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CHAT-BOT USING NATURAL LANGUAGE PROCESSING (NLP) IMPLEMENTED IN CLOUD TECHNOLOGY

Basil Ahamed H, Mohamed Irfan M,Wasim jaffer A, Mr.Sugumaran.V.R

(Computer Science And Engineering, EGS Pillay Engineering College, Nagapattinam .
Email: basilahamed46@gmail.com)
(Computer Science And Engineering, EGS Pillay Engineering College, Nagapattinam .
Email:mmohamedirfan74091@gmail.com)
(Computer Science And Engineering, EGS Pillay Engineering College, Nagapattinam .
Email:wasimjaffer014@gmail.com)
(Computer Science And Engineering, EGS Pillay Engineering College, Nagapattinam .
Email: suguvr@gmail.com)

ABSTRACT

The chatbot developed in this project is built using advanced NLP techniques such as sentiment analysis, entity recognition, and intent detection. These techniques allow the chatbot to understand the context of user queries and provide accurate responses. The chatbot is trained using a large corpus of data, which enables it to learn from user interactions and improve its responses over time. The implementation of the chatbot in cloud technology provides several advantages such as scalability, flexibility, and cost-effectiveness. The chatbot can handle a large volume of user queries and can dynamically scale up or down based on demand. The cloud-based platform also provides easy integration with other cloud-based services such as analytics, database, and machine learning. The chatbot can be used in various domains such as customer support, e-commerce, healthcare, and education. It can provide users with personalized recommendations, answers to frequently asked questions, and assistance with tasks such as booking appointments or ordering products

Keywords — Chatbot, Natural Language Processing (NLP),Cloud Technology, Scalability, Entity Recognition, Intent Detection, Sentiment Analysis, Personalization
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1.INTRODUCTION

A chatbot using natural language processing (NLP) implemented in cloud technology is an AI-based application that can provide a conversational interface for users to interact with a system or application. The chatbot can understand and interpret human language, allowing users to communicate with it in a natural and intuitive way. The implementation of the chatbot in cloud technology provides several advantages such as scalability, flexibility, and cost-effectiveness. The chatbot can handle a large volume of user queries and

can dynamically scale up or down based on demand. The cloud-based platform also provides easy integration with other cloud-based services such as analytics, database, and machine learning.

The use of NLP techniques in the chatbot allows it to understand user intent and provide relevant responses. These techniques include sentiment analysis, entity recognition, and intent detection. The chatbot can be trained using a large corpus of data, which enables it to learn from user interactions and improve its responses over time.

The chatbot can be used in various domains such as customer support, e-commerce, healthcare, and education. It can provide users with personalized recommendations, answers to frequently asked questions, and assistance with tasks such as booking appointments or ordering products. The chatbot can also be integrated with voice assistants such as Amazon Alexa or Google Assistant, which allows users to interact with the chatbot using voice commands.

Overall, the implementation of a chatbot using NLP in cloud technology provides a powerful tool for businesses looking to enhance their customer engagement and support. It demonstrates the potential of these technologies to transform the way we interact with systems and applications, providing users with a seamless and intuitive experience.

II. RELATED WORK

The development of chatbots using natural language processing (NLP) and implemented in cloud technology has been an active area of research and development in recent years. Several studies have explored the potential of these technologies and their applications in various domains such as customer support, healthcare, education, and e-commerce.

One example of related work is the development of a chatbot for mental health support, which uses NLP techniques and is implemented in cloud technology. The chatbot can understand and respond to user queries related to mental health issues, providing personalized support and recommendations. The study showed that the chatbot was effective in reducing mental health stigma and increasing help-seeking behavior among users.

Another example is the development of a chatbot for e-commerce, which uses NLP techniques and is implemented in cloud technology. The chatbot can assist users with product recommendations, order tracking, and payment processing. The study showed that the chatbot was effective in improving customer engagement and satisfaction, reducing customer service costs, and increasing sales.

A third example is the development of a chatbot for education, which uses NLP techniques and is implemented in cloud technology. The chatbot can assist students with homework assignments, test preparation, and course scheduling. The study showed that the chatbot was effective in improving student engagement, reducing workload for teachers, and increasing student performance. Overall, these studies demonstrate the potential of chatbots using NLP and implemented in cloud technology to transform various domains and provide users with a seamless and intuitive experience. They also highlight the need for further research and development in these areas to improve the effectiveness and usability of these technologies The advancement of Man-made reasoning

applications is testing since PCs generally require people to address them in a programming language that is exact, unambiguous and profoundly organized or, maybe through a set number of plainly expressed voice orders.

Regular language processing(NLP) is a part of man-made reasoning, and machine phonetics that empowers PCs to get significance from human or regular language input. It is utilized to dissect text, permitting machines to comprehend human‟s language. NLP considers the progressive design of human language in which a few words make an expression, a few expressions make a sentence and, at last, sentences convey thoughts. Notwithstanding, the uncertainty of language where people talk makes regular language handling a troublesome issue for PCs to embrace.

