate conversations with the chatbot and observe its responses in real-time. **'rasa interactive'**
- **End to End Training** : With end-to-end training, you do not have to deal with the specific intents of the messages that are extracted by the NLU pipeline or with separate utter_ responses in the domain file. Instead, you can include the text of the user messages and/or bot responses directly in your stories. See the training data format for detailed description of how to write end-to-end stories. You can mix

training data in the end-to-end format with labeled training data which has intents and actions specified: Stories can have some steps defined by intents/actions and other steps defined directly by user or bot utterances. We call it end-to-end training because policies can consume and predict actual text. For end-to-end user inputs, intents classified by the NLU pipeline and extracted entities are ignored.

5.5 Limitations and Considerations

5.5.1 Limitations

While the Rasa framework offers a powerful platform for building conversational AI applications, there are some limitations to consider when using it for a college chatbot:

- **Complexity of Setup and Configuratio**n: Setting up and configuring a Rasa chatbot requires a certain level of technical expertise, particularly in natural language processing (NLP) and machine learning. Users may need to invest time in understanding Rasa's architecture, components, and configuration options.
- **Data Requirements:** Training an effective chatbot requires a substantial amount of labeled training data, including examples of user queries and their corresponding intents/entities. Collecting and annotating this data can be time-consuming, especially for specialized domains like college-specific inquiries.
- **Handling Complex Conversations:** Rasa's dialogue management capabilities are primarily rule-based or based on finite state machines (FSMs), which may limit the chatbot's ability to handle complex, multi-turn conversations with context-sensitive responses.
- **Continuous Maintenance and Updates:** Building a successful chatbot is an ongoing process that requires continuous monitoring, maintenance, and updates. As user needs and preferences evolve, the chatbot's training data, models, and responses may need to be revised and improved accordingly.
- **Integration Complexity:** Integrating a Rasa chatbot with existing systems, databases, and APIs within a college environment may present integration challenges, particularly if the college's data sources are disparate or poorly structured.

5.5.2 Considerations

To overcome the limitations of using the Rasa framework for a college chatbot and improve its effectiveness in the future, several strategies can be implemented:

- **Simplified Setup and Configuration:** Enhance the user experience by providing more user-friendly interfaces, documentation, and tutorials for setting up and configuring Rasa chatbots. Streamline the process of creating and deploying chatbots to reduce the barrier to entry for non-technical users.
- **Automated Model Training and Tuning:** Implement automated machine learning (AutoML) techniques to streamline the process of model training and hyperparameter optimization. Develop tools and frameworks that automate the selection of optimal architectures, hyperparameters, and training strategies based on performance metrics and user feedback.
- **Continuous Learning and Adaptation:** Integrate mechanisms for continuous learning and adaptation into chatbots, allowing them to improve over time based on user interactions, feedback, and changing requirements. Implement techniques like online learning, active learning, and model updating to facilitate ongoing improvement and adaptation.
- **Enhanced Integration Capabilities:** Expand the integration capabilities of Rasa chatbots by developing standardized connectors, APIs, and SDKs for seamless integration with third-party systems, databases, and services commonly used in college environments. Foster a vibrant ecosystem of plugins and extensions to support diverse integration requirements.

By implementing these strategies and continuously improving the Rasa framework and associated tools and resources, we can overcome the limitations mentioned earlier and build more effective and scalable chatbots for college and other domains in the future.

5.6 SUMMARY

This chapter covered the use of all the approaches and modules in the proposed work in brief detail. The project's primary framework, implementation also serves as the primary

factor in determining how well our work turns out. As a result, using the best algorithms produces the best outcomes, which is why we compare several algorithms to ensure the project's success.

CHAPTER 6

EXPERIMENTAL RESULTS

6.1 PREAMBLE

The previous chapter discussed project implementation and the choice for the majority used throughout project implementation. The obtained measurements of the developed model are discussed in this chapter. Moreover, the obtained measurements of a few existing systems are being compared in order to determine the efficiency of the proposed system.

6.2 RESULTS

Result analysis in a Rasa chatbot project involves the examination and interpretation of various metrics and outputs generated during the training, testing, and validation phases. This process is crucial for understanding the performance and behavior of the chatbot, identifying areas for improvement, and ensuring that it meets the desired objectives. By analyzing results such as accuracy, precision, F1-score, and confusion matrices for intents, actions, and stories, developers gain insights into how effectively the chatbot understands user input, generates appropriate responses, and follows predefined conversation paths. Through thorough analysis, developers can refine the chatbot's training data, optimize its behavior, and enhance the overall user experience.

6.2.1 Data Validation

Data validation is crucial for ensuring a RASA chatbot functions smoothly and understands user queries accurately. It involves two key components: intent validation and story validation.

Intent validation focuses on the individual intents, which are essentially the categories of user requests the chatbot can recognize. The validation process checks for:

- Valid intents**:** It ensures that each intent is correctly labeled and makes sense within the chatbot's domain. Imagine an intent named "Buy Pizza," which wouldn't be relevant for a college chatbot.
- Distinct intents**:** The validation process also verifies that intents are distinct from

each other. For example, intents like "Ask about financial aid" and "Check financial aid status" should be separate to allow the chatbot to provide tailored responses.

Story validation delves deeper into the conversation flow between the user and the chatbot. It checks for:

- Unique intents and stories**:** Similar to intent validation, story validation ensures that there are no duplicate stories or intents within the chatbot's conversation definition. This prevents confusion and guarantees the chatbot follows the intended conversation structure.
- Conflict-free story structure: The validation process also identifies any inconsistencies or ambiguities within the story flow. For example, a story might have two paths triggered by the same user utterance, leading to unpredictable behavior.

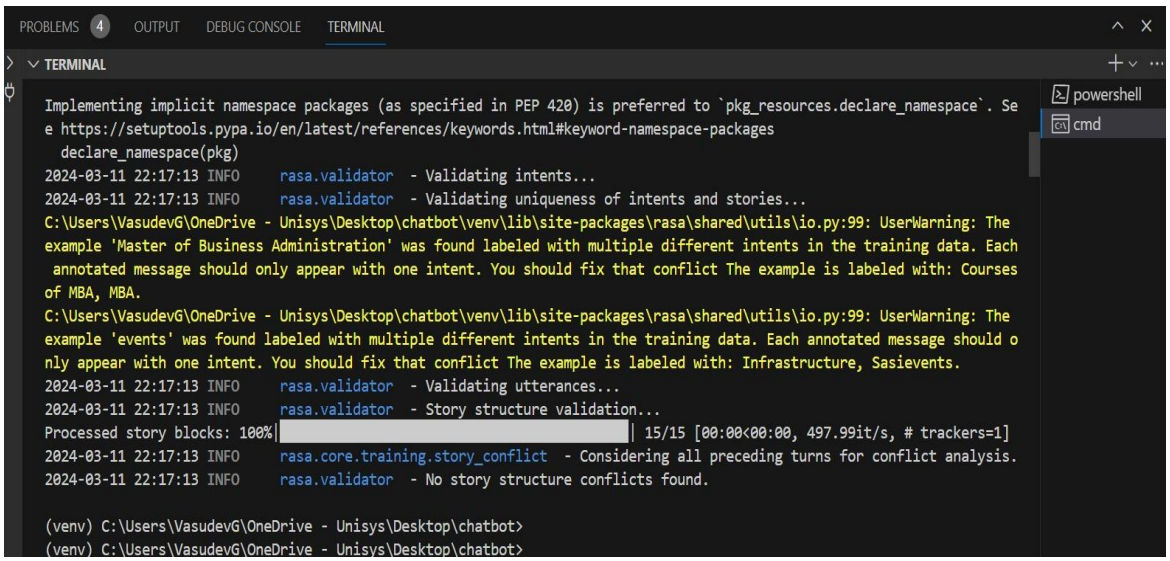


Figure 6.1: Output for data validation of Educational Chatbot.

The output from the rasa data validate command indicates the validation process performed on the training data of a Rasa chatbot. It starts with deprecation warnings related to certain APIs and packages, followed by validation of intents to ensure proper formatting and uniqueness. The process then checks the uniqueness of intents and stories, highlighting warning messages for examples labeled with multiple different intents, indicating conflicts in labeling. Subsequently, utterances and story structure are validated to ensure proper formatting and absence of conflicts. The output concludes with a message stating that no story structure conflicts were found,

indicating that the training data passed the validation process without major issues, albeit with some warning messages regarding conflicts in intent labeling.

6.2.2 Test Results

Story Testing: The chatbot evaluates the accuracy and correctness of conversations based on defined stories. It generates a detailed report on the performance of individual stories, highlighting any failures or warnings.

Action Testing: The chatbot assesses the accuracy, precision, and F1-score of actions taken during conversations. It provides a confusion matrix to visualize the performance of action predictions.

Intent Testing: The chatbot predicts the accuracy, precision, and F1-score of intents identified in user messages. It generates a confusion matrix to visualize the performance of intent predictions.

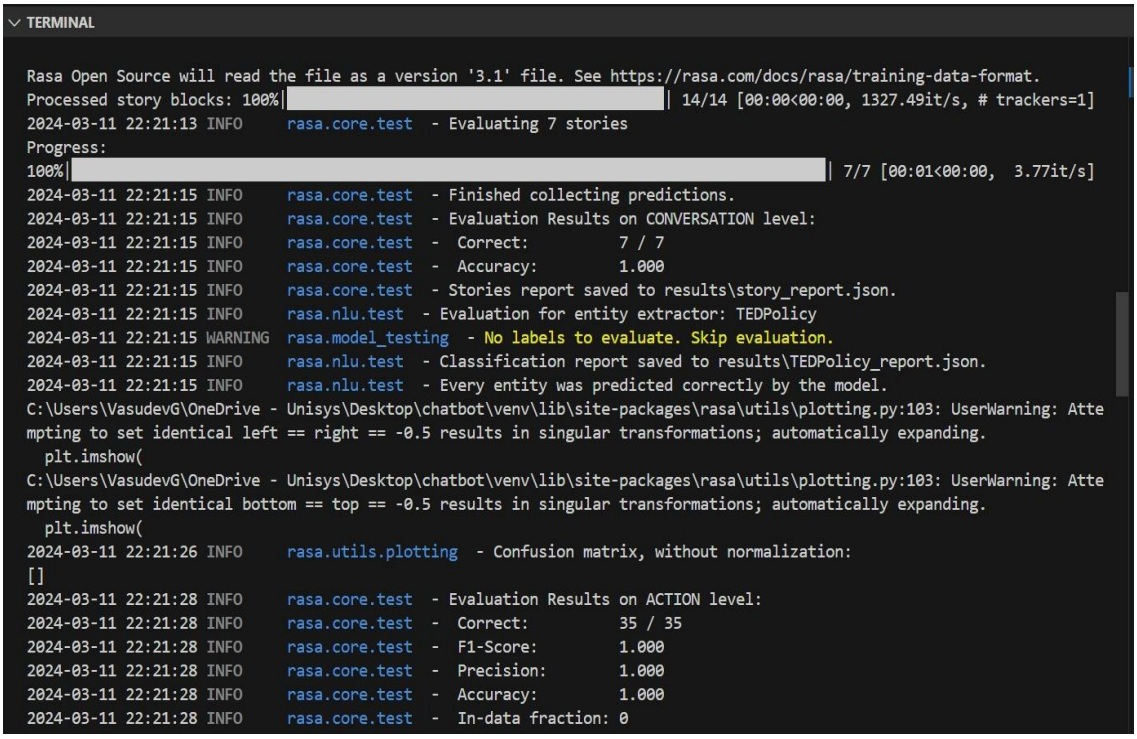


Figure 6.2: Output for testing of Educational Chatbot.

The output from the rasa test command indicates the testing process performed on the trained model of a Rasa chatbot. It starts with deprecation warnings related to certain APIs and packages. Then, it loads the trained model and proceeds to evaluate stories and predictions. The evaluation results on the conversation level show the

accuracy of the model in predicting correct story paths, with a story report saved to a JSON file. The evaluation also includes testing of the action level, showing the accuracy, F1-score, precision, and confusion matrix for actions. Additionally, intent evaluation results are provided, including a classification report and a confusion matrix for intents, along with information on incorrect intent predictions saved to JSON files. Overall, the output provides comprehensive evaluation results for both conversation paths and intents of the Rasa chatbot's trained model.

- **Confusion Matrix**

  It shows the distribution of the confidence scores of the Rasa college chatbot's intent predictions [1]. The x-axis of the graph is labeled "Confidence" and it ranges from 0.0 to 2.0. The y-axis is labeled "Number of Samples" and it ranges from 0 to 120.

  The bars on the left side of the graph represent the number of predictions that the college chatbot made with a confidence score between 0.6 and 1.0. The bars on the right side of the graph represent the number of predictions that the college chatbot made with a confidence score between 0.0 and 0.6. The tallest bar in the graph is at a confidence level of 0.97, which means that this was the most common confidence score for the chatbot's correct predictions.

  Overall, the histogram shows that the college chatbot's intent predictions were more likely to be correct when the chatbot had a higher confidence score. Additionally, you can calculate other metrics like precision, recall, and F1 score for each class to gain a more comprehensive understanding of the model's performance.

  - Accuracy = (Sum of Diagonal Cells) / (Total Number of Predictions) * 100%
  - Precision = (True Positives) / (True Positives + False Positives)
  - Recall = (True Positives) / (True Positives + False Negatives)
  - F1 Score = 2 * (Precision * Recall) / (Precision + Recall)

  Understanding the F1 Score: The F1 score ranges from 0 to 1, with 1 being the best score and 0 being the worst. A higher F1 score indicates a better balance between precision and recall.

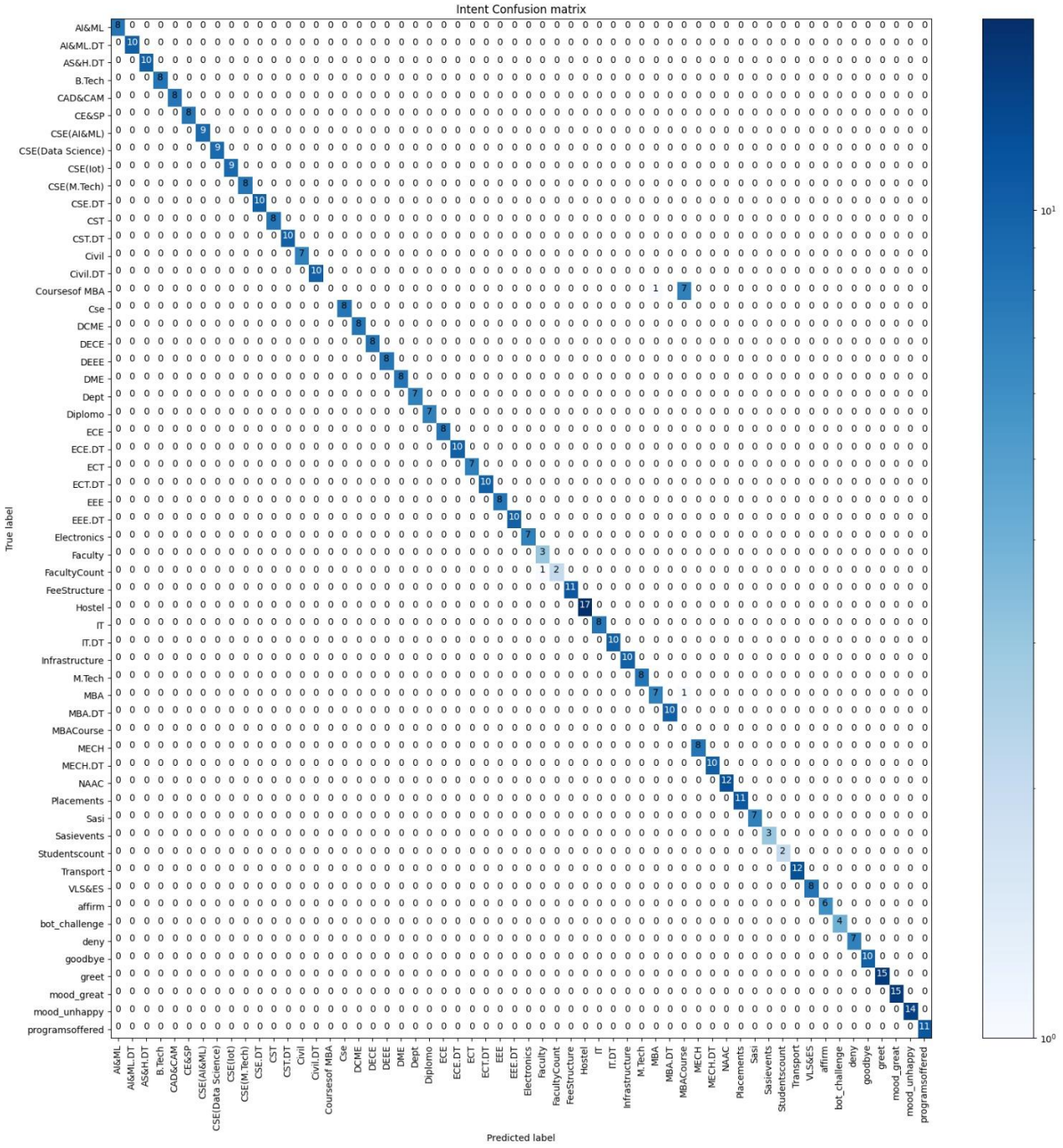


Figure 6.3: Intent confusion matrix of Educational Chatbot.

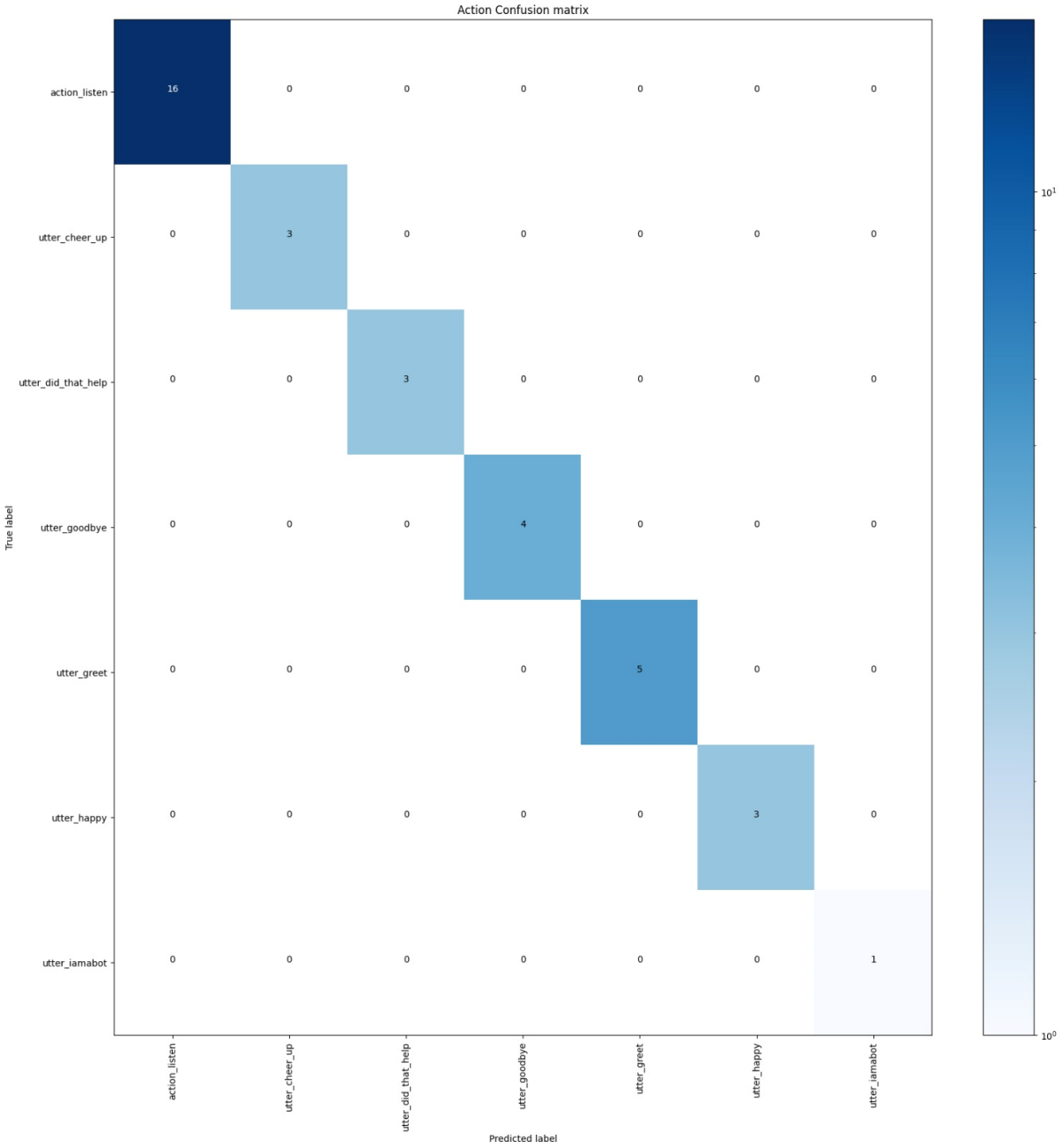


Figure 6.4: Story confusion matrix of Educational Chatbot.

6.2.3 Visualization

6.2.3.a Story Visualization :

- **Interactive Learning:** Rasa provides an "interactive learning" mode where you can test stories in real-time. As you enter user messages, the chatbot highlights the predicted intent and the corresponding path in the story. This provides a visual understanding of the conversation flow and helps identify any inconsistencies.

- **Debugging Tools:** While not directly visualizing stories, Rasa offers debugging tools that help you analyze conversation paths. By stepping through individual actions and intents, you can map out the conversation flow and pinpoint potential issues within stories.

6.2.3.b Rules Visualization:

- **Dialogue State Tracker Visualization:** Rasa offers a visualization tool for the dialogue state tracker, which keeps track of the conversation context. This visualization shows the values of entities and slots extracted from user messages, which can indirectly represent the rules governing chatbot behavior based on the conversation history.

The graph displays various input data in a sequential order, presenting information about different aspects of the college's programs, departments, offerings.

6.3 RESULTS COMPARISONS

Comparison for the proposed algorithm results and existing methods are shown below :

The table 6.3 that has shown below is describing about the three models that are RNN, LSTM, CNN, DSTM, Navie Bayes etc., The table is about the comparison of the different methods. The table rows are having the methods like RNN, LSTM, CNN, DSTM, Navie Bayes etc., The columns are having the Accuracy, Progress Tracking, 24/7 Availability and Multilingual Support.

The model's comparison has shown the below in the below table. The accuracies are all shown below.

Table 6.1: COMPARISON TABLE OF DIFFERENT MODELS

S NO	Methods	Accuracy	Progress Tracking	24/7 Availability	Multilingual Support
1	RNN	78.0	✓	×	×
2	LSTM	77.0	✓	×	×
3	SLR Method	65.0	✓	×	×
4	Naïve Bayes	69.0	×	×	×

5	DNN	64.0	✓	×	×
6	RNN	73.0	✓	×	×
7	RNN	75.6	✓	×	×
8	LSTM	79.0	×	×	×
9	LSTM	78.0	✓	✓	✓
10	DSTM	67.0	✓	×	×
11	Random Forest	60.5	✓	×	✓
12	RNN	77.0	×	×	×
13	NLP pipeline	72.7	×	×	×
14	DB SCAN	76.7	×	✓	×
15	CNN	75.0	×	✓	×

while neural network-based methods like RNNs and LSTMs generally exhibit higher accuracy, they often lack continuous availability and multilingual support. Other methods like Random Forest, DB SCAN, and CNN offer alternative approaches with varying levels of accuracy, availability, and support for multilingualism. The choice of method would depend on the specific requirements and constraints of the application.

The Recurrent Neural Network (RNN) is a type of neural network commonly used for sequence modeling tasks. In the provided list, RNNs exhibit varying levels of accuracy across different instances, ranging from 73.0% to 78.0%. RNNs are characterized by their ability to retain information from previous inputs, making them suitable for tasks involving sequential data. While RNNs offer progress tracking capabilities, they lack 24/7 availability and multilingual support.

In the provided list, LSTMs achieve accuracies ranging from 77.0% to 79.0%. Unlike traditional RNNs, LSTMs incorporate memory cells and various gating mechanisms to selectively retain or forget information over time, making them well-suited for tasks involving sequential data with long-range dependencies. While LSTMs offer progress tracking capabilities, they generally lack 24/7 availability and multilingual support, limiting their applicability in certain contexts.

The Simple Linear Regression (SLR) method is a fundamental statistical technique used to model the relationship between a single independent variable and a

dependent variable. In the provided list, the SLR method achieves an accuracy of 65.0%. SLR aims to find the best-fitting straight line through the data points to predict the dependent variable based on the independent variable. While SLR offers progress tracking capabilities, it lacks 24/7 availability and multilingual support.

The Naïve Bayes method is a probabilistic classifier based on Bayes' theorem with the "naive" assumption of independence between features. In the provided list, Naïve Bayes achieves an accuracy of 69.0%. Naïve Bayes is particularly useful when working with large datasets and high-dimensional feature spaces. Additionally, Naïve Bayes does not offer progress tracking capabilities, 24/7 availability, or multilingual support, which may limit its applicability in certain contexts compared to more complex classification models.

Convolutional Neural Networks (CNNs) are a type of deep learning model commonly used for image recognition and computer vision tasks. In the provided list, CNNs achieve an accuracy of 75.0%. CNNs are designed to automatically and adaptively learn spatial hierarchies of features from input images through a series of convolutional and pooling layers. However, in the context of the provided table, CNNs do not offer progress tracking capabilities but are available 24/7 and may provide multilingual support depending on the application framework used.

DBSCAN (Density-Based Spatial Clustering of Applications with Noise) is a popular clustering algorithm known for its ability to discover clusters of arbitrary shape in spatial data, while also being robust to noise. In the provided list, DBSCAN achieves an accuracy of 76.7%. DBSCAN offers progress tracking capabilities and multilingual support, making it suitable for various applications. However, it does not provide 24/7 availability. DBSCAN is commonly used in spatial data analysis, anomaly detection, and pattern recognition tasks, particularly when dealing with datasets containing irregularly shaped clusters or noisy data.

Random Forest is an ensemble learning method that operates by constructing a multitude of decision trees during training and outputting the mode of the classes (classification) or mean prediction (regression) of the individual trees. In the provided list, Random Forest achieves an accuracy of 60.5%. However, Random Forests do not provide 24/7 availability. Random Forests are less prone to overfitting compared to

individual decision trees due to the ensemble nature of the method, which averages out biases present in the individual trees.

6.4 SUMMARY

This chapter summarizes about the results produced by using different methods of transfer learning. We also discussed about the parameters and accuracies of the models. Accuracy, Graphs and Confusion matrix of each model are also shown. A comparisontable gives better understanding of result. The existing methods were used focused on Implementing a AI chatbot. Most of them are less effective in capturing intricate patterns within the data, often lack continuous availability and multilingual support. These drawbacks underscore the need for innovative approaches that can overcome these limitations. So, the new project is implemented in such a way that it can answer the college related quires accurately .

CHAPTER 7

CONCLUSION AND FUTURE ENHANCEMENT

7.1 CONCLUSION

Chat bots are a thing of the future which is yet to uncover its potential but with its rising popularity and craze among companies, they are bound to stay here for long types of chat bots being introduced, it is of great excitement to witness the growth of a new domain in technology while surpassing the previous threshold. We are inventing the system because of the need of the increasing population of our country. As we know if we want to join in a college we need to go to colleges and from the college admins, college staff we need to get the all information about college structure in the sense how would be the faculty lecture, How many branches in college, Hostel fee structure, College fee structure, How many seats available for specific branch, About college environment, Available Specializations in a department like Data Science, Machine Learning in CSE , Infrastructure of college like labs, library, College placements, Internships and college professors, Special events that occur in our college i.e. college fests, College extra circular activities updates like annual day, sports events, technical events, Achievements of college, NIRF Ranking, Naas rating to college etc.., Thus, the college chatbot will give the assistance to the students even the students no need to visit the colleges.

7.2 FUTURE ENHANCEMENT

Future enhancements for the college chatbot system include introducing multi-lingual support, enhancing personalization for tailored user experiences, integrating virtual reality for remote campus tours, improving natural language processing capabilities, integrating with student information systems for real-time updates, implementing voice recognition for hands-free interaction, exploring virtual assistant integration, incorporating a feedback mechanism for continuous improvement, expanding content coverage, and utilizing machine learning for predictive analytics. These enhancements aim to provide students with a seamless and efficient way to access essential college-related information and support services.

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ANNEXURE A

SOURCE CODE

YAML Configuration for NLU Training Data

```
version: "3.1"

nlu:
- intent: greet
  examples: |
    - hey
    - hello
    - hy
    - hai
    - hi
    - hello there
    - good morning
    - good evening
    - moin
    - hey there
    - let's go
    - hey dude
    - goodmorning
    - goodevening
    - good afternoon
- intent: goodbye
  examples: |
    - cu
    - good by
    - cee you later
    - good night
    - bye
    - goodbye
    - have a nice day
    - see you around
    - bye bye
    - see you later
- intent: affirm
  examples: |
    - yes
    - y
    - indeed
    - of course
    - that sounds good
    - correct
```

```
- intent: deny
  examples: |
    - no
    - n
    - never
    - I don't think so
    - don't like that
    - no way
    - not really
- intent: mood_great
  examples: |
    - perfect
    - fine
    - great
    - amazing
    - feeling like a king
    - wonderful
    - I am feeling very good
    - I am great
    - I am amazing
    - I am going to save the world
    - super stoked
    - extremely good
    - so so perfect
    - so good
    - so perfect
- intent: mood_unhappy
  examples: |
    - my day was horrible
    - I am sad
    - I don't feel very well
    - I am disappointed
    - super sad
    - I'm so sad
    - sad
    - very sad
    - unhappy
    - not good
    - not very good
    - extremly sad
    - so saad
    - so sad
- intent: bot_challenge
  examples: |
    - are you a bot?
    - are you a human?
    - am I talking to a bot?
```

```
    - am I talking to a human?
  - intent: programsoffered
    examples: |
    - programsoffered?
    - What are the programs available in this college?
    - Could you provide information about the programs offered here?
    - Can you list the programs available for study at this college?
    - What majors or degrees does this college offer?
    - I'm interested in learning about the academic programs here. Can you help?
    - Could you tell me more about the courses or degrees available?
    - What kind of programs can I expect to find at this college?
    - Do you have any information on the academic offerings of this institution?
    - I'm curious about the educational programs. Where can I find information about
them?
    - What are the areas of study or disciplines covered by this college?
  - intent: B.Tech
    examples: |
    - BTech
    - Bachelor of Technology
    - What are the courses offered in the B.Tech program?
    - Can you list the majors available within the B.Tech degree?
    - I'm interested in the B.Tech program. What specific areas of study does it cover?
    - Could you give me an overview of the courses included in the B.Tech program?
    - What are the core courses required for completing a B.Tech degree?
    - I'm considering enrolling in B.Tech. What are the different specializations or
concentrations available?
  - intent: AI&ML
    examples: |
    - aiml
    - Artificial Intelligence & Machine Learning
    - Could you provide information about the AI & ML course?
    - What are the details of the AI & ML course?
    - How many available seats are there in the AI & ML course?
    - Are there any seats left for the AI & ML course?
    - What is the duration of the AI & ML course?
    - How many years does the AI & ML course last?
  - intent: Civil
    examples: |
    - civil
    - Could you provide information about the Civil course?
    - What are the details of the Civil course?
    - How many available seats are there in the Civil course?
    - Are there any seats left for the Civil course?
    - What is the duration of the Civil course?
    - How many years does the Civil course last?
  - intent: Cse
    examples: |
```

```
    - cse
    - seats
    - Computer Science and Engineering
    - Could you provide information about the Cse course?
    - What are the details of the Cse course?
    - How many available seats are there in the Cse course?
    - Are there any seats left for the Cse course?
    - What is the duration of the Cse course?
    - How many years does the Cse course last?
- intent: CST
  examples: |
    - cst
    - Computer Science & Technology
    - Could you provide information about the Cst course?
    - What are the details of the cst course?
    - How many available seats are there in the cst course?
    - Are there any seats left for the cst course?
    - What is the duration of the cst course?
    - How many years does the cst course last?
- intent: CSE(AI&ML)
  examples: |
    - cseaiml
    - Artificial Intelligence (cse)
    - Machine Learning (cse)
    - Could you provide information about the CSE(AI&ML) course?
    - What are the details of the CSE(AI&ML) course?
    - How many available seats are there in the CSE(AI&ML) course?
    - Are there any seats left for the CSE(AI&ML) course?
    - What is the duration of the CSE(AI&ML) course?
    - How many years does the CSE(AI&ML) course last?
- intent: CSE(Data Science)
  examples: |
    - CSE(Data Science)
    - datascience
    - DS
    - Could you provide information about the CSE(Data Science) course?
    - What are the details of the CSE(Data Science) course?
    - How many available seats are there in the CSE(Data Science) course?
    - Are there any seats left for the CSE(Data Science) course?
    - What is the duration of the CSE(Data Science) course?
    - How many years does the CSE(Data Science) course last?
- intent: CSE(Iot)
  examples: |
    - CSEIot
    - Internet of Things
    - iot
    - Could you provide information about the CSE(Iot) course?
```

```
    - What are the details of the CSE(Iot) course?
    - How many available seats are there in the CSE(Iot) course?
    - Are there any seats left for the CSE(Iot) course?
    - What is the duration of the CSE(Iot) course?
    - How many years does the CSE(Iot) course last?
- intent: ECE
  examples: |
    - ece
    - Electronics and Communication Engineering
    - Could you provide information about the ECE course?
    - What are the details of the ECE course?
    - How many available seats are there in the ECE course?
    - Are there any seats left for the ECE course?
    - What is the duration of the ECE course?
    - How many years does the ECE course last?
- intent: ECT
  examples: |
    - ect
    - Could you provide information about the ECT course?
    - What are the details of the ECT course?
    - How many available seats are there in the ECT course?
    - Are there any seats left for the ECT course?
    - What is the duration of the ECT course?
    - How many years does the ECT course last?
- intent: EEE
  examples: |
    - eee
    - Electronics and Communication Technology
    - Could you provide information about the EEE course?
    - What are the details of the EEE course?
    - How many available seats are there in the EEE course?
    - Are there any seats left for the EEE course?
    - What is the duration of the EEE course?
    - How many years does the EEE course last?
- intent: IT
  examples: |
    - it
    - Information Technology
    - Could you provide information about the IT course?
    - What are the details of the IT course?
    - How many available seats are there in the IT course?
    - Are there any seats left for the IT course?
    - What is the duration of the IT course?
    - How many years does the IT course last?
- intent: MECH
  examples: |
    - mech
```

```
    - Mechanical Engineering
    - Could you provide information about the MECH course?
    - What are the details of the MECH course?
    - How many available seats are there in the MECH course?
    - Are there any seats left for the MECH course?
    - What is the duration of the MECH course?
    - How many years does the MECH course last?
  - intent: M.Tech
    examples: |
    - MTech
    - Master of Technology
    - What are the courses offered in the M.Tech program?
    - Can you list the majors available within the M.Tech degree?
    - I'm interested in the M.Tech program. What specific areas of study does it cover?
    - Could you give me an overview of the courses included in the M.Tech program?
    - What are the core courses required for completing a M.Tech degree?
    - I'm considering enrolling in M.Tech. What are the different specializations or
concentrations available?
  - intent: CSE(M.Tech)
    examples: |
    - csemtech
    - cse Master of Technology
    - Could you provide information about the CSE(M.Tech) course?
    - What are the details of the CSE(M.Tech) course?
    - How many available seats are there in the CSE(M.Tech) course?
    - Are there any seats left for the CSE(M.Tech) course?
    - What is the duration of the CSE(M.Tech) course?
    - How many years does the CSE(M.Tech) course last?
  - intent: VLS&ES
    examples: |
    - vlses
    - Very Large Scale Integration & Embedded Systems
    - Could you provide information about the VLS&ES course?
    - What are the details of the VLS&ES course?
    - How many available seats are there in the VLS&ES course?
    - Are there any seats left for the VLS&ES course?
    - What is the duration of the VLS&ES course?
    - How many years does the VLS&ES course last?
  - intent: CE&SP
    examples: |
    - cesp
    - Construction Engineering and Structural Planning
    - Could you provide information about the CE&SP course?
    - What are the details of the CE&SP course?
    - How many available seats are there in the CE&SP course?
    - Are there any seats left for the CE&SP course?
    - What is the duration of the CE&SP course?
```

```
    - How many years does the CE&SP course last?
  - intent: Electronics
    examples: |
      - electronics
      - Could you provide information about the Electronics course?
      - What are the details of the Electronics course?
      - How many available seats are there in the Electronics course?
      - Are there any seats left for the Electronics course?
      - What is the duration of the Electronics course?
      - How many years does the Electronics course last?
  - intent: CAD&CAM
    examples: |
      - cadcam
      - Computer-Aided Design and Computer-Aided Manufacturing
      - Could you provide information about the CAD&CAM course?
      - What are the details of the CAD&CAM course?
      - How many available seats are there in the CAD&CAM course?
      - Are there any seats left for the CAD&CAM course?
      - What is the duration of the CAD&CAM course?
      - How many years does the CAD&CAM course last?
  - intent: MBA
    examples: |
      - MBA
      - Master of Business Administration
      - What are the courses offered in the MBA program?
      - Can you list the majors available within the MBA degree?
      - I'm interested in the MBA program. What specific areas of study does it cover?
      - Could you give me an overview of the courses included in the MBA program?
      - What are the core courses required for completing a MBA degree?
      - I'm considering enrolling in MBA. What are the different specializations or
concentrations available?
  - intent: Coursesof MBA
    examples: |
      - mba
      - Master of Business Administration
      - Could you provide information about the MBA course?
      - What are the details of the MBA course?
      - How many available seats are there in the MBA course?
      - Are there any seats left for the MBA course?
      - What is the duration of the MBA course?
      - How many years does the MBA course last?
  - intent: Diplomo
    examples: |
      - Diplomo
      - What are the courses offered in the Diplomo program?
      - Can you list the majors available within the Diplomo degree?
      - I'm interested in the Diplomo program. What specific areas of study does it cover?
```

```
      - Could you give me an overview of the courses included in the Diplomo program?
      - What are the core courses required for completing a Diplomo degree?
      - I'm considering enrolling in Diplomo. What are the different specializations or
concentrations available?
    - intent: DECE
      examples: |
        - dece
        - Diploma in Electronics and Communication Engineering
        - Could you provide information about the DECE course?
        - What are the details of the DECE course?
        - How many available seats are there in the DECE course?
        - Are there any seats left for the DECE course?
        - What is the duration of the DECE course?
        - How many years does the DECE course last?
    - intent: DCME
      examples: |
        - dcme
        - Diploma in Computer Engineering
        - Could you provide information about the DCME course?
        - What are the details of the DCME course?
        - How many available seats are there in the DCME course?
        - Are there any seats left for the DCME course?
        - What is the duration of the DCME course?
        - How many years does the DCME course last?
    - intent: DEEE
      examples: |
        - deee
        - Diploma in Electrical and Electronics Engineering
        - Could you provide information about the DEEE course?
        - What are the details of the DEEE course?
        - How many available seats are there in the DEEE course?
        - Are there any seats left for the DEEE course?
        - What is the duration of the DEEE course?
        - How many years does the DEEE course last?
    - intent: DME
      examples: |
        - dme
        - Diploma in Mechanical Engineering
        - Could you provide information about the DME course?
        - What are the details of the DME course?
        - How many available seats are there in the DME course?
        - Are there any seats left for the DME course?
        - What is the duration of the DME course?
        - How many years does the DME course last?
    - intent: Dept
      examples: |
        - departmentd
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    - How many departments are there in the organization?
    - Can you provide a list of all the departments in the company?
    - What are the different departments within the organization?
    - Could you tell me the names of the departments in the company?
    - What areas do the different departments cover within the organization?
    - How are the departments organized within the organization?
- intent: AS&H.DT
  examples: |
    - timetable AS&H
    - Can I see the timetable for the AS&H department?
    - Where can I find the schedule for AS&H department classes?
    - What is the class timetable for AS&H students?
    - Could you provide me with the AS&H department's timetable?
    - When are the classes scheduled for AS&H courses?
    - Is there a specific timetable for AS&H lab sessions?
    - Are there any changes to the AS&H department timetable this week?
    - Can I access the AS&H department timetable online?
    - Are there any breaks or free periods in the AS&H department timetable?
- intent: Civil.DT
  examples: |
    - timetable Civil
    - Can I see the timetable for the Civil department?
    - Where can I find the schedule for Civil department classes?
    - What is the class timetable for Civil students?
    - Could you provide me with the Civil department's timetable?
    - When are the classes scheduled for Civil courses?
    - Is there a specific timetable for Civil lab sessions?
    - Are there any changes to the Civil department timetable this week?
    - Can I access the Civil department timetable online?
    - Are there any breaks or free periods in the Civil department timetable?
- intent: ECT.DT
  examples: |
    - timetable ECT
    - Can I see the timetable for the ECT department?
    - Where can I find the schedule for ECT department classes?
    - What is the class timetable for ECT students?
    - Could you provide me with the ECT department's timetable?
    - When are the classes scheduled for ECT courses?
    - Is there a specific timetable for ECT lab sessions?
    - Are there any changes to the ECT department timetable this week?
    - Can I access the ECT department timetable online?
    - Are there any breaks or free periods in the ECT department timetable?
- intent: CSE.DT
  examples: |
    - timetable CSE
    - Can I see the timetable for the CSE department?
    - Where can I find the schedule for CSE department classes?
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    - What is the class timetable for CSE students?
    - Could you provide me with the CSE department's timetable?
    - When are the classes scheduled for CSE courses?
    - Is there a specific timetable for CSE lab sessions?
    - Are there any changes to the CSE department timetable this week?
    - Can I access the CSE department timetable online?
    - Are there any breaks or free periods in the CSE department timetable?
- intent: CST.DT
  examples: |
    - timetable CST
    - Can I see the timetable for the CST department?
    - Where can I find the schedule for CST department classes?
    - What is the class timetable for CST students?
    - Could you provide me with the CST department's timetable?
    - When are the classes scheduled for CST courses?
    - Is there a specific timetable for CST lab sessions?
    - Are there any changes to the CST department timetable this week?
    - Can I access the CST department timetable online?
    - Are there any breaks or free periods in the CST department timetable?
- intent: ECE.DT
  examples: |
    - timetable ECE
    - Can I see the timetable for the ECE department?
    - Where can I find the schedule for ECE department classes?
    - What is the class timetable for ECE students?
    - Could you provide me with the ECE department's timetable?
    - When are the classes scheduled for ECE courses?
    - Is there a specific timetable for ECE lab sessions?
    - Are there any changes to the ECE department timetable this week?
    - Can I access the ECE department timetable online?
    - Are there any breaks or free periods in the ECE department timetable?
- intent: EEE.DT
  examples: |
    - timetable EEE
    - Can I see the timetable for the EEE department?
    - Where can I find the schedule for EEE department classes?
    - What is the class timetable for EEE students?
    - Could you provide me with the EEE department's timetable?
    - When are the classes scheduled for EEE courses?
    - Is there a specific timetable for EEE lab sessions?
    - Are there any changes to the EEE department timetable this week?
    - Can I access the EEE department timetable online?
    - Are there any breaks or free periods in the EEE department timetable?
- intent: IT.DT
  examples: |
    - timetable IT
    - Can I see the timetable for the IT department?
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    - Where can I find the schedule for IT department classes?
    - What is the class timetable for IT students?
    - Could you provide me with the IT department's timetable?
    - When are the classes scheduled for IT courses?
    - Is there a specific timetable for IT lab sessions?
    - Are there any changes to the IT department timetable this week?
    - Can I access the IT department timetable online?
    - Are there any breaks or free periods in the IT department timetable?
- intent: AI&ML.DT
  examples: |
    - timetable AI&ML
    - Can I see the timetable for the AI&ML department?
    - Where can I find the schedule for AI&ML department classes?
    - What is the class timetable for AI&ML students?
    - Could you provide me with the AI&ML department's timetable?
    - When are the classes scheduled for AI&ML courses?
    - Is there a specific timetable for AI&ML lab sessions?
    - Are there any changes to the AI&ML department timetable this week?
    - Can I access the AI&ML department timetable online?
    - Are there any breaks or free periods in the AI&ML department timetable?
- intent: MECH.DT
  examples: |
    - timetable MECH
    - Can I see the timetable for the MECH department?
    - Where can I find the schedule for MECH department classes?
    - What is the class timetable for MECH students?
    - Could you provide me with the MECH department's timetable?
    - When are the classes scheduled for MECH courses?
    - Is there a specific timetable for MECH lab sessions?
    - Are there any changes to the MECH department timetable this week?
    - Can I access the MECH department timetable online?
    - Are there any breaks or free periods in the MECH department timetable?
- intent: MBA.DT
  examples: |
    - timetable MBA
    - Can I see the timetable for the MBA department?
    - Where can I find the schedule for MBA department classes?
    - What is the class timetable for MBA students?
    - Could you provide me with the MBA department's timetable?
    - When are the classes scheduled for MBA courses?
    - Is there a specific timetable for MBA lab sessions?
    - Are there any changes to the MBA department timetable this week?
    - Can I access the MBA department timetable online?
    - Are there any breaks or free periods in the MBA department timetable?
- intent: Infrastructure
  examples: |
    - infra
```

- library
- sports
- environment
- about college
- infrastructure
- Is there a dedicated area for student gatherings or events?
- How are the classrooms equipped?
- Do they have audiovisual facilities?
- Can you provide information about the college's environmental initiatives or sustainability efforts?

- intent: Placements
  examples: |
- Placements
- What is the placement percentage of the college?
- Can you provide information about the average salary package offered during placements?
- Which companies visit the college for placements?
- What is the placement record of specific departments or courses?
- How does the college prepare students for placements?
- Can you share some success stories or testimonials from students regarding placements?
- Are there any internship opportunities provided by the college?
- Can you provide details about the placement process followed by the college?
- What is the placement support system like at the college?
- Are there any alumni networks or connections that help with placements?

- intent: Hostel
  examples: |
- hstl facility
- Hostel
- What types of accommodation options are available in the hostel?
- Can you provide details about the amenities offered in the hostel rooms?
- How many students typically share a room in the hostel?
- Are there separate hostels for male and female students?
- What are the meal options available in the hostel mess? Is it included in the hostel fees?
- Can students cook their own meals in the hostel kitchen?
- Are there any laundry facilities available in the hostel?
- What are the security measures in place in the hostel premises?
- Is there a curfew for students in the hostel?
- How do students apply for hostel accommodation, and what is the allocation process?
- Are there any recreational facilities available in the hostel, such as a common room or sports facilities?
- How is the cleanliness and maintenance of the hostel ensured?
- Are there any study spaces or libraries within the hostel premises?
- Can students receive guests or visitors in the hostel?
- What is the procedure for reporting maintenance issues or requesting repairs in the

hostel rooms?

- intent: FeeStructure
  examples: |
    - fee
    - FeeStructure
    - What is the fee structure for [specific program/course] at the college?
    - Can you provide details about the tuition fees for undergraduate programs?
    - How much does it cost to study [specific program] per semester?
    - Are there any additional fees apart from tuition, such as hostel fees or examination fees?
    - Can you break down the fee structure for international students?
    - Are there any scholarships or financial aid options available to help with the fees?
    - What is the payment schedule for the fees? Is it paid annually, per semester, or monthly?
    - Do fees vary for different departments or programs within the college?
    - How can I get a detailed fee statement for my current semester/year?
- intent: Transport
  examples: |
    - bus
    - transport
    - What are the bus routes provided by the college's transportation facility?
    - Can you provide details about the pickup/drop-off points along each bus route?
    - How frequently do the buses operate?
    - Are there any special arrangements for students or staff with disabilities?
    - How do I apply for a bus pass or transportation service?
    - Is there a mobile app or online system to track the bus locations in real-time?
    - What are the operating hours of the transportation service?
    - Are there any additional costs associated with using the transportation service?
    - How do I report issues or provide feedback about the transportation service?
    -Can I request additional bus stops or changes to existing routes?
- intent: NAAC
  examples: |
    - naac
    - NAAC
    - What is the NAAC accreditation status of the college?
    - Can you provide details about the NAAC accreditation process undergone by the college?
    - What is the grade awarded to the college by NAAC?
    - When was the last NAAC assessment conducted for the college?
    - What are the key parameters evaluated by NAAC during the accreditation process?
    - Can you share the NAAC accreditation report or document for the college?
    - How does the NAAC accreditation benefit the college and its stakeholders?
    - Are there any specific areas highlighted for improvement in the NAAC assessment report?
    - How often does the college undergo NAAC accreditation?
    - Can you provide information about the NAAC criteria met by the college to attain

accreditation?

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- intent: Sasi
  examples: |
    - vison
    - mison
    - About collge
    - Why this college
    - About vison and mison
    - Special about this college
    - Objective of the college
- intent: Sasievents
  examples: |
    - events
    - Can i Know about the events in the college
    - extracircular activites
- intent: Faculty
  examples: |
    - faculty details
    - names of faculty
    - list of faculty
- intent: FacultyCount
  examples: |
    - no of availble faculty count
    - total no of faculty
    - faculty count

- intent: Studentscount
  examples: |
    - no of availble students count
    - total no of students
```

For Rasa Rules

```
version: "3.1"
rules:
- rule: Say goodbye anytime the user says goodbye
  steps:
  - intent: goodbye
  - action: utter_goodbye
- rule: Say 'I am a bot' anytime the user challenges
  steps:
  - intent: bot_challenge
  - action: utter_iamabot
```

for Rasa Intents and Responses

```
version: "3.1"
intents:
  - greet
  - goodbye
  - affirm
  - deny
  - mood_great
  - mood_unhappy
  - bot_challenge
  - programsoffered
  - B.Tech
  - M.Tech
  - MBA
  - Diplomo
  - AI&ML
  - Civil
  - Cse
  - CSE(AI&ML)
  - CSE(Data Science)
  - CSE(Iot)
  - ECE
  - ECT
  - CST
  - EEE
  - IT
  - MECH
  - CSE(M.Tech)
  - VLS&ES
  - CE&SP
  - Electronics
  - CAD&CAM
  - Coursesof MBA
  - DECE
  - DCME
  - DEEE
  - DME
```

```
  - Dept
  - AS&H.DT
  - Civil.DT
  - ECT.DT
  - CSE.DT
  - CST.DT
  - ECE.DT
  - EEE.DT
  - IT.DT
  - AI&ML.DT
  - MECH.DT
  - MBA.DT
  - Infrastructure
  - Placements
  - Hostel
  - FeeStructure
  - Transport
  - NAAC
  - Sasi
  - Sasievents
  - Faculty
  - FacultyCount
  - Studentscount
responses:
  utter_greet:
  - text: "Hey! How are you?"
  utter_cheer_up:
  - text: "Here is something to cheer you up:"
    image: "https://i.imgur.com/nGF1K8f.jpg"
  utter_did_that_help:
  - text: "Did that help you?"
  utter_happy:
  - text: "Great, carry on!"
  utter_goodbye:
  - text: "Bye"
  utter_iamabot:
  - text: "I am a bot, powered by Rasa."
```

utter_programsoffered:

- text: "The programs offered at our college include 'B. Tech,M. Tech,MBA,Diploma'"

utter_B.Tech:

- text: 'Artificial Intelligence & Machine Learning,Civil Engineering,Computer Science & Engineering,Computer Science & Technology,CSE (Artificial Intelligence & Machine Learning),CSE (Data Science),CSE (Internet of Things and Cyber Security including Block Chain Technology),Electronics & Communication Engineering,Electronics & Communication Technology,Electrical & Electronics Engineering,Information Technology,Mechanical Engineering.'

utter_Artificial Intelligence & Machine Learning:

- text: 'The Artificial Intelligence & Machine Learning program spans four years with an intake of 60 students annually.'

utter_Civil Engineering:

- text: 'The Civil Engineering program has a duration of four years with an intake of 30 students.'

utter_Computer Science & Engineering:

- text: 'The Computer Science & Engineering program extends over four years with an intake of 180 students.'

utter_Computer Science & Technology:

- text: 'The Computer Science & Technology program has a duration of four years with an intake of 60 students.'

utter_CSE (Artificial Intelligence & Machine Learning):

- text: 'The CSE (Artificial Intelligence & Machine Learning) program is designed for a duration of four years with an intake capacity of 120 students.'

utter_CSE (Data Science):

- text: 'The CSE (Data Science) program spans four years with an intake of 60 students.'

utter_CSE (Internet of Things and Cyber Security including Block Chain Technology):

- text: 'The CSE (Internet of Things and Cyber Security including Blockchain Technology) program is structured for four years with an intake of 60 students.'

utter_Electronics & Communication Engineering:

- text: 'The Electronics & Communication Engineering program runs for four years with an intake of 180 students.'

utter_Electronics & Communication Technology:

- text: 'The Electronics & Communication Technology program lasts for four years with an annual intake of 60 students.'

utter_Electrical & Electronics Engineering:

- text: 'The Electrical & Electronics Engineering program has a duration of four years with an intake of 60 students.'

utter_Information Technology:

- text: 'The Information Technology program spans four years with an intake of 120 students.'

utter_Mechanical Engineering.:

- text: 'The Mechanical Engineering program is structured for a duration of four years with an intake of 30 students.'

utter_M.Tech:

- text: 'Computer Science & Engineering,VLSI&ES,CE&SP,Power Electronics,CAD&CAM'

utter_Computer Science & Engineering_M. Tech:

- text: 'The Computer Science & Engineering program is condensed into a two-year duration with an intake of 9 students.'

utter_VLSI&ES:

- text: 'The VLSI & Embedded Systems program is designed for a duration of two years with an intake of 9 students.'

utter_CE&SP:

- text: 'The CE&SP program is structured to run for two years with an intake of 9 students.'

utter_Power Electronics:

- text: 'The Power Electronics program is designed to be completed in two years with an intake of 9 students.'

utter_CAD&CAM:

- text: 'The CAD&CAM program is crafted to span two years with an intake of 9 students.'

utter_MBA:

- text: 'Master of Business Administration'

utter_Master of Business Administration:

- text: 'The Master of Business Administration (MBA) program typically lasts for two years with intake of 60.'

utter_Diploma :

- text: 'DECE,DCME,DEEE,DME'

utter_DECE:

- text: 'The DECE (Diploma in Electronics and Communication Engineering) program is designed to be completed in three years with an intake of 60 students.'

utter_DCME:

- text: 'The DCME (Diploma in Computer Engineering) program is structured for a duration of three years with an intake of 60 students.'

utter_DEEE:

- text: 'The DEEE (Diploma in Electrical and Electronics Engineering) program is designed to be completed in three years with an intake of 60 students.'

utter_DME:

- text: 'The DME (Diploma in Mechanical Engineering) program spans three years with an intake of 30 students.'

utter_Dept :

- text: 'Our organizational structure comprises Applied Sciences & Humanities(AS& H),Civil Engineering,Electronics and Communication Technology,Computer Science & Engineering,Computer Science & Technology (CST),Electronics and Communication Engineering,Electrical & Electronics Engineering (EEE),Information Technology,Artificial Intelligence & Machine Learning (AI&ML),Mechanical Engineering,Master of Business Administration departments'

utter_AS&H.T :

- text: 'https://drive.google.com/file/d/1baYRsNdw-U-FUW-G5FbJkOIyCEye3fwi/view'

utter_Civil.T :

- text: 'CLICK HERE FOR II/I TIMETABLE - https://drive.google.com/file/d/1qw8l8TbZujj_ocoF7lpl9aAt-h45sFVH/view

CLICK HERE FOR III/I TIMETABLE - https://drive.google.com/file/d/1sfRSWvPUTvpZ5H31tI6HwBj2BRU-YEdE/view

CLICK HERE FOR IV/I TIMETABLE - https://drive.google.com/file/d/1323qyMyoUjHQ41k5vC4YgSE5OYsfGfC3/view'

utter_ECT.T :

- text: 'CLICK HERE FOR II/I TIMETABLE - https://drive.google.com/file/d/1G06k7O0rbAz3WxYbqO5ELxRnUVVO5kUI/view

CLICK HERE FOR III/I TIMETABLE - https://drive.google.com/file/d/1vplgsTyP8Lb7YrEEASCHm0zPbnboCllg/view

CLICK HERE FOR IV/I TIMETABLE - https://drive.google.com/file/d/15JS3fylaCway1DRBYhLCIF2q_4HqPyND/view'

utter_CSE.T :

- text: 'CLICK HERE FOR II/I TIMETABLE - https://drive.google.com/file/d/1kGLy0ROhzOk0Y-GqbD29gfefk17PlUQw/view

CLICK HERE FOR III/I TIMETABLE - https://drive.google.com/file/d/16IjBTGorz-wghfVwXKS6xr68BG3yE4d6/view

CLICK HERE FOR IV/I TIMETABLE - https://drive.google.com/file/d/1gWtaztuXgaY-_dooGHPYpT-_oC3ZDntD/view'

utter_CST.T :

- text: 'CLICK HERE FOR II/I TIMETABLE - https://drive.google.com/file/d/1x_UgcTYpS2R0aeWvNlqbad0DabObAL0g/view

CLICK HERE FOR III/I TIMETABLE - https://drive.google.com/file/d/19jNwLAWmBW2TzGlCCtGhJp0lyc2PHDho/view

CLICK HERE FOR IV/I TIMETABLE - https://drive.google.com/file/d/1i21F8p8LSVB180qMlw-TS3D26Fz3ytbh/view'

utter_ECE.T :

- text: 'CLICK HERE FOR II/I TIMETABLE - https://drive.google.com/file/d/1uG6StnV9WRYo6XNue5MZcma36uWfcZzt/view

CLICK HERE FOR III/I TIMETABLE - https://drive.google.com/file/d/1pmMJBJoVZXzYbDqkyuKdwRaa3F1AdJtP/view

CLICK HERE FOR IV/I TIMETABLE - https://drive.google.com/file/d/1uykNpd0qloT11-FPuGZVxlFu2qocGlgN/view'

utter_EEE.T :

- text: 'CLICK HERE FOR II/I TIMETABLE - https://drive.google.com/file/d/1o2sr-6CamMi4QpY7hRLQkjECt5_BYLdC/view

CLICK HERE FOR III/I TIMETABLE - https://drive.google.com/file/d/1XhFPRyIz3StqAzouYx52AqlFv7KzMC3X/view

CLICK HERE FOR IV/I TIMETABLE - https://drive.google.com/file/d/1BHzKa8-PYvEh3rqIQHdDEvuUw0FQr-J1/view'

utter_IT.T :

- text: 'CLICK HERE FOR II/I TIMETABLE - https://drive.google.com/file/d/12j8pW0BD8iRS1Dp6WU6fIDIrBG-an8sE/view

CLICK HERE FOR III/I TIMETABLE - https://drive.google.com/file/d/1YPtCIRBWBUPKlRv8wJKKY8iDWXXZbCoK/view

CLICK HERE FOR IV/I TIMETABLE - https://drive.google.com/file/d/1Qjlj8FQq6S3_FGlQt3LTixfDRCYO9Ioc/view'

utter_AI&ML.T :

- text: 'CLICK HERE FOR II/I TIMETABLE - https://drive.google.com/file/d/18SY-6sHjpCTeF0oMJV8qgsQ-oNSPQ7gf/view

CLICK HERE FOR III/I TIMETABLE - https://drive.google.com/file/d/1z3jesI6IUbvHj4by52G9AHHPei5bIpkq/view

CLICK HERE FOR IV/I TIMETABLE - Currently Not Available'

utter_MECH.T :

- text: 'CLICK HERE FOR II/I TIMETABLE - https://drive.google.com/file/d/1YupicRqk3f1pQ5OH-xhUpdl3G3Pfz4T6/view

CLICK HERE FOR III/I TIMETABLE - https://drive.google.com/file/d/12joQqOC-1S1lEyfMTrWyswQ_TUnFqSnI/view

CLICK HERE FOR IV/I TIMETABLE - https://drive.google.com/file/d/1D5wx7TNtxDPNdo2aEfo0GW3kRGAukC6f/view'

utter_MBA.T :

- text: 'CLICK HERE FOR SEMI TIMETABLE - https://drive.google.com/file/d/15adcvTmgRa0O_NWuGcYyT0qdTdANYA2y/view

CLICK HERE FOR SEMII TIMETABLE - Currently Not Available

CLICK HERE FOR SEMIII TIMETABLE - https://drive.google.com/file/d/1D-k6EKH05IzMZ4ioU_16CmlLHTUg5K_g/view'

utter_infra:

- text: "The college, with its classic infrastructure and abundant greenery, provides a

pleasant atmosphere for learning. It boasts vast classrooms equipped with projectors and smart screens, facilitating interactive teaching. The central library offers a diverse range of resources, catering to every course and academic need. Separate hostel facilities for boys and girls ensure a safe and comfortable living environment, albeit with slightly expensive fees. Despite the cost, the hostel provides good food, 24/7 water, and a focus on healthy surroundings. The canteen offers decent food options, albeit at a higher price point. Additionally, amenities like a medical dispensary and a large sports ground contribute to the overall well-being and development of students.CLICK THIS FOE MORE https://docs.google.com/document/d/1V8fXvpFJfRAwdEhjPVYkUjxxy_dKSV6Y/edit "

utter_placements:

- text: "In the previous year, the college's placement drive depicted a robust landscape of employment opportunities for its graduating cohort. With a total of 777 offers extended, the campus experienced a notable surge in job prospects across various disciplines. Among these, the Computer Science and Engineering (CSE) department emerged as a key focal point, securing 243 placements, closely followed by Mechanical Engineering (ME) with 268 offers. The Information Technology (IT) sector also demonstrated significant interest, providing 56 placements. Notably, the campus witnessed a considerable number of single offers, indicating direct placements for 461 students. This emphasized the strong alignment between student skills and industry requirements. The high level of student engagement was evident, with 599 individuals actively participating in the recruitment process, showcasing their enthusiasm and readiness for professional roles. Major industry players such as Amazon, TCS, Infosys, and Wipro played pivotal roles, offering competitive compensation packages ranging from 3 to 60 LPA. Overall, the college's placement efforts in the previous year underscored its commitment to facilitating diverse and rewarding career pathways for its students, setting a strong foundation for their future endeavors.FOR MORE ANALYSIS PLEASE REFER https://www.sasi.ac.in/placements-summary/ "

utter_hstl:

- text: "The hostel at SITE offers comprehensive facilities to ensure a comfortable and secure living environment for its students. Located within the college premises, separate accommodations are provided for male and female students. The hostel features spacious rooms that are fully furnished, with round-the-clock access to RO mineral water and uninterrupted electricity and water supply. Hygienic and quality food is served in a spacious mess, with separate seating arrangements for boys and girls. Resident wardens ensure discipline and provide guidance, while a standby power generator and security guard ensure safety during power failures.

Additionally, the hostel offers various amenities including a provision store, coin telephones, indoor gaming facilities, and a computer lab. First aid services are available, and senior faculty provide supervision. Furthermore, assistant wardens offer consultation and guidance to students. The campus also houses a Central Bank ATM for convenience. Students are encouraged to engage in co-curricular and extra-curricular activities such as the Hostel Premier League, 'Seminar Junction' events, and short film contests, promoting holistic development. Overall, the hostel at SITE strives to create a conducive environment for academic growth and personal enrichment.

PLZ CONTACT M. Vijaya Krishna,

Coordinator,

Hostel Committee,

SASI Institute of Technology & Engineering,

Tadepalligudem- 534101

Email id :hostel@sasi.ac.in

FOR MORE INFORMATION"

utter_fee:

- text: "The fee structure for the academic year 2023-24 includes a fee of ₹25,000 for the Diploma program. For the B.Tech program, Category A students are required to pay ₹50,270, while Category B students pay ₹150,810 for the first year and ₹50,270 for subsequent years. M.Tech program fees stand at ₹66,000 for both Category A and B students. MBA students, regardless of category, are charged ₹35,000 for the academic year 2023-24."

utter_transport:

- text: "The transportation facility provided by the Transport Committee covers a wide radius of 70 km for both students and staff. The committee coordinates various bus routes regularly with the help of bus in-charges and supervises daily bus operations, providing instructions as necessary. They also inspect the condition of buses, report for necessary actions, and periodically check bus documents while maintaining ISO documents.

Here is the comprehensive list of bus routes provided by the committee: https://docs.google.com/spreadsheets/d/1E3_jHqTGP44sqMrnvCh4uYwgbSL0BPllS86pIYeea64/edit#gid=0 With these extensive routes, the transportation facility for the college is comprehensive, ensuring accessibility for both students and staff within the specified radius.FOR CONTACT R Narendra Kumar,Coordinator,Transport Committee,SASI Institute of Technology & Engineering,Tadepalligudem-534101,email id :transport@sasi.ac.in"

utter_naac:

- text: "Sure, here is the link for NAAC details of the college: [NAAC Details](https://naac.sasi.ac.in/)"

utter_sasi:

- text: "SASI Institute of Technology & Engineering, established over 42 years ago, has evolved from offering four undergraduate programs to now providing eight undergraduate, six postgraduate, and three diploma programs. Notably, it has secured accreditations from NAAC and NBA, alongside 2(f) & 12(b) status and permanent affiliation from JNTUK. Rooted in West and East Godavari districts, the institute, under the SASI Educational Society, upholds strong values and aims to be a leader in professional education, fostering innovation, ethical citizenship, and global standards. With a commitment to continuous improvement, it creates a conducive environment for active learning, research, and consultancy, aspiring to propel societal transformations.

https://drive.google.com/file/d/1ElC1l5CIy2H0-Ad36IOgMfaf9n6LRq3v/view"

utter_events:

- text: "MOU with foreign University(https://www.sasi.ac.in/mou-with-foreign-

university/),Folk Youth Forum Presents Hare Krishna Utsav at Tadépalligudem.(https://www.sasi.ac.in/folk-youth-forum-presents-hare-krishna-utsav-at-tadepalligudem/),Social & Sustainable Innovations in Technology & Engineering(https://www.sasi.ac.in/social-sustainable-innovations-in-technology-engineering/),2024 International Conference On Social And Sustainable Innovations In Technology And Engineering Sasi-ite'24,Two days workshop on Art of Writing Quality Funding Proposal on coming 3rd and 4th, February, 2023 in face-to-face mode"

utter_faculty:

- text: "Here is the detailed one : https://docs.google.com/spreadsheets/d/1Vg9-gPgJICoIrcuJ3UMWsefpHeAO0pdRYbNfa28c6mE/edit?usp=sharing"

utter_facultycount:

- text: "Total number of faculty available : 208"

utter_studentscount:

- text: "Nearly 1500 Students"

session_config:

session_expiration_time: 60

carry_over_slots_to_new_session: true

For Rasa Stories

version: "3.1"

stories:

- story: happy path

steps:

- intent: greet

- action: utter_greet

- intent: mood_great

- action: utter_happy

- story: sad path 1

steps:

- intent: greet

- action: utter_greet

- intent: mood_unhappy

- action: utter_cheer_up

- action: utter_did_that_help

- intent: affirm

```
  - action: utter_happy
- story: sad path 2
  steps:
  - intent: greet
  - action: utter_greet
  - intent: mood_unhappy
  - action: utter_cheer_up
  - action: utter_did_that_help
  - intent: deny
  - action: utter_goodbye
- story: About College Programs
  steps:
  - intent: programsoffered
  - action: utter_programsoffered
- story: Program1
  steps:
  - intent: B.Tech
  - action: utter_B.Tech
- story: B.Tech Courses
  steps:
  - intent: AI&ML
  - action: utter_Artificial Intelligence & Machine Learning
  - intent: Civil
  - action: utter_Civil Engineering
  - intent: Cse
  - action: utter_Computer Science & Engineering
  - intent: CST
  - action: utter_Computer Science & Technology
  - intent: CSE(AI&ML)
```

- action: utter_CSE (Artificial Intelligence & Machine Learning)

- intent: CSE(Data Science)

- action: utter_CSE (Data Science)

- intent: CSE(Iot)

- action: utter_CSE (Internet of Things and Cyber Security including Block Chain Technology)

- intent: ECE

- action: utter_Electronics & Communication Engineering

- intent: ECT

- action: utter_Electronics & Communication Technology

- intent: EEE

- action: utter_Electrical & Electronics Engineering

- intent: IT

- action: utter_Information Technology

- intent: MECH

- action: utter_Mechanical Engineering.

- story: Program2

steps:

- intent: M.Tech

- action: utter_M.Tech

- story: M.Tech Courses

steps:

- intent: CSE(M.Tech)

- action: utter_Computer Science & Engineering_M. Tech

- intent: VLS&ES

- action: utter_VLSI&ES

- intent: CE&SP

- action: utter_CE&SP

- intent: Electronics

- action: utter_Power Electronics

```
  - intent: CAD&CAM
  - action: utter_CAD&CAM
- story: Program3
  steps:
  - intent: MBA
  - action: utter_MBA
- story: MBACourses
  steps:
  - intent: Coursesof MBA
  - action: utter_Master of Business Administration
- story: Diplomo
  steps:
  - intent: Diplomo
  - action: utter_Diploma
- story: Diplomo Courses
  steps:
  - intent: DECE
  - action: utter_DECE
  - intent: DCME
  - action: utter_DCME
  - intent: DEEE
  - action: utter_DEEE
  - intent: DME
  - action: utter_DME
- story: Departments
  steps:
  - intent: Dept
  - action: utter_Dept
- story: TimeTables
```

```
  steps:
  - intent: AS&H.DT
  - action: utter_AS&H.T
  - intent: Civil.DT
  - action: utter_Civil.T
  - intent: ECT.DT
  - action: utter_ECT.T
  - intent: CSE.DT
  - action: utter_CSE.T
  - intent: CST.DT
  - action: utter_CST.T
  - intent: ECE.DT
  - action: utter_ECE.T
  - intent: EEE.DT
  - action: utter_EEE.T
  - intent: IT.DT
  - action: utter_IT.T
  - intent: AI&ML.DT
  - action: utter_AI&ML.T
  - intent: MECH.DT
  - action: utter_MECH.T
  - intent: MBA.DT
  - action: utter_MBA.T
- story: About College
  steps:
  - intent: Sasi
  - action: utter_sasi
  - intent: Infrastructure
  - action: utter_infra
```

- intent: Placements
- action: utter_placements
- intent: Hostel
- action: utter_hstl
- intent: FeeStructure
- action: utter_fee
- intent: Transport
- action: utter_transport
- intent: NAAC
- action: utter_naac
- intent: Sasievents
- action: utter_events
- intent: Faculty
- action: utter_faculty
- intent: FacultyCount
- action: utter_facultycount
- intent: Studentscount
- action: utter_studentscount

Rasa Configuration File: default.v1

assistant_id: 20240307-094708-pure-rhyth

language: en

pipeline: null

ANNEXURE B

SCREENSHOTS

B.1 VIRTUAL ENVIRONMENT

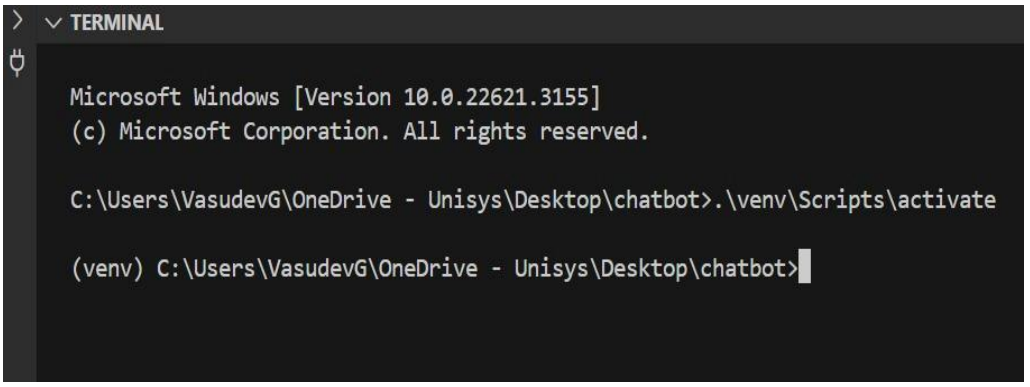

Figure B.1 : Activating the virtual environment

B.2 TRAIN DATA

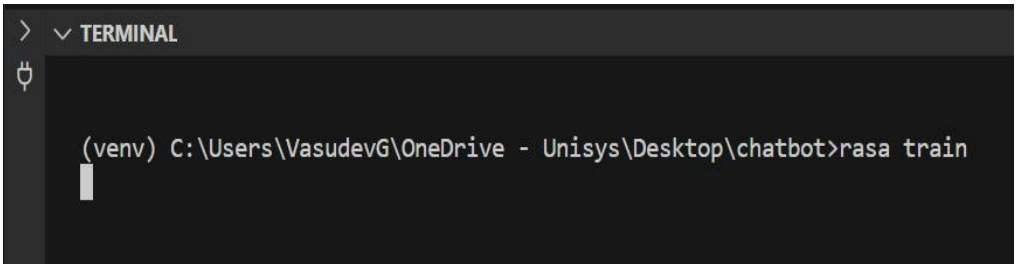

Figure B.2.1 Training the dataset

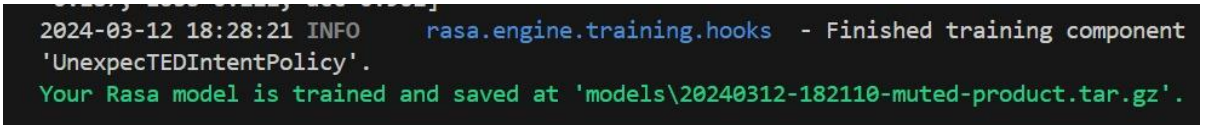

Figure B.2.2 Sucessfully Trained the dataset

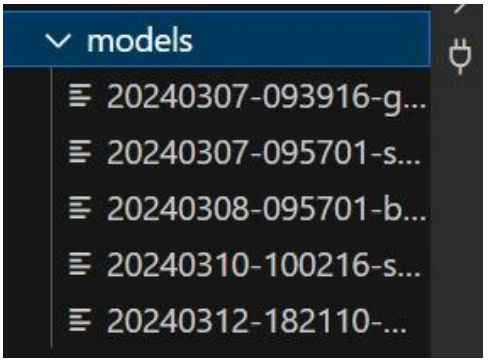

Figure B.2.3 Location of Trained data

B.3 INTERACTING

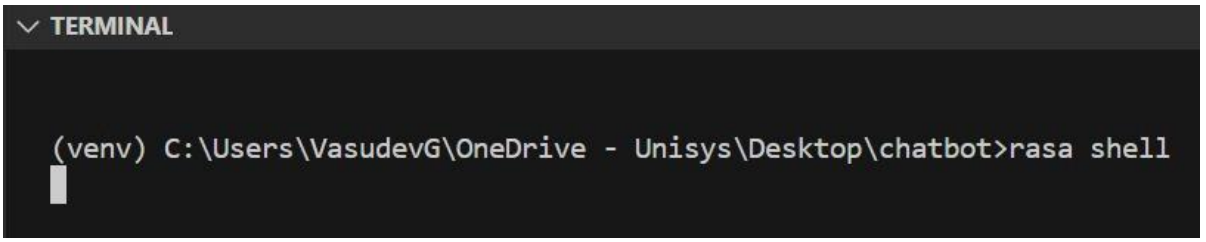

Figure B.3.1 : Initializing cmd for interaction

Figure B.3.2 : Result of the Educational Chatbot

B.4 VALIDATING

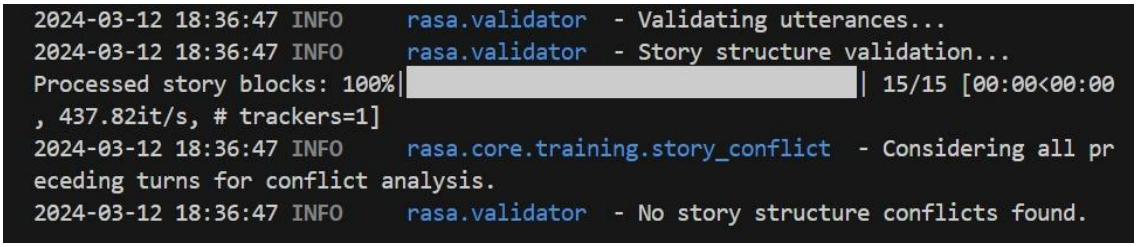

Figure B.4 : Validation output of the Educational Chatbot

B.5 VISUALIZATION

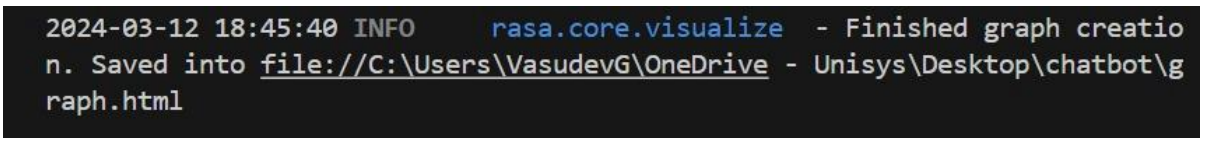

Figure B.5 : Visualization of the Educational Chatbot

B.6 GRAPH

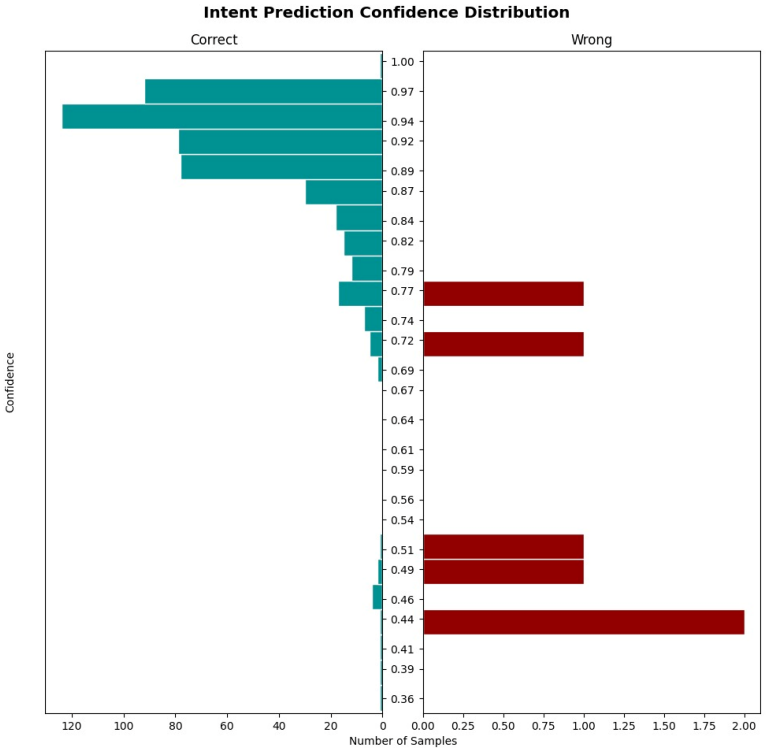

Figure B.6 : Confidence Distrubution of intent prediction

Annexure C

Data Set Used

This Rasa College chatbot was developed using a dataset collected from the official Rasa College website. The dataset encompassed a variety of textual information relevant to students, including:

- Descriptions of courses offered
- Faculty profiles and bios
- Information on labs and facilities
- Details about placement statistics and resources

Real-world college information can exhibit variations similar to the challenges

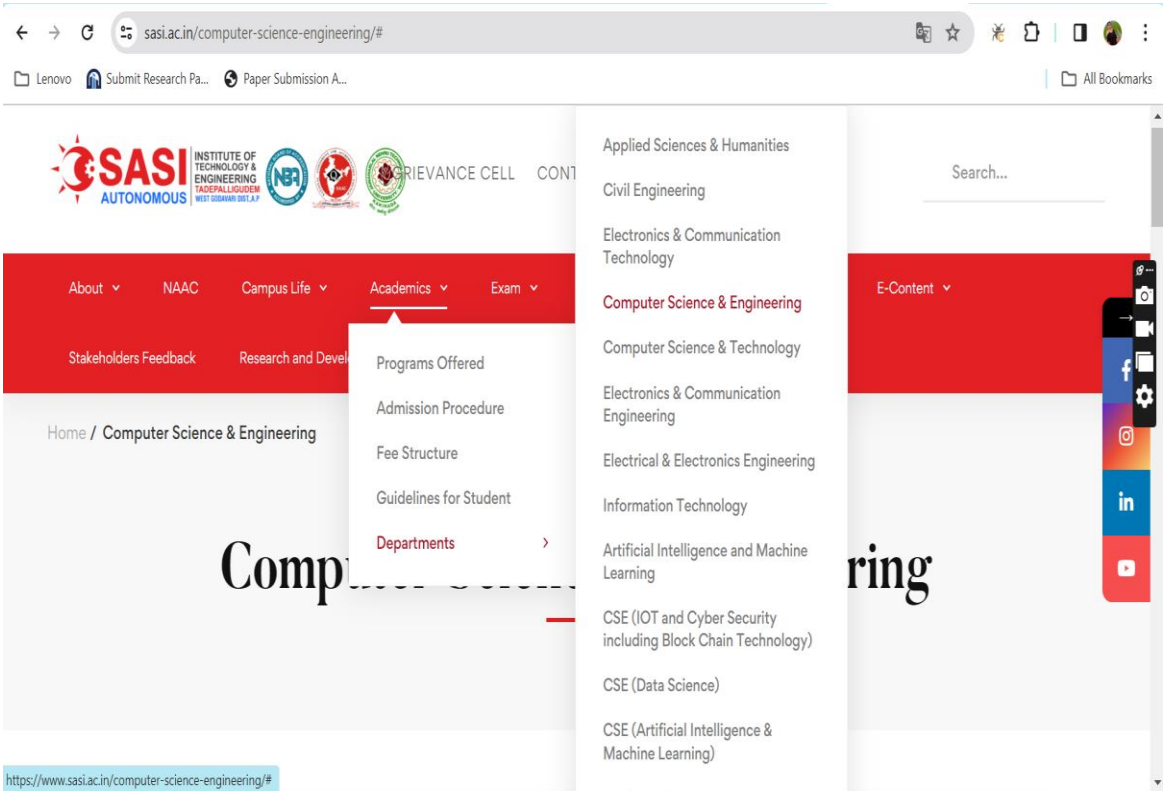

Figure C.1 : College Website

ANNEXURE D
STUDENT CONTRIBUTION

Project Members Contribution Table

No	Activity	20K61A05G9	20K61A0571	20K61A05F3	19K61A05G8
1	Title Conformation	✓	✓	✓	
2	Literature Survey	✓	✓	✓	✓
3	Research	✓	✓	✓	✓
4	Planning and Organization	✓	✓	✓	✓
5	Requirement Gathering	✓	✓		✓
6	Coding/Development	✓		✓	✓
7	Implementation	✓		✓	
8	Documentation	✓	✓		
9	Presentation Preparation	✓	✓	✓	✓

ANNEXURE E

PO, PSO, PEO, AND CO RELEVANCE WITH PROJECT

CO-PO MAPPING SHEET COURSE OUTCOMES

OUTCOME NO	DESCRIPTION
CO1	Develop problem formation and design skills for engineering and real-world problems.
CO2	Collect and Generate ideas through literature survey on current research areas which help to analyze and present to impart knowledge in different fields.
CO3	Import knowledge on software & hardware to meet industry perspective needs and standards.
CO4	Create interest to carry out research on innovative ideas as a lifelong learning.
CO5	Ability to work with team and enrich presentation and communication skills.
CO6	Create a platform that makes students employable.

SUMMARY OF CO MAPPING TO PROGRAM OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	0	0	1	0	1	1	1	3	3	0	1	0	0
CO2	3	3	0	0	0	2	0	0	3	2	0	0	0	0
CO3	2	0	1	1	3	0	0	0	3	2	0	0	0	0
CO4	3	0	0	3	3	0	3	1	3	3	1	1	0	0
CO5	2	0	0	0	2	0	0	0	3	3	0	3	0	0
CO6	2	1	0	0	3	1	0	3	3	2	2	2	0	0
Overall Course	3	1	1	1	2	1	1	0	3	2	1	1	0	0

PROGRAM OUTCOMES (POs)

POs	PROGRAM OUTCOMES	RELEVANCE
PO1	**Engineering Knowledge:** Apply knowledge of mathematics,science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.	This project needs a mathematics and Computer Science and Engineering specialization background to perform calculations in the classification task.
PO2	**Problem Analysis:** Identity, formulates, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.	For this project ruderous literature survey is conducted to analyze the existing systems problems.
PO3	**Design/ Development of Solutions:** Design solutions for complex engineering problems and design system components or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.	Once the formulation of the problem has been completed, the design of the solution relevant to the problem is created to meet the needs of the problem in all aspects.
PO4	**Conduct investigations of complex problems:** Using research-based knowledge and research methods including design of experiments, analysis, and interpretation of data, and synthesis of the information to provide valid conclusions.	Referred to similar kinds of experiments to gain the knowledge of fixing parameters and framing the conclusions.
PO5	**Modern Tool Usage:** Create, select and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.	Recent methods like Jupiter notebook have been used to solve the stated problem
PO6	**The Engineer and Society:** Apply to reason informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional engineering practice.	This problem provides a solution to the people without depletion of any cultural, social, health, safety, and legal issues.

PO7	**Environment and Sustainability:** Understand the impact of professional engineering solutions in societal and environmental contexts and demonstrate knowledge of and need for sustainable development.	This Project doesn't deteriorate any sort of environmental issues.
PO8	**Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practice.	This project has been executed by following proper ethics as stated in the engineering practice.
PO9	**Individual and Teamwork:** Function effectively as an individual, and as a member or leader in diverse teams and multidisciplinary settings.	This project is carried out with collective teamwork by making the entire project into proper segments.
PO10	**Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear. instructions.	Complete information related to the project has been documented for clear understanding.
PO11	**Life-long Learning:** Recognize the need for and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.	----
PO12	**Project Management and Finance:** Demonstrate knowledge and understanding of engineering and management principles and apply these to one's work, as a member and leader in a team, to manage projects and in multidisciplinary environments.	This work can be enhanced to a larger extent concerning time and other factors.

PROGRAM SPECIFIC OUTCOME (PSOs)

PSOs	Program Specific Outcome	Relevance
PSO1	**Mobile & Web Application Development:** Ability to develop mobile & web applications using J2EE, Android, and J2ME.	-----

PSO2	**Cloud Services:** To deploy virtualized and cloud-based services in the organization.	-----

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

PEOs	Programmed Educational Objectives	RELEVANCE
PEO 1	Graduates will be able to analyze, design, and develop advanced computer applications to provide a solution to real-world problems.	To get the project executed, all the team have done analysis and research-oriented surveys to frame the solution and identify the limitations.
PEO 2	Graduates are well-trained, confident, research-oriented, and industry-ready professionals who are intellectual, ethical, and socially committed.	As implemented the problem with Deep Learning, is the latest trend that leads to being well accustomed to the recent technological standards as per industry requirements.
PEO 3	Graduates will have the technical, communication skills and character that will prepare them for technical and leadership roles.	After completing the project successfully, all the team members can be able to reach a satisfactory level in explaining technical aspects with effective communication.

COURSE OUTCOME (COs)

COs	Course Outcome	POs, PSOs, and PEOs Mapped
CO1	Develop problem formation and design skills for engineering and real-world problems	PO1, PO2, PO3, PSO2
CO2	Collect and Generate ideas through literature surveys on current research areas which help to analyze and	PO2, PO3, PO5, PO6
CO3	Import knowledge of software & hardware to meet industry perspective needs and standards.	PO5, PO7, PO8, PO9
CO4	Create interest to research innovative ideas as lifelong learning.	PO11
CO5	Ability to work with a team and enrich presentation and communication skills.	PO10

CO6	Create a platform that makes students employable.	PO5, PO9, PO11, PO12, PSO2

RELEVANCE TO POs

CO	PO	PI	Relevance
CO1	**PO1**	**1.2.1**	Apply different statistics and numerical techniques to solve the problem.
	PO4	**4.4.2**	Understand the problem and applied the proper algorithm.
	PO6	**6.4.1**	This is challenges state to assess societal, safety and legal issues.
	PO7	**7.3.1**	Identified the risks/impacts in the life cycle of an product and activity.
	PO8	**8.3.1**	Identified situations of unethical professional conduct and propose ethical alternatives.
	PO9	**9.5.2**	This work is carried out by all the team members.
	PO10	**10.4.2**	Produced the work in well-structured form**.**
	PO12	**12.5.2**	This work can be enhanced to larger extent with respect to the time and other factors.
CO2	**PO1**	**1.6.1**	Uses the engineering fundamentals to complete the work.
	0PO2	**2.6.4**	Compared and select alternative solutions/methods to select the best methods.
	PO6	**6.4.1**	Interpret legislation, regulations, codes, and standards relevant to your discipline and explain their contribution to the protection of the public.
	PO9	**9.5.2**	Treat other team members respectfully.
	PO10	**10.4.2**	Produced the work in a well-structured form**.**
	PO1	**1.2.1**	Applied the knowledge of discrete structures, linear algebra, statistics, and numerical techniques to solve problems.

CO3	**PO3**	**3.6.2**	Ability to produce a variety of potential design solutions suited to meet functional requirements.
	PO4	**4.4.3**	Ability to choose appropriate hardware/software tools to conduct the experiment.
	PO5	**5.5.1**	Identify the strengths and limitations of tools for (i) acquiring information, (ii) modelling and simulating, (iii) monitoring system performance, and (iv) creating engineering designs.
	PO9	**9.4.2**	Implement the norms of practice (e.g., rules, roles, charters, agendas, etc.) of effective teamwork, to accomplish a goal.
	PO10	**10.4.1**	Read, understand, and interpret technical and nontechnical information.
CO4	**PO1**	**1.5.1**	Apply laws of natural science to an engineering problem.
	PO4	**4.6.2**	Critically analyses data for trends and correlations, stating possible errors and limitations.
	PO5	**5.6.2**	Verify the credibility of results from tool use with reference to the accuracy and limitations, and the assumptions inherent in their use.
	PO7	**7.4.1**	Describe management techniques for sustainable development
	PO8	**8.4.2**	Examine and apply moral & ethical principles to known case studies
	PO9	**9.5.2**	Treat other team members respectfully
	PO10	**10.5.2**	Deliver effective oral presentations to technical and nontechnical audiences
	PO11	**11.4.2**	Analyze different forms of financial statements to evaluate the financial status of an engineering project
	PO1	**1.6.1**	Apply engineering fundamentals
	PO5	**5.5.2**	Demonstrate proficiency in using discipline specific tools.
	PO9	**9.5.3**	Listen to other members ure in difficult situations

CO5	**PO10**	**10.5.1**	Listento and comprehend information, instructions, and viewpoints of others
			Analyze sourced technical and popular
	PO12	**12.6.2**	information for feasibility, viability, sustainability,
	PO1	**1.7.1**	Apply theory and principles of computer science engineering to solve an engineering problem.
	PO2	**2.6.2**	Identifies functionalities and computing resources.
	PO5	**5.6.1**	Discuss limitations and validate tools, techniques, and resources
			Identify and describe various engineering roles;
	PO6	**6.3.1**	particularly as pertains to protection of the public. and public interest at global, regional, and local level
	PO8	**8.3.1**	Identify situations of unethical professional conduct and propose ethical alternatives.
CO6	**PO9**	**9.5.1**	Demonstrate effective communication, problem solving, conflict resolution and leadership skills
	PO10	**10.5.1**	Listento and comprehend information, instructions, and viewpoints of others
			Identify the tasks required to complete an
	PO11	**11.6.1**	engineering activity, and the resources required to
			complete the tasks.
	PO12	**12.6.1**	Source and comprehend technical literature and other credible sources of information.

CO	PSO	Relevance
CO1	-	-
CO2	-	-
CO3	-	-
CO4	-	-
CO5	-	-
CO6	-	-

Annexure F

PUBLICATION PROOF REVIEW PAPER

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JOURNAL OF EMERGING TECHNOLOGIES AND INNOVATIVE RESEARCH (JETIR)

An International Scholarly Open Access, Peer-reviewed, Refereed Journal

Ref No : JETIR / Vol 11 / Issue 3 / 036

Confirmation Letter

To,
V.Ganga Bhavani
Published in : Volume 11 | Issue 3 | 2024-03-04

Subject: Publication of paper at International Journal of Emerging Technologies and Innovative Research .

Dear Author,

With Greetings we are informing you that your paper has been successfully published in the International Journal of Emerging Technologies and Innovative Research (ISSN: 2349-5162). Following are the details regarding the published paper.

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UGC Approval	: UGC and ISSN Approved - UGC Approved Journal No: 63975 | Link: https://www.ugc.ac.in/journallist/subjectwisejurnallist.aspx?tid=MjM0OTUxNjI=&&did=U2VhcmNoIGJ5IElTU04=
Registration ID	: JETIR 533121
Paper ID	: JETIR2403036
Title of Paper	: A Survey on Various Chatbots
Impact Factor	: 7.95 (Calculate by Google Scholar)
DOI	:
Published in	: Volume 11 | Issue 3 | 2024-03-04
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Page No	: a277-a284
Published URL	: http://www.jetir.org/view?paper=JETIR2403036
Authors	: V.Ganga Bhavani, Akula.V.S. Siva Rama Rao, K.Manasa Lakshmi, S.Venkateswara Rao, V.Venkata Sai Anuhya

Thank you very much for publishing your article in JETIR. We would appreciate if you continue your support and keep sharing your knowledge by writing for our journal JETIR.

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