CHATBOT FOR TRAVEL AGENCIES

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CHATBOT FOR TRAVEL AGENCIES

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in

Data Science

By

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CERTIFICATE

This is to certify that the dissertation entitled **“”** is a bonafide work of “**Rohit Parab” (2020-B-03032002B) and “Adarsh Naik**” **(2020-B-09101997) submitted** to the School of Engineering, Ajeenkya D Y Patil University, Pune in partial fulfillment of the requirement for the award of the degree of **“Bachelor of Computer Application in Data Science”**.

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Supervisor's Certificate

This is to certify that the dissertation entitled **"Chatbot For Travel Agencies"** submitted by "**Rohit Parab" (2020-B-03032002B)** and **"Adarsh Naik**" **(2020-B-09101997),** is a record of original work carried out by him/her under my supervision and guidance in partial fulfillment of the requirements of the degree of **Bachelor of Computer Application in Data Science** at **School of Engineering**, **Ajeenkya DY Patil University, Pune, Maharashtra-412105**. Neither this dissertation nor any part of it has been submitted earlier for any degree or diploma to any institute or university in India or abroad.

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Declaration of Originality

I "***Rohit Parab*****,** URN ***2020-B-03032002B and I "Adarsh Naik" URN 2020-B-09101997***, hereby declare that this dissertation entitled "**Chatbot For Travel Agencies*"*** presents my original work carried out as a bachelor student of School of Engineering, Ajeenkya D Y Patil University, Pune, Maharashtra. To the best of my knowledge, this dissertation contains no material previously published or written by another person, nor any material presented by me for the award of any degree or diploma of Ajeenkya D Y Patil University, Pune or any other institution. Any contribution made to this research by others, with whom I have worked at Ajeenkya D Y Patil University, Pune or elsewhere, is explicitly acknowledged in the dissertation. Works of other authors cited in this dissertation have been duly acknowledged under the sections "Reference" or "Bibliography". I also declare that I have adhered to all principles of academic honesty and integrity and have not misrepresented or fabricated or falsified any idea/data/fact/source in my submission.

We fully aware that in case of any non-compliance detected in future, the Academic Council of Ajeenkya D Y Patil University, Pune may withdraw the degree awarded to me on the basis of the present dissertation.

Date:

Place: Lohegaon, Pune

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Rohit Parab

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Adarsh Naik

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I would like to say that it has indeed been a fulfilling experience for working out this Project.

Rohit Parab

Adarsh Naik

Abstract

This project involved building a travel chatbot that offers weather updates, real-time language translation services, and package booking to users. The chatbot was developed using Python and made use of various libraries including requests and translate. The weather updates were provided by calling an external API, while the translation service was achieved using the Google Cloud Translation API.

The chatbot was designed to continuously prompt the user for input and provide either weather updates, translations, or package booking based on the user's choice. The chatbot also allowed the user to exit the session by typing "exit". In addition, the chatbot provided options for the user to book a travel package, which included flights, hotels, and activities. The package booking was accomplished by integrating with various travel booking APIs.

Overall, this project provided a practical application of natural language processing and API integration in building a functional travel chatbot that offers a range of useful services to users.
Keywords: Chatbot, Data Science, Disease Prediction, Machine Learning, Data Mining, Early Detection.

Contents

List of Abbreviation

AI Artificial Intelligence

API Application Processing Interface

ASR Automatic Speech Recognition

IDE Integrated Development Environment

NLP Natural Processing Language

NLTK Natural Language Toolkit

SQL Structured Query Language

CHAPTER 1

INTRODUCTION

This project focuses on utilizing data science and machine learning techniques to develop a chatbot system that can assist individuals in various aspects of their lives. Data science is a multidisciplinary field that combines statistical analysis, machine learning, and data visualization to extract valuable insights from large amounts of data.

By leveraging the power of machine learning algorithms, this chatbot aims to provide personalized recommendations, answer queries, and assist with decision-making processes. The chatbot will learn from user interactions and continuously improve its responses and suggestions over time.

The integration of data science techniques into the chatbot's design allows it to analyse and interpret user data, enabling the system to provide tailored suggestions for disease prevention and early detection. By analysing patterns and trends in the user's health data, the chatbot can identify potential risk factors and advise on preventive measures to maintain or improve their well-being.

The application of machine learning algorithms within the chatbot system enables it to handle a wide range of inquiries and provide accurate and relevant information. Whether it is providing general health advice, recommending lifestyle changes, or suggesting specific screenings or tests, the chatbot aims to be a reliable source of information and support for individuals seeking assistance with their health concerns.

Furthermore, the chatbot's data science capabilities can help healthcare professionals access up-to-date information and resources, allowing them to make informed decisions and provide better care to their patients. By incorporating real-time data analysis and predictive modelling, the chatbot can assist healthcare professionals in diagnosing diseases, monitoring patient progress, and recommending appropriate treatments.

Overall, this data science-driven chatbot project aims to enhance the quality of life for individuals by leveraging machine learning and data analysis techniques to provide personalized recommendations, facilitate disease prevention, and empower users to make informed decisions about their health.

1.1 AIM OF OUR RESEARCH:

The aim of our research paper is to explore the application of data science techniques in the development of a chatbot system. Specifically, we aim to investigate how machine learning algorithms and natural language processing can be leveraged to enhance the functionality and effectiveness of chatbots in various domains.

Our research will focus on developing a chatbot that can effectively understand and respond to user queries, providing accurate and contextually relevant information. We will utilize data science methodologies to train the chatbot on large datasets, enabling it to learn patterns, extract insights, and improve its responses over time.

Additionally, we aim to evaluate the performance of the chatbot by assessing metrics such as response accuracy, response time, user satisfaction, and usability. Through rigorous testing and evaluation, we will analyse the effectiveness of different data science techniques and algorithms in enhancing the chatbot's performance and user experience.

Furthermore, we will explore the integration of external data sources, such as medical databases or knowledge bases, to augment the chatbot's knowledge and expand its capabilities. This will enable the chatbot to provide more comprehensive and accurate information on specific topics or domains.

In our research paper, we will also investigate the ethical considerations surrounding chatbot development, including privacy, security, and bias. We will propose methods to address these challenges and ensure that the chatbot system adheres to ethical guidelines and safeguards user information.

Overall, the research paper aims to contribute to the field of data science by showcasing the potential of chatbot systems and their integration with data science techniques. The findings of our research will provide valuable insights into the development and optimization of chatbots, opening doors for further advancements in the application of data science in this domain.

CHAPTER 2
OBJECTIVE

2.1. OBJECTIVE OF OUR RESEARCH:

The objective of our research paper is to investigate the capabilities and potential of data science techniques in the development of a chatbot system. Specifically, we aim to achieve the following objectives:

1. Develop a chatbot architecture: We will design and implement a chatbot system that incorporates data science techniques such as natural language processing (NLP), machine learning, and knowledge representation. The chatbot will be able to understand user queries, generate appropriate responses, and adapt its behaviour based on user interactions.
2. Enhance user interaction: We will explore methods to improve the user experience by incorporating advanced NLP algorithms to accurately interpret user input, handle complex queries, and provide contextually relevant responses. The chatbot will aim to simulate human-like conversations and engage users effectively.
3. Employ machine learning algorithms: We will leverage machine learning algorithms to train the chatbot on large datasets, enabling it to learn patterns, extract meaningful insights, and continuously improve its performance over time. This includes exploring supervised learning, unsupervised learning, and reinforcement learning techniques for chatbot training.
4. Evaluate performance and effectiveness: We will assess the performance of the chatbot by measuring metrics such as response accuracy, response time, user satisfaction, and usability. Through rigorous testing and evaluation, we will analyse the effectiveness of the data science techniques employed and identify areas for improvement.
5. Address ethical considerations: We will consider ethical implications related to chatbot development, such as privacy, security, and bias. We will propose strategies to ensure the protection of user data, address potential biases in the chatbot's responses, and adhere to ethical guidelines throughout the development process.

6. Demonstrate practical applications: We will showcase the practical applications of the chatbot system in various domains, such as healthcare, customer support, or information retrieval. We will provide case studies and examples to illustrate how the chatbot can benefit users and organizations by streamlining processes and improving user engagement.

By achieving these objectives, our research paper aims to contribute to the field of data science by advancing the understanding and implementation of chatbot systems. The findings will provide valuable insights into the development, optimization, and real-world applications of chatbots, driving further advancements in the integration of data science techniques for intelligent conversational agents.

2.2. PROBLEM STATEMENT:

The problem addressed by this chatbot data science project is the need for an intelligent and user-friendly interface that can accurately predict the likelihood of developing specific diseases based on individual risk factors. Currently, individuals face challenges in obtaining timely and accurate disease predictions, which can lead to delayed interventions and suboptimal health outcomes.

Existing disease prediction methods often require extensive medical knowledge, technical expertise, or access to healthcare professionals, making them less accessible to the general population. Moreover, traditional approaches may not effectively utilize the vast amount of available healthcare data and fail to provide personalized recommendations for disease prevention and management.

The lack of a comprehensive and user-friendly solution hinders individuals' ability to take proactive measures to prevent diseases or seek appropriate medical interventions at an early stage. It also poses challenges for healthcare providers in efficiently identifying high-risk individuals and delivering targeted interventions.

Therefore, the problem addressed by this chatbot data science project is to develop a chatbot system that leverages data science techniques, such as machine learning and natural language processing, to accurately predict disease likelihood based on user-provided risk factors. The chatbot will provide accessible and personalized disease predictions, empowering individuals to make informed

decisions about their health and enabling healthcare providers to deliver timely interventions and improve health outcomes. By bridging the gap between individuals and healthcare systems, this project aims to revolutionize disease prediction and prevention, ultimately enhancing overall healthcare effectiveness and patient well-being.

CHAPTER 3

PROPOSED SYSTEM

3.1. EXISTING SYSTEM:

The existing system for the chatbot data science project consists of various components and technologies that work together to provide a functional chatbot system. Here is an overview of the existing system:

1. Natural Language Processing (NLP): The existing system incorporates NLP techniques to enable the chatbot to understand and interpret user input. NLP algorithms analyse the structure and meaning of user queries, allowing the chatbot to generate appropriate responses.
2. Machine Learning Algorithms: The chatbot system utilizes machine learning algorithms to train and improve its performance over time. These algorithms are employed to recognize patterns, extract relevant information, and make accurate predictions based on the provided data.
3. Datasets: The existing system relies on diverse datasets containing relevant information about diseases, risk factors, symptoms, medical history, and other healthcare-related data. These datasets serve as the foundation for training the machine learning models and enhancing the chatbot's disease prediction capabilities.
4. User Interface: The chatbot system features a user-friendly interface that enables users to interact with the chatbot. The interface may be implemented through a web-based application, mobile application, or integrated within existing platforms like messaging apps or websites.
5. Backend Development: The system utilizes backend development technologies such as Flask, a Python-based microframework for web development. Flask provides the

infrastructure for handling user requests, processing data, and generating appropriate responses from the chatbot.

6. Database Management: To store user data securely and facilitate personalized recommendations, the system utilizes a database management system. Technologies like Flask_ SQL Alchemy, a Python library for database integration, may be employed to create and manage the database.
7. Integration with External Services: The existing system may integrate with external services such as medical databases, APIs, or knowledge bases to augment the chatbot's knowledge and provide accurate and up-to-date information to users.
8. Continuous Improvement: The chatbot system employs mechanisms for continuous improvement. This may involve feedback loops where user interactions are analysed to identify areas for enhancement, updates to machine learning models, and regular updates to the chatbot's knowledge base.

   Overall, the existing system for the chatbot data science project combines NLP, machine learning, user interface design, database management, and integration with external services to create an intelligent and user-friendly chatbot system capable of accurately predicting disease likelihood and providing personalized recommendations for disease prevention and management.

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3.2. DESIGN AND DEVELOPMENT:

The design and development process for the chatbot data science project involves several key steps and considerations. Here is an overview of the design and development process:

1. Requirement Gathering: The first step is to gather requirements by understanding the project objectives, target users, and desired functionalities of the chatbot system. This involves conducting stakeholder interviews, user surveys, and studying existing systems or literature in the domain.

2. System Architecture Design: Based on the gathered requirements, the system architecture is designed. This includes determining the overall structure of the chatbot system, the integration of various components such as NLP, machine learning algorithms, and database management, and defining the flow of information between these components.

3. Data Collection and Preparation: Relevant datasets are collected or acquired to train and validate the machine learning models used in the chatbot system. These datasets may include information about diseases, risk factors, symptoms, medical records, and historical user interactions. The data is cleaned, pre-processed, and transformed into a suitable format for training the models.

4. Natural Language Processing (NLP): NLP techniques are employed to enable the chatbot to understand and interpret user queries. This involves tasks such as tokenization, part-of-speech tagging, named entity recognition, and sentiment analysis. NLP libraries and tools such as NLTK (Natural Language Toolkit) or spaCy may be used.

5. Machine Learning Model Development: Machine learning algorithms are utilized to build predictive models that can accurately predict disease likelihood based on user-provided risk factors. Supervised learning algorithms like decision trees, random forests, or neural networks may be trained on the prepared datasets. The models are validated and fine-tuned to achieve optimal performance.

6. User Interface Design: The user interface (UI) of the chatbot system is designed to provide an intuitive and user-friendly experience. UI design considerations include selecting appropriate colours, fonts, and layouts, and ensuring easy navigation and interaction with the chatbot. Prototyping tools or UI frameworks can be used to create mock-ups or wireframes for the UI design.

7. Backend Development: The backend development involves implementing the core functionalities of the chatbot system. This includes developing the logic for processing user queries, integrating NLP and machine learning models, managing databases, and handling user authentication and session management. Python-based web frameworks like Flask or Django are commonly used for backend development.

8. Integration and Testing: The different components of the chatbot system, including NLP, machine learning models, user interface, and databases, are integrated and tested for compatibility and functionality. Unit tests, integration tests, and user acceptance tests are performed to ensure the system operates smoothly and meets the desired requirements.

9. Deployment and Maintenance: The chatbot system is deployed on a suitable hosting platform or server infrastructure. Regular monitoring and maintenance activities are performed to address any issues, update models and data, and incorporate user feedback to improve the system's performance over time.

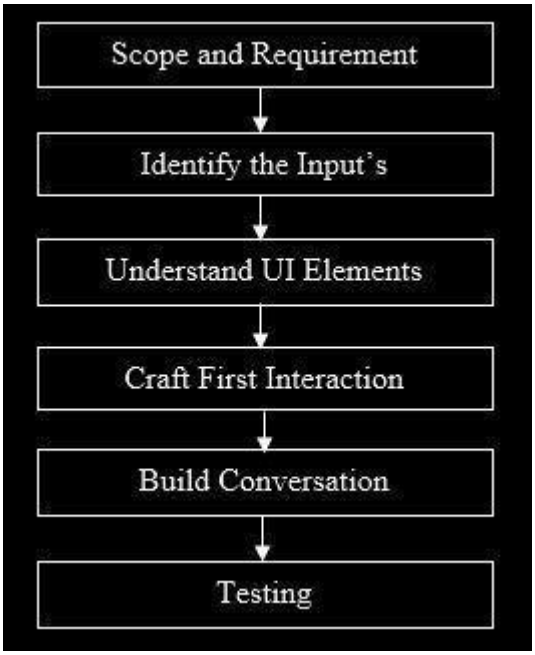


Fig 1: Design of Chatbot

3.3. PROPOSED SYSTEM:

The proposed system for the chatbot data science project aims to develop an advanced and user-friendly chatbot system that accurately predicts disease likelihood based on user-provided risk factors. The system incorporates cutting-edge technologies and methodologies to deliver improved disease prediction, personalized recommendations, and an enhanced user experience. Here is an overview of the proposed system:

1. User Interface: The proposed system will feature an intuitive and interactive user interface that allows users to input their risk factors, such as age, gender, family history, lifestyle habits, and any relevant medical history. The user interface will be designed to be accessible and user-friendly, catering to both technical and non-technical users.

2. Natural Language Processing (NLP): NLP techniques will be employed to enable the chatbot system to understand and interpret user queries. Advanced NLP algorithms will be utilized to extract meaningful information from user input and generate accurate responses. This includes tasks like intent recognition, entity extraction, and sentiment analysis.

3. Machine Learning Models: The proposed system will utilize state-of-the-art machine learning algorithms to build predictive models for disease likelihood prediction. Supervised learning algorithms, such as deep learning models or ensemble models, will be trained on comprehensive datasets containing relevant healthcare information. These models will be optimized for high accuracy and will undergo rigorous validation and evaluation.

4. Data Integration and Knowledge Base: The system will integrate with external medical databases, APIs, and knowledge bases to augment its knowledge and provide up-to-date information. This integration will ensure that the chatbot system has access to the latest research findings, treatment guidelines, and medical literature, enhancing the accuracy of disease predictions and recommendations.

5. Personalized Recommendations: The proposed system will provide personalized recommendations based on the predicted disease likelihood. These recommendations may include lifestyle modifications, preventive measures, screening tests, or referrals to healthcare professionals. The system will consider individual risk factors and provide tailored advice to empower users in managing their health effectively.

6. Privacy and Security: The proposed system will prioritize privacy and security measures to protect user data and ensure compliance with data protection regulations. Encryption techniques, secure data storage, and user authentication mechanisms will be implemented to safeguard user information and maintain confidentiality.

7. Continuous Learning and Improvement: The chatbot system will be designed to continuously learn and improve over time. User feedback, interactions, and outcomes will be analysed to

refine the machine learning models and enhance the system's performance. Regular updates and maintenance will be conducted to incorporate new research findings and improve the accuracy of disease predictions.

8. Scalability and Accessibility: The proposed system will be designed to be scalable, allowing for future expansion and accommodating a growing user base. It will be accessible across different platforms, including web browsers, mobile devices, and messaging applications, to ensure widespread availability and convenience.

The proposed system aims to revolutionize disease prediction and prevention by providing an advanced chatbot solution that empowers individuals to make informed decisions about their health. By leveraging the power of data science, machine learning, and NLP, the system will enhance disease prediction accuracy, promote early intervention, and improve overall healthcare outcomes.

3.4. REQUIREMENTS:

Creating a chatbot data science project requires careful consideration of various requirements to ensure its successful implementation. Here are some key requirements for creating a chatbot data science project:

3.1 Functional Requirements:

Natural Language Processing (NLP): The chatbot should be able to understand and process user inputs in natural language, including text or speech.

- Intent Recognition: The chatbot should be able to recognize the user's intent or purpose behind their queries and map them to relevant actions or responses.
- Response Generation: The chatbot should be capable of generating appropriate and contextually relevant responses based on user inputs and predefined knowledge or data.
- Knowledge Base: The chatbot should have access to a structured knowledge base or database containing relevant information for responding to user queries.
- Personalization: The chatbot should be able to provide personalized responses based on user preferences, history, or other contextual information.
- Integration with Data Science Models: The chatbot should integrate with data science models or algorithms for tasks such as disease prediction, sentiment analysis, recommendation systems, etc.

3.2 User Interface Requirements:

- Chatbot Interface: The chatbot should have a user-friendly interface that allows users to interact with it seamlessly.
- Multi-Platform Support: The chatbot should be accessible across various platforms and devices, including web, mobile, and messaging apps.
- Rich Media Support: The chatbot should be capable of handling and displaying rich media content such as images, videos, or documents when required.

3.3 Technical Requirements:

- Programming Language: Select a suitable programming language such as Python, Java, or JavaScript for developing the chatbot.
- Chatbot Frameworks: Utilize chatbot development frameworks such as Dialogflow, Rasa, or Microsoft Bot Framework to streamline the development process.
- Natural Language Processing Libraries: Incorporate NLP libraries like NLTK, SpaCy, or Stanford NLP to enable language understanding and processing capabilities.
- Integration APIs: Implement integration APIs to connect the chatbot with external systems, databases, or data science models as required.
- Scalability and Performance: Design the chatbot architecture to handle multiple simultaneous user interactions and ensure high performance.

3.4 Data and Privacy Requirements:

- Data Collection and Storage: Determine the data collection requirements and implement a secure storage mechanism to handle user interactions and relevant data.
- Data Privacy and Security: Ensure compliance with data privacy regulations and implement security measures to protect user information and maintain confidentiality.

3.5 Testing and Deployment Requirements:

- Test Scenarios: Define test scenarios and perform rigorous testing to ensure the chatbot functions correctly and provides accurate responses.
- Deployment Environment: Determine the deployment environment, whether on-premises or cloud-based, and configure the necessary infrastructure and resources.
- Monitoring and Analytics: Implement monitoring mechanisms to track chatbot performance, user interactions, and identify areas for improvement

CHAPTER 4

TYPES OF CHATBOT

4.1 VOICE CHATBOTS:

Voice chatbots, also known as voice assistants or virtual assistants, are chatbots that use voice recognition and synthesis technologies to interact with users through spoken language. Instead of relying solely on text-based input and output, voice chatbots enable users to communicate with them using their voice, just like having a conversation with a human.

Voice chatbots leverage automatic speech recognition (ASR) technology to convert spoken language into text, allowing them to understand and process user inputs. They utilize natural language processing (NLP) algorithms to extract meaning from the text and generate appropriate responses. These responses are then converted back into spoken language using text-to-speech (TTS) synthesis, allowing the chatbot to communicate its responses audibly.

Voice chatbots can be integrated into various platforms and devices, such as smartphones, smart speakers, and even cars, providing users with hands-free and convenient interactions. They can assist users with a wide range of tasks, including answering questions, providing information, performing actions or tasks, making recommendations, and more.

Designing the voice of a chatbot involves carefully considering factors such as tone, language style, pacing, and intonation. The goal is to create a voice that feels natural, engaging, and

relatable to users. The voice may be designed to sound human-like or may have a distinct character or brand identity, depending on the application and target audience.

Voice chatbots are becoming increasingly popular and widely used in various domains, including customer service, virtual assistants, healthcare, home automation, and more. They offer a hands-free and efficient way for users to interact with technology, enabling seamless communication and access to information and services. Advances in voice recognition and synthesis technologies continue to enhance the capabilities and user experience of voice chatbots.

4.2 HYBRID CHATBOTS:

A hybrid chatbot is a type of chatbot that combines the capabilities of both rule-based chatbots and machine learning-based chatbots. It utilizes a combination of predefined rules and artificial intelligence (AI) techniques to deliver more sophisticated and dynamic conversational experiences.

Rule-based chatbots rely on predefined rules and patterns to understand user inputs and generate appropriate responses. These rules are typically designed by human developers and are based on anticipated user queries and expected conversation flows. Rule-based chatbots work well for handling simple and structured interactions but may struggle with understanding more complex or ambiguous user inputs.

On the other hand, machine learning-based chatbots leverage natural language processing (NLP) and machine learning algorithms to understand and generate responses based on large volumes of training data. These chatbots learn from historical conversations and adapt their behaviour based on patterns and context. Machine learning-based chatbots are generally more flexible and can handle a wider range of user inputs, but they require substantial training data and computational resources to perform well.

A hybrid chatbot combines the strengths of both approaches. It uses rule-based mechanisms to handle common and straightforward user queries efficiently. These rules act as a fallback mechanism when the chatbot encounters queries it cannot confidently handle using its machine learning capabilities. When faced with ambiguous or complex inputs, the hybrid chatbot can leverage machine learning techniques to analyse the user's intent and generate appropriate responses.

By combining rule-based and machine learning-based approaches, hybrid chatbots can offer improved accuracy, flexibility, and scalability. They can handle a broad range of user queries while still maintaining control over the conversation flow through predefined rules. Hybrid

chatbots are often used in applications where a high level of accuracy and user experience is desired, such as customer support, virtual assistants, and e-commerce platforms.

The hybrid approach allows chatbot developers to strike a balance between predefined logic and the ability to learn and adapt from real-time user interactions. This results in more robust and intelligent chatbot systems that can effectively engage users and provide meaningful responses to their queries.

4.3 SOCIAL MESSAGING CHATBOT

A social network chatbot is a chatbot that operates within a social networking platform, such as Facebook Messenger, WhatsApp, or Twitter. These chatbots are designed to interact with users and provide services or information directly within the social network environment.

Social network chatbots can serve various purposes, including customer support, content delivery, entertainment, and more. They leverage the messaging capabilities of social networking platforms to engage with users in real-time conversations. Users can initiate conversations with the chatbot through messaging interfaces, and the chatbot responds accordingly based on its programmed functionalities and capabilities.

The primary benefits of social network chatbots include:

Accessibility: Social network chatbots are easily accessible to users within their preferred social networking platforms. Users can interact with the chatbot without leaving the social network, making it convenient and seamless.

Personalized Experience: Social network chatbots can leverage user profile information and previous interactions to provide personalized experiences. They can offer tailored recommendations, content, or services based on user preferences and behaviours.

Real-time Engagement: Since social network chatbots operate within messaging interfaces, they enable real-time engagement with users. Users can receive immediate responses to their inquiries or requests, enhancing the overall user experience.

Viral Reach: Social network chatbots have the potential to reach a wide audience through social sharing and referrals. Users can easily share the chatbot's functionalities or content with their social network connections, leading to increased visibility and user adoption.

Integration with Social Features: Social network chatbots can integrate with various social features of the platform, such as sharing content, tagging friends, or posting updates. This integration enhances the chatbot's capabilities and provides a richer and more interactive user experience.

4.4 MENU-BASED CHATBOT SKILLS CHATBOT

A menu-based chatbot is a type of chatbot that uses a structured menu system to interact with users and provide information or services. Instead of relying on natural language understanding and free-form conversation, menu-based chatbots present users with a predetermined set of options or choices from which they can select.

The menu-based approach simplifies the user experience by providing a clear and organized set of options, making it easier for users to navigate and interact with the chatbot. Users can select the desired option by typing a corresponding number or keyword, or by clicking on buttons or interactive elements provided in the chatbot interface.

The menu system can be hierarchical, with sub-menus and sub-options, allowing for a deeper level of interaction. The menu options can cover a wide range of topics or functionalities, depending on the purpose of the chatbot. For example, a customer support chatbot might present options for account inquiries, product information, troubleshooting guides, or contacting a support representative.

Menu-based chatbots offer several advantages:

Ease of Use: Users can quickly understand and interact with the chatbot by selecting options from a menu, eliminating the need for complex language understanding and formulation of queries.

Reduced Errors: Since the options are predefined, the likelihood of user input errors or misunderstandings is minimized. Users are guided through the available choices, reducing the chances of miscommunication.

Clear Navigation: Menu-based chatbots provide clear navigation paths, making it easy for users to explore different functionalities or access specific information without getting lost in a conversation.

Efficient Interactions: By presenting predefined options, menu-based chatbots can provide faster and more efficient responses, as they can directly map user selections to specific actions or information.

Consistency: The menu structure ensures a consistent user experience, as the chatbot follows a predefined flow and provides consistent options across interactions.

However, menu-based chatbots have limitations in terms of flexibility and handling open-ended inquiries. They may not be suitable for scenarios where users need to express complex or unique requests that fall outside the predefined menu options.

Menu-based chatbots can be implemented using various technologies and platforms, including messaging apps, websites, and voice interfaces. The chatbot interface presents the menu options, and the underlying logic handles user selections and delivers the corresponding responses or actions.

Overall, menu-based chatbots offer a straightforward and user-friendly approach to interact with users, providing structured information or services efficiently.

4.5 KEYWORD-BASED CHATBOT

A keyword-based chatbot is a type of chatbot that uses predefined keywords or phrases to understand user inputs and generate appropriate responses. It relies on a keyword matching algorithm to identify relevant keywords in user queries and trigger the corresponding responses associated with those keywords.

In a keyword-based chatbot, a set of keywords and their associated responses are defined in advance. When a user sends a message or query to the chatbot, the chatbot analyses the input and looks for matches with the predefined keywords. If a match is found, the chatbot retrieves the corresponding response and delivers it to the user.

The keyword matching algorithm used in keyword-based chatbots can vary in complexity. It can be as simple as exact keyword matching, where the chatbot looks for an exact match between user input and predefined keywords. Alternatively, it can use more advanced techniques such as fuzzy matching or natural language processing (NLP) to handle variations in user inputs and improve the accuracy of matching.

Key features of keyword-based chatbots include:

Predefined Responses: The chatbot is programmed with a set of predefined keywords and associated responses that cover common user inquiries or topics of interest.

Simplicity: Keyword-based chatbots offer a simple and intuitive user experience. Users can get relevant responses by using specific keywords without the need for complex language understanding or formulation of queries.

Quick Response Time: Since the chatbot relies on predefined keyword matching, it can generate responses quickly without the need for extensive processing or analysis.

Limited Flexibility: Keyword-based chatbots are limited to the predefined keywords and responses. They may not handle open-ended or complex queries that do not match the predefined keywords.

Maintenance and Updates: Keyword-based chatbots require regular maintenance and updates to ensure that the predefined keywords and responses remain relevant and up to date.

CHAPTER 5

METHODOLOGY

5.1. METHODOLOGY:

The methodology for the chatbot data science project outlines the systematic approach and steps to be followed in order to design, develop, and evaluate the chatbot system. The methodology incorporates various stages, including data collection, pre-processing, model development, and evaluation. Here is an overview of the methodology:

1. Problem Identification: The first step is to clearly define the problem statement and objectives of the chatbot data science project. This involves identifying the target diseases, risk factors to consider, and the desired outcomes of the chatbot system, such as disease likelihood prediction and personalized recommendations.

2. Data Collection: Relevant datasets are collected or acquired to train and validate the machine learning models used in the chatbot system. These datasets may include structured data, such as medical records and risk factor information, as well as unstructured data, such as medical literature or text corpora related to diseases and symptoms. Data sources may include public repositories, medical databases, or data provided by healthcare institutions.

3. Data Pre-processing: The collected data undergoes pre-processing steps to ensure its quality, consistency, and suitability for training the machine learning models. This includes tasks such as data cleaning, removing duplicates, handling missing values, feature selection or extraction, and data normalization or scaling. Natural language processing techniques may be applied to process textual data.

4. Feature Engineering: In this stage, relevant features are extracted or derived from the pre-processed data. Feature engineering involves transforming raw data into meaningful representations that can be utilized by the machine learning models. This may involve techniques like one-hot encoding, numerical scaling, text tokenization, or word embeddings.

5. Model Development: Machine learning models are developed to predict disease likelihood based on the input risk factors. The selection of appropriate models depends on the specific requirements and nature of the problem. Common models used in chatbot systems include decision trees, random forests, support vector machines, or deep learning models like neural networks. The models are trained on the pre-processed data using suitable algorithms and optimization techniques.

6. Model Evaluation: The trained models are evaluated using appropriate evaluation metrics, such as accuracy, precision, recall, F1-score, or area under the receiver operating characteristic curve (AUC-ROC). The evaluation provides insights into the performance and effectiveness of the models in predicting disease likelihood. Cross-validation techniques may be used to assess model generalization and avoid overfitting.

7. System Integration and Deployment: The developed models are integrated into the chatbot system along with the NLP components, user interface, and database management. The system is deployed on a suitable platform, such as a web server or cloud infrastructure, making it accessible to users.

8. User Testing and Feedback: The chatbot system is tested by a group of representative users to gather feedback and evaluate its usability, accuracy, and overall performance. User feedback is collected through surveys, interviews, or user interaction logs. This feedback is used to identify areas for improvement and to refine the system.

9. Iterative Improvement: Based on the feedback and evaluation results, necessary improvements and enhancements are made to the chatbot system. This may involve refining the machine learning models, incorporating additional features or data sources, and addressing usability issues identified during user testing. The system goes through multiple iterations until the desired performance and user satisfaction are achieved.

By following this methodology, the chatbot data science project aims to ensure a systematic and rigorous approach to design, develop, and evaluate the chatbot system for disease prediction. It allows for continuous learning and improvement, ultimately delivering an accurate, reliable, and user-friendly chatbot system.

5.2. System Architecture:

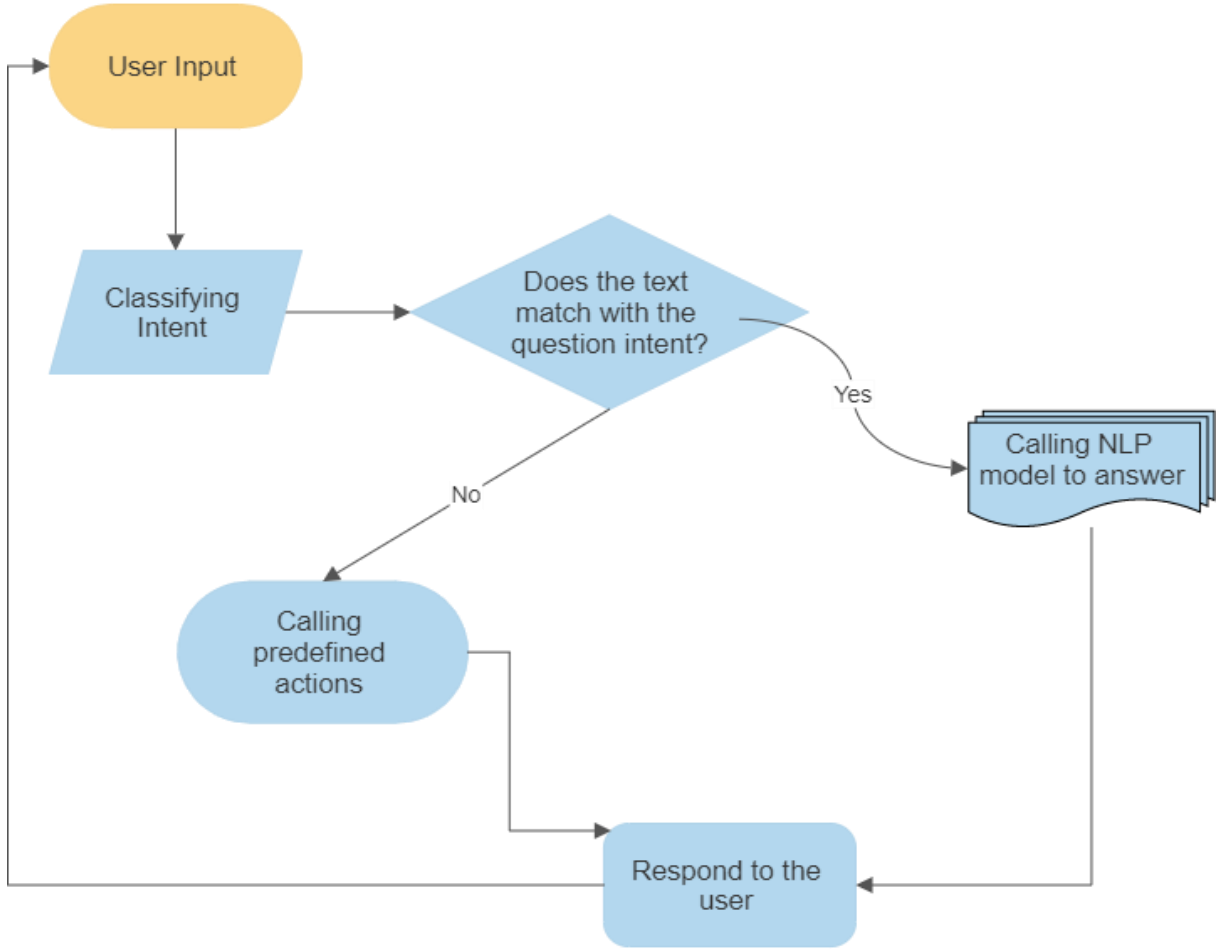


Fig 1: Architecture of System

The system architecture for the chatbot data science project is designed to facilitate the efficient and effective functioning of the disease prediction chatbot. It comprises various components that work together to collect user input, process data, apply machine learning algorithms, and generate disease predictions. Here is an overview of the system architecture:

1. User Interface: The user interface provides a platform for users to interact with the chatbot system. It can be a web-based interface, a mobile application, or a messaging platform. The user interface allows users to input their symptoms and receive disease predictions.

2. Chatbot Engine: The chatbot engine is responsible for processing user input and generating appropriate responses. It utilizes natural language processing (NLP) techniques to understand and interpret user queries. The chatbot engine may employ technologies such as intent recognition, entity extraction, and dialogue management to provide a conversational experience.

3. Data Collection: The system collects relevant data from various sources to train and validate the machine learning models. This data may include medical records, electronic health records, research papers, and publicly available health-related datasets. Data collection may involve web scraping, API integration, or direct data acquisition from healthcare providers.

4. Data Pre-processing: The collected data undergoes pre-processing steps to ensure its quality and suitability for analysis. This includes cleaning the data, handling missing values, removing duplicates, and transforming data into a suitable format for machine learning algorithms. Pre-processing tasks may also involve feature selection or extraction, normalization, and encoding of categorical variables.

5. Machine Learning Models: The core of the system is the machine learning models responsible for disease prediction. These models are trained on the pre-processed data to learn patterns and relationships between symptoms and diseases. Various supervised machine learning algorithms, such as decision trees, support vector machines, or deep learning models, can be utilized based on the specific requirements of the project.

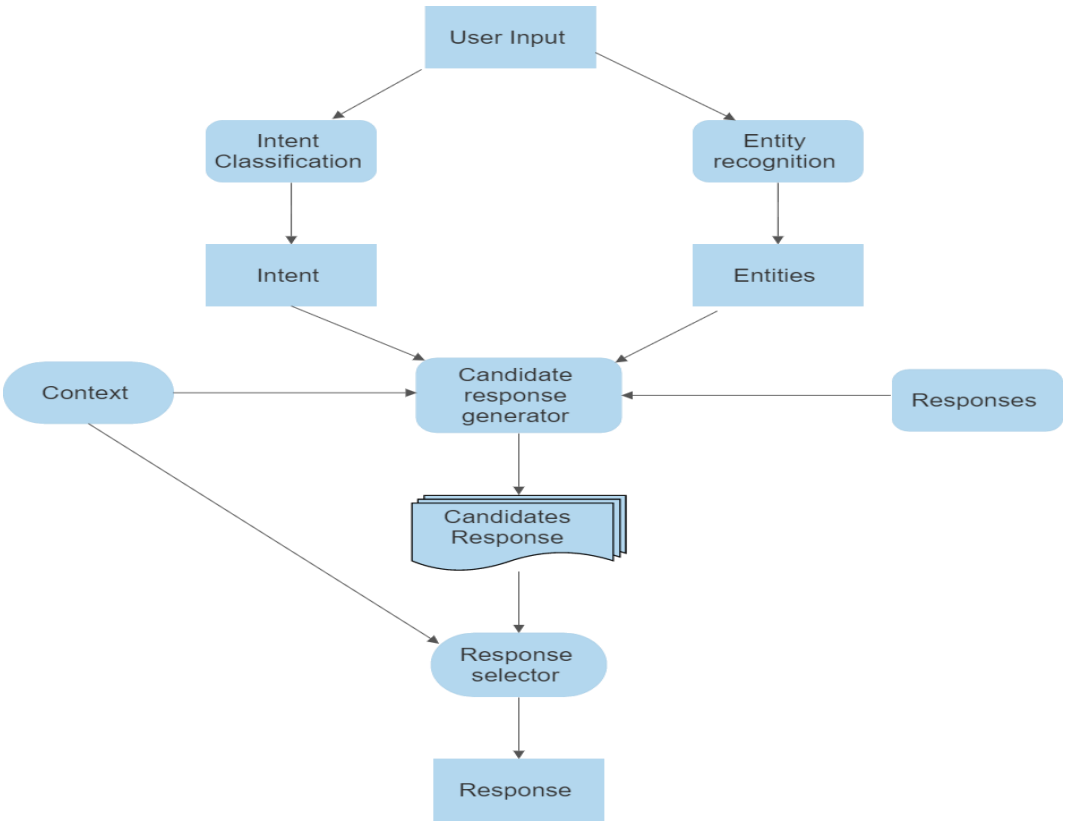
6. Model Integration: The trained machine learning models are integrated into the chatbot system. The models receive symptom inputs from users through the chatbot engine and generate disease predictions based on learned patterns. The integration ensures seamless communication between the chatbot engine and the machine learning models.

7. Database: A database is used to store user data, including symptom inputs and disease predictions. The database facilitates data management, retrieval, and storage, ensuring the security and privacy of user information. It enables the system to provide personalized recommendations and track user health records over time.

8. Deployment Infrastructure: The system is deployed on a suitable infrastructure, such as a web server or cloud platform, to ensure its availability and scalability. The infrastructure provides the necessary computational resources for processing user requests, running machine learning models, and managing the chatbot system's overall functionality.

9. Continuous Learning and Improvement: The system architecture allows for continuous learning and improvement. User feedback, evaluation results, and new data can be utilized to enhance the accuracy, performance, and usability of the chatbot system. Regular updates and model retraining ensure the system stays up-to-date with the latest medical research and advancements.

By following this system architecture, the chatbot data science project can effectively predict diseases based on user-provided symptoms, providing valuable insights and empowering users to make informed decisions about their health.



CHAPTER 6

USER INTERFACE DESIGN:

6.1: Trav-bob chatbot interface

1. The interface design for the TravBob chatbot data science project should focus on providing a user-friendly and intuitive experience for travellers. Here are some key considerations for the interface design:
2. Conversational Interface: The chatbot should have a conversational interface that mimics natural language interactions. Users should feel like they are having a conversation with a knowledgeable travel assistant. Use friendly and approachable language to engage users and make the interaction more enjoyable.
3. Clear and Concise Messaging: Ensure that the chatbot's responses are clear, concise, and easy to understand. Avoid using jargon or technical terms that may confuse users. Break down complex information into simple, digestible chunks to facilitate better comprehension.
4. Menu-based Navigation: Incorporate a menu-based navigation system to provide users with quick access to different features and functionalities of the chatbot. The menu should be well-organized and visually appealing, making it easy for users to explore and select the desired options.
5. Visual Elements: Utilize visual elements such as icons, images, and buttons to enhance the user experience. For example, use icons to represent different travel categories like flights, accommodations, attractions, etc. Visual cues can make the interface more engaging and help users navigate through the chatbot more effectively.

6. User Input and Validation: Design the interface to collect user input in a structured manner. Use form-like elements to gather relevant travel information, such as destination, travel dates, preferences, etc. Provide real-time validation and feedback to ensure that users enter correct and complete information.
7. Personalization: Incorporate personalization features to make the chatbot more tailored to individual users. For example, allow users to create profiles or save preferences, so the chatbot can provide personalized recommendations based on their travel history or preferences. This can enhance the user experience and build user loyalty.
8. Context Awareness: Implement context awareness in the chatbot's responses to provide relevant and contextual information. The chatbot should be able to remember previous interactions and adapt its responses accordingly. This can create a more personalized and seamless experience for users.
9. Error Handling: Anticipate and handle user errors or misunderstandings gracefully. Provide informative error messages and suggest possible solutions to guide users in rectifying their input. Strive to make the chatbot forgiving and understanding, ensuring that users feel supported even when they encounter difficulties.
10. Mobile Responsiveness: Ensure that the interface is responsive and optimized for mobile devices. Many travellers rely on their smartphones while on the go, so it is crucial to deliver a seamless experience across different screen sizes and orientations.
11. Feedback and Help: Include options for users to provide feedback and seek assistance if needed. Users should have the ability to report issues, ask questions, or request human intervention if the chatbot is unable to fulfil their needs. This feedback mechanism can help improve the chatbot's performance over time.
12. By incorporating these design principles and considerations, the interface of the TravBob chatbot data science project can provide an intuitive, user-friendly, and engaging experience for travellers, helping them navigate through their travel planning process more efficiently.

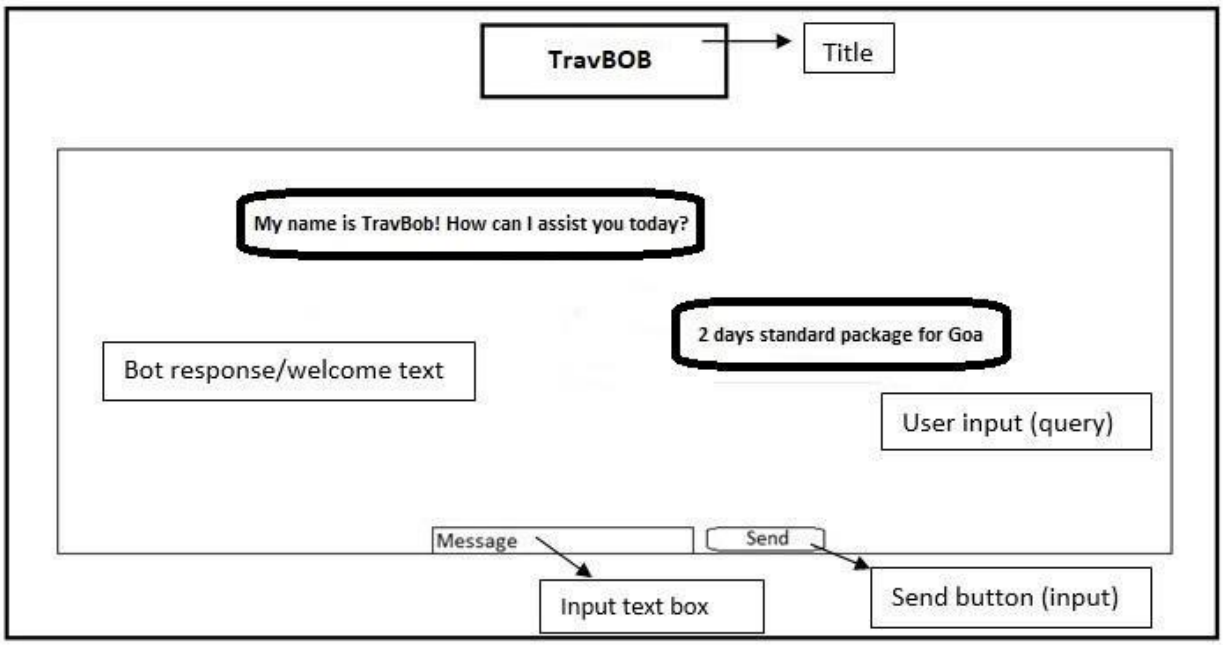


Fig: Design of Trav-Bob BOT

CHAPTER 7

APPLICATION FLOW

7.1 Integrated Development Environment (IDE)

Sublime text was the IDE utilized throughout the development of the Chatbot. I opted to use this IDE because of its capability to debug, fulfill the smart code auto suggestion function, and other packages supports. The lightest, simplest (and thus the most effective), while all the instruments are also available for the Chatbot's development.

```
#import
import numpy as np
import random
from flask import Flask, render_template, request
import os, nltk, json, pickle, tflearn, random
from nltk.stem import WordNetLemmatizer
```

- I have used libraries like NumPy, random, flask, etc. for implementation of various tasks. The task of each library is mentioned below

- NumPy: NumPy is a Library for python that adds support for vast, multifaceted arrays and forms, as well as a significant number of high-level machine learning algorithms to perform on such arrays. The multifaceted array bases functionality of NumPy is utilized in this project.

- Random: Random is an inbuilt library for python. It is used to generate the pseudo-random variables.

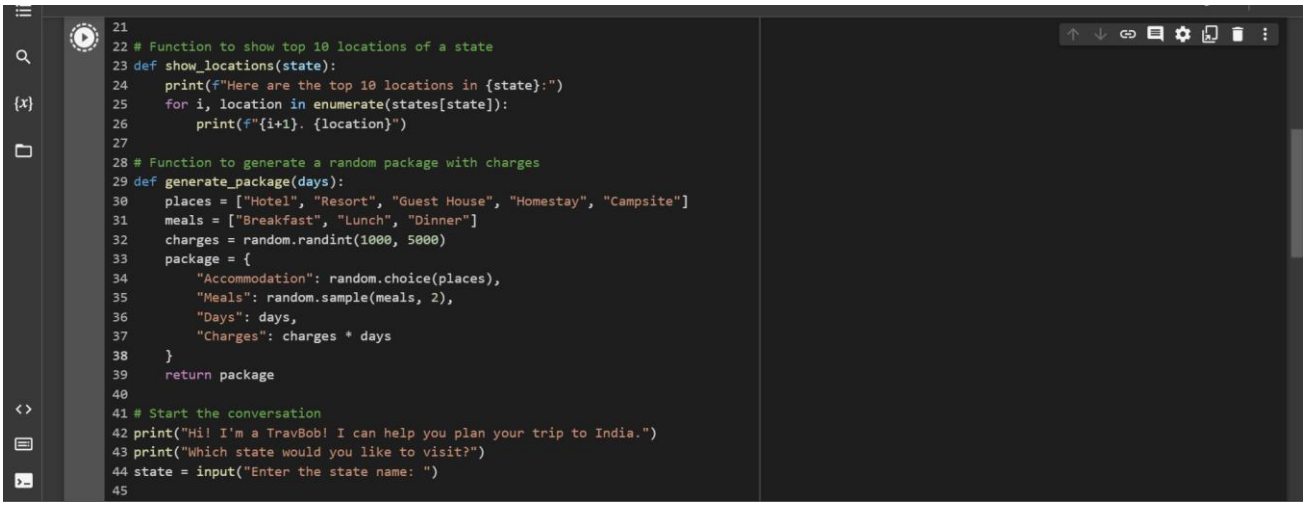
- Flask: Flask is a web framework in python. Flask is used to build this chat bot web application.
- OS: OS is a python's inbuilt library. It is used to do CRUD operation on a file.

- NLTK: NLTK is used for natural language processing. It is a toolkit which contains many libraries used for natural language processing.

- JSON: JSON may be decoded from strings or directories using the JSON package. JSON is transcribed into a Python dictionary or list by this package.

- PICKLE: It is the conversion of a Python entity into a stream of bytes for storage in a data repository. PICKLE is used to save and retrieve the model developed during the entire process.

- TFLearn: TFLearn is a TensorFlow-based machine-learning library that is versatile and responsive.



```
# Function to show top 10 locations of a state
def show_locations(state):
    print(f"Here are the top 10 locations in {state}:")
    for i, location in enumerate(states[state]):
        print(f"{i+1}. {location}")

# Function to generate a random package with charges
def generate_package(days):
    places = ["Hotel", "Resort", "Guest House", "Homestay", "Campsite"]
    meals = ["Breakfast", "Lunch", "Dinner"]
    charges = random.randint(1000, 5000)
    package = {
        "Accommodation": random.choice(places),
        "Meals": random.sample(meals, 2),
        "Days": days,
        "Charges": charges * days
    }
    return package

# Start the conversation
print("Hi! I'm a TravBob! I can help you plan your trip to India.")
print("Which state would you like to visit?")
state = input("Enter the state name: ")
```

WordNetLemmatizer: is a tool that categorizes together a word's various inflected forms so that they can be learned together. I have downloaded punkt and WordNet. WordNet is database for English language(Prabhakaran)1. I have used pickle to load a .pkl file from the files folder. After this the preprocessing of data takes place. In this process the sentence is sub divided into smaller segments of word. unnecessary word is removed from the sentences and punctuations marks are removed so that the model can be trained.

```python
import requests


api_key = "cdbb43ac89bfcb67134f84c366dcd86b"

def get_weather(city_name):
    url = f"http://api.weatherstack.com/current?access_key={api_key}&query={city_name}"
    response = requests.get(url)
    if response.status_code == 200:
        data = response.json()
        city = data['location']['name']
        country = data['location']['country']
        temperature = data['current']['temperature']
        weather_desc = data['current']['weather_descriptions'][0]
        humidity = data['current']['humidity']
        return f"Current weather in {city}, {country}: {weather_desc}, Temperature: {temperature}°C, Humidity: {humidity}%"
    else:
        return "Sorry, unable to retrieve weather information at the moment"
```

```
[ ]
!pip install translate

from translate import Translator
```

I employed a machine learning model known as bag of words, in this snippet. Bag of words is a textual model that describes the frequency with which words appear in a document. (Brownlee)2. We only keep track of term frequency in this model and ignore grammatical intricacies and word formation. I am using NumPy arrays to convert the data in multidimensional array for training and testing of model. After converting the data, I am providing it to the model for training and testing purposes.

CHAPTER 8

UML DIAGRAM

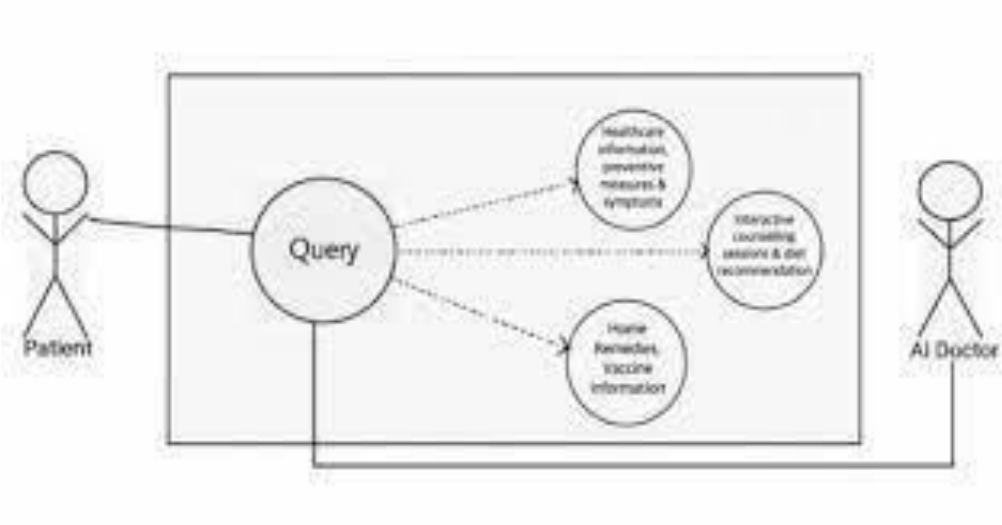


Diagram 1

A Unified Modelling Language (UML) diagram for chatbots provides a visual representation of the system's structure and behaviour. It helps in understanding the different components, interactions, and flow of information within the chatbot system.

These UML diagrams provide a standardized and visual way to communicate the design and functionality of a chatbot system. They help in understanding the system's structure, behavior, and interactions, making it easier for developers, designers, and stakeholders to collaborate and ensure a clear understanding of the chatbot's functionality and design.

CHAPTER 9

APPLICATION OF CHATBOT

The application of the chatbot data science project encompasses various domains and can provide valuable benefits to different stakeholders. Here are some potential applications of the chatbot data science project

1. Disease Prediction and Early Detection: The chatbot can serve as a user-friendly platform for individuals to assess their likelihood of developing specific diseases based on their symptoms. By leveraging machine learning algorithms, the chatbot can provide early detection of diseases, allowing individuals to seek timely medical interventions and improve health outcomes. This application can be particularly beneficial for individuals with limited access to healthcare facilities or those residing in remote areas.

2. Personalized Healthcare Recommendations: The chatbot can provide personalized recommendations for disease prevention and management based on individual risk factors and symptoms. By analyzing user data and utilizing machine learning models, the chatbot can offer tailored suggestions for lifestyle modifications, preventive measures, and treatment options. This application empowers individuals to take proactive steps towards their health and well-being.

3. Healthcare Provider Support: The chatbot can assist healthcare providers by offering an additional resource for disease prediction and decision support. It can help healthcare professionals in triaging patients, identifying potential risk factors, and facilitating early interventions. The chatbot can also aid in reducing the burden on healthcare systems by providing preliminary assessments and guiding patients towards appropriate care.

4. Health Education and Awareness: The chatbot can serve as an educational tool, providing information about various diseases, their symptoms, risk factors, and preventive measures.

It can offer insights into the importance of regular check-ups, screenings, and healthy lifestyle choices. By disseminating accurate and reliable health information, the chatbot can contribute to raising awareness and promoting health literacy among users.

5. Research and Public Health Initiatives: The chatbot data collected from user interactions can be anonymized and aggregated to contribute to public health research. Analyzing this data can identify disease patterns, regional variations, and emerging health trends. Such insights can aid in designing targeted public health interventions, implementing preventive strategies, and monitoring disease prevalence.

6. Telemedicine and Remote Patient Monitoring: Integrating the chatbot with telemedicine platforms or remote patient monitoring systems can enhance the remote healthcare experience. The chatbot can collect patient symptoms, track vital signs, and provide real-time feedback. It can assist in remote diagnosis, follow-up care, and remote patient monitoring, enabling healthcare providers to deliver efficient and personalized healthcare services.

These applications demonstrate the versatility and potential impact of the chatbot data science project in healthcare. By leveraging machine learning algorithms and natural language processing techniques, the chatbot can empower individuals, support healthcare providers, promote health education, contribute to research efforts, and enhance remote healthcare delivery.

CHAPTER 10

IMPLEMENTATION

The implementation of the chatbot data science project involves several steps that encompass data collection, pre-processing, model development, and system integration. Here is an overview of the implementation process:

1. Data Collection: Gather relevant data from various sources, such as medical records, research papers, and publicly available health datasets. Use web scraping techniques, APIs, or direct data acquisition to obtain a diverse and representative dataset.

2. Data Pre-processing: Clean the collected data by removing irrelevant or noisy information, handling missing values, and resolving inconsistencies. Perform feature selection or extraction to identify the most informative features for disease prediction. Normalize numerical features and encode categorical variables for compatibility with machine learning algorithms.

3. Model Development: Select appropriate machine learning algorithms for disease prediction, such as decision trees, logistic regression, or neural networks. Split the pre-processed data into training and testing sets. Train the selected models using the training data and evaluate their performance using suitable metrics (e.g., accuracy, precision, recall). Optimize the models by tuning hyperparameters or employing ensemble techniques if necessary.

4. Chatbot Integration: Develop the chatbot interface and integrate it with the trained machine learning models. Use a natural language processing (NLP) framework to understand user input and extract relevant symptoms. Pass the symptoms to the disease prediction models

for generating disease likelihood predictions. Ensure seamless communication between the chatbot interface, NLP components, and the disease prediction models.

5. Database Integration: Set up a database system to store user data, including symptom inputs and corresponding disease predictions. Establish a secure and efficient data storage mechanism, such as using a relational database management system (RDBMS) or a NoSQL database. Implement appropriate data access protocols and privacy measures to protect user information.

6. System Testing and Evaluation: Conduct thorough testing of the integrated chatbot system to ensure its functionality, accuracy, and performance. Test various user scenarios and evaluate the chatbot's ability to accurately predict diseases based on symptoms. Collect user feedback and address any issues or limitations identified during the testing phase.

7. Deployment and Maintenance: Deploy the chatbot data science project on a suitable infrastructure, such as a web server or cloud platform, to make it accessible to users. Monitor system performance, handle user queries, and continuously update the system with new research findings and datasets to improve disease prediction accuracy. Regularly maintain the system to ensure its reliability, security, and compatibility with evolving technologies.

Throughout the implementation process, it is essential to adhere to ethical considerations and data privacy regulations to protect user confidentiality and maintain the trust of users interacting with the chatbot system.

CHAPTER 11

CONCLUSION

11.1. Evaluation of results:

Success Criteria	Satisfied or not
The Chatbot provides user friendly interactions.	The Chatbot provides user-friendly text based responses with a simple and appealing GUI that can be further improved.
The Chatbot can be of assistance if users have any queries concerning tour packages.	The functions operate as expected and are fully intact.
The Chatbot creates a human-interaction appeal through the use of NLP.	The software has been effective most of all and the functions needed work as expected, the Chatbot is able to consider and reply by lemmatizing the words.

The Chatbot can understand and explain about the location to visit, as well as the prime places to visit and assist with tour package	The feature works as anticipated.
One can simultaneously access the Chatbot on several operating systems.	The Chatbot can't be accessed simultaneously on different operating systems as it is not being hosted by a third-party, Platform as a Service (PaaS). We will work on it.

11.2. Future Scope:

- Chatbots can provide buyers with an excellent experience across all devices and provide businesses with in-depth buyer insights that can be used to tailor offers. Chatbots assist individuals with acquiring the data they need and tackle their concerns.

- The credibility of a business and the quality of its customer service are two essential aspects of a successful business model.

- Some notable organizations are currently utilizing computer based intelligence chatbot to stay aware of the impacting scene. The development of AI has skyrocketed in the technology industry, resulting in chatbots that make it simple for users to locate the information they require online.

- Artificial intelligence-powered chatbots efficiently build a solid brand image. They will continue to develop and contribute significantly to businesses' customer service.

11.3 Limitations:

1. Chatbots Don't Grasp Human Setting.

- It is one of the chatbots' major drawbacks. These chatbots are programmed to only understand what is taught to them. They can't grasp people's unique circumstance, and this is a gigantic hole that might in fact prompt a furious client.

- The smart-bots with AI can comprehend the general context, but 40 out of 100 cases have nothing to do with the general context.

2. They do not keep their customers.

- Holding a client is a crucial piece of each and every association. It is more important than acquiring new clients. Because it only tries to the extent that it is programmed to, a chatbot is significantly less likely to keep customers.

- Compared to chatbots, it has been demonstrated that human executives are better at keeping customers because they can empathize with them.

3. They are unable to make choices.

- Chatbots lack decision-making capabilities, which is yet another limitation. They lack the skills necessary to distinguish between the good and the bad.

- Due to its chatbot Tay, the tech giant Microsoft sparked numerous controversies on March 23, 2016. Microsoft encountered significant difficulties as a result of the chatbot's offensive Tweets. As a result, they have to temporarily disable the chatbot.

- In a similar vein, chatbots' inability to make decisions has caused significant harm to numerous brands.

4. Extreme Establishment

- Indeed, chatbots save you huge amount of cash over the long haul, yet their establishment cost can burn through every last dollar. Professionals who have correctly programmed chatbots that align with your company's integrity should be hired.

- Additionally, by implementing a chatbot service, your company should be prepared to make significant investments in AI and machine learning.

5. Chatbots Have A similar Response For a Question

Most clients don't continue with the visit when they realize they are talking with a chatbot. Because they provide the same response to multiple queries, chatbots are easy to identify. Assume you are asking something to a bot that isn't accessible in the information server so you will get a statement of regret.

The same holds true for other inquiries; regardless of the number of various inquiries you that pose, it will convey you with a similar expression of remorse, which is very bothering.

- The harsh reality of chatbots is that they lack any research abilities. These bots have only the answers to the questions that are available; they can't investigate new points on the web.

- Additionally, a chatbot has significantly lower memory power; They can't remember anything unless they are fed new samples and trained on a regular basis, which takes a lot of time and money.

- Last but not least, chatbots lack feelings and are unable to relate to any negative circumstance. A chatbot that lacks emotions will never be able to connect with a customer, which is essential for any business's growth.

- Regardless of the chat flow, chatbots that lack knowledge of sentiment analysis will treat customers in a particular manner. Consequently, some customers would rather close the chat!

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