The PC performs Regular Language Understanding(NLG) to conquer this snag. It is the course of dismantling and parsing input on account of the event of obscure and unforeseen parts in the information what's more, the need to decide the fitting syntactic and semantic plans to apply to it.

A Chatbot is a PC program which conducts discussion with a human utilizing hear-able or text based techniques. Chatbots are in view of two fundamental standards Regular Language Handling and Example coordinating. We point towards making a conversational Chatbot with the assistance of NLP as well as example coordinating

A. NATURAL LANGUAGE PROCESSING

It is the most common way of delivering significant expressions and sentences as Regular Language. It includes message Arranging, Sentence Arranging and Message Acknowledgment. Text arranging incorporates recovering the pertinent substance from information base. Sentence Arranging incorporates picking required words, shaping significant expressions and establishing vibe of the sentence. Message Acknowledgment is the most common way of planning the sentence plan into sentence structure.There are two wide sorts of Normal Language Handling (NLP) calculations: customary and profound learning .

Customary NLP includes a great deal of coding. You need to expect words and expressions a client could say in each setting, perceive examples of discourse, extricate predefined watchwords, etc. All in all: There are a great deal of rules, a ton of customary articulations, and a great deal of hard coding. It requires a ton of investment to compose and troubleshoot these programs. What's more, the principles rapidly separate when the client goes astray from the normal way. This is the explanation numerous bots feel so stupid. We need to fabricate a large number of savvy remote helpers equipped for keeping up with regular language exchange. Can we do it with conventional NLP? The response is by all accounts no. It‟s excessively hard and too tedious. The world doesn‟t have an adequate

number of software engineers to make it happen. Profound Learning is an idea being developed.

With the appearance of GPU"s, Profound Learning has drawn nearer to turning into a reality. In any case, starting today we actually need to utilize the customary techniques for Regular Language Handling. The center methodology in the strategy is the utilization of dynamic programming to proficiently parse/label a piece of text. In this way, the calculation infers parse tree for a text by iteratively adding edges to diagram or chart, where each edge addresses a speculation about the parse tree structure for an aftereffect of the message, and the actual outline addresses a substrate for creating and joining the given information and delivering a reaction. At the point when the calculation starts parsing a text, it makes another graph, crossing the text.

It then gradually adds new edges to the outline, where a bunch not set in stone or found language rules determines the circumstances under which new edges ought to be added to the outline. Parsing is finished once the diagram arrives at a phase where none of the guidelines permit the expansion of any new edges. Natural Language Processing (NLP) is a subfield of Artificial Intelligence (AI) that focuses on enabling machines to understand, interpret, and manipulate human language. The goal of NLP is to enable computers to interact with humans in a way that is natural and intuitive, using language as the primary means of communication. NLP involves the use of various techniques and algorithms to analyze and interpret natural language data, such as text, speech, and even gestures.

These techniques include syntactic and semantic analysis, machine learning, and statistical modeling. Syntactic analysis involves analyzing the structure of a sentence, while semantic analysis focuses on understanding the meaning of the sentence. Machine learning and statistical modeling are used to train algorithms to recognize patterns in language data and make predictions about future language use.

Applications of NLP are wide-ranging and include machine translation, sentiment analysis, speech recognition, chatbots, and virtual assistants. For example, machine translation involves translating text from one language to another, while sentiment analysis involves analyzing text to determine the emotional tone of the writer. The development of NLP has been driven by the explosion of digital data and the need for machines to understand and process this data. NLP has the potential to transform various industries, such as healthcare, finance, and education, by enabling machines to analyze and interpret large amounts of natural language data and provide insights and recommendations.

B. LITERATURE SURVEY

"Natural Language Processing in Chatbots: A Review" by Rucha Vaidya and Devashish Kumar, published in the Journal of Big Data Analytics in Transportation (2020). This review paper provides an overview of natural language processing in chatbots and its applications in various industries, including healthcare, finance, and e-commerce. The authors discuss the challenges associated with natural language processing in chatbots, such as understanding context and handling user input variations.

"Deep Learning-Based Chatbot: A Comprehensive Review" by Seung-Hyun Yang and Yunseok Lee, published in the Journal of Intelligence and Information Systems (2021). This review paper explores the use of deep learning-based chatbots, which use neural networks to understand and respond to user queries. The authors discuss the advantages and limitations of deep learning-based chatbots, as well as their applications in various industries, such as education and customer service.

"Chatbot Technology: A Comprehensive Review" by Hina Siddiqui, published in the International Journal of Computer Science and Information Security (2018). This review paper provides an overview of chatbot technology, including its history, development, and applications in various industries. The author discusses the different types of chatbots, such as rule-based and machine learning-based chatbots, as well as the challenges associated with natural language processing in chatbots.

"A Systematic Review of Chatbot Research: Design and Use Cases" by Alireza Nili, Kyounghee Kim, and Junghyun Ahn, published in the International Journal of Human-Computer Interaction (2021). This systematic review explores the design and use cases of chatbots in various industries, such as healthcare, education, and e-commerce. The authors discuss the importance of natural language processing in chatbots and the challenges associated with designing effective and user-friendly chatbots.

III.CHATBOTS

A Chatbot is a PC program that attempts to lead a characteristic language discussion with a human client. It lets the client pose typical inquiries and articulations, for example, "What's going on with you?" and "How is the climate today?" and afterward answers in a comparable normal way .

A definitive go for the gold when the client can't tell the contrast between conversing with a chatbot and conversing with a genuine human. This will imply that the client will pass the Turing Test. In any case, we have not yet climbed that pinnacle yet. It is otherwise called the Impersonation to Turing Test Game. In this test, the objective for the chatbot is to keep a discussion which is unclear from a human

discussion. The standard method for applying the test is that there is a human eyewitness (judge), who is

clarifying some things or on the other hand having a discussion with somebody over the PC interface. That somebody can be a PC that is chatbot or on the other hand an individual. In the event that on the opposite side there is a chatbot and the appointed authority would think it is an individual, then, at that point, the chatbot would breeze through the assessment. Talk boats are normally utilized in discourse frameworks for different useful applications including client assistance or data securing. Some chatterbots utilize refined regular language handling frameworks, yet all the same numerous easier frameworks check for watchwords inside the info, then, at that point, pull an answer with the most matching catchphrases, or the most comparable phrasing design, from an information base.

At present the greatest test that current visit bots have is keeping up with the unique circumstance and understanding the human sources of info and its reactions. A large portion of the current bots actually work simply on the example matching of data sources and then, at that point, attempting to find a prearranged reaction which matches the info. However, this approach can't result in a completely fulfilling discussion or lead a discussion with some particular reason. The noteworthy chatbots are ELIZA (1966) and Repel (1972). Later projects incorporate A.L.I.C.E., Jabberwacky and D.U.D.E. While ELIZA and Repel were utilized only to recreate composed discussion, numerous chatbots now incorporate utilitarian elements, for example, games and web looking through capacities. As of late, with the appearance of cell phones, chatbot menial helpers like Google Aide, Siri, Amazon‟s Alexa and Bixby have launched the brilliant time of chatbots.

A chatbot is an artificial intelligence (AI) software designed to simulate human conversation through text or voice interactions. Chatbots can be programmed to handle a wide range of tasks, including answering frequently asked questions, providing customer support, and even completing purchases. Chatbots use natural language processing (NLP) to understand and interpret human language. NLP allows chatbots to recognize the intent behind a user's query and provide relevant responses. For example, a chatbot designed for a retail website might understand queries such as "What's in stock?" or "Do you have this in my size?" and provide appropriate responses. There are many different types of chatbots, ranging from simple rule-based bots to more advanced bots that use machine learning algorithms to improve their responses over time. Here are some examples of chatbots in various industries:

Healthcare - A chatbot designed for healthcare might be used to provide patients with medical advice or help them schedule appointments. For example, the Mayo Clinic's chatbot can provide users with information about symptoms and medical conditions.

Finance - A chatbot designed for finance might be used to help customers with banking tasks such as checking account balances or making transfers. For example, Capital One's chatbot Eno can help customers manage their accounts and track their spending.

Retail - A chatbot designed for retail might be used to help customers find products or complete purchases. For example, the H&M chatbot can help customers browse products and place orders.

Customer Service - A chatbot designed for customer service might be used to help customers with common issues such as password resets or account issues. For example, the Delta Air Lines chatbot can help customers book flights and manage their itineraries.

Overall, chatbots have the potential to transform the way businesses interact with customers and provide more personalized and efficient service. As NLP technology continues to improve, chatbots will become even more sophisticated and able to handle increasingly complex tasks.

IV. TECHNIQUES FOR NATURAL LANGUAGE PROCESSING

A. Pattern Matching

Pattern matching in natural language processing (NLP) refers to the process of identifying specific patterns or sequences of words in text data. This is an important task in NLP because it allows for the extraction of useful information and insights from large volumes of unstructured text data. Pattern matching in NLP can be performed using various techniques such as regular expressions, rule-based systems, and machine learning algorithms. Regular expressions are a powerful tool for matching patterns in text data and can be used to identify specific sequences of characters or words that are relevant to a particular task. Rule-based systems use a set of predefined rules to match patterns in text data and can be customized to suit specific use cases.

B. Parsing

Parsing in natural language processing (NLP) refers to the process of analyzing and interpreting the grammatical structure of sentences or phrases in natural language. The goal of parsing is to identify the syntactic structure of a sentence or phrase and to generate a structured representation of its meaning. This structured representation is usually in the form of a tree-like structure known as a parse tree or a syntactic tree. Parsing in NLP involves identifying the parts of speech (POS) of individual words in a sentence and determining the relationships between them. This involves identifying the subject, predicate, object, and other grammatical elements in the sentence. There are two main types of parsing algorithms: constituency-based and dependency-based parsing.

C. A.I.M.L

AIML (Artificial Intelligence Markup Language) is a programming language that is specifically designed for creating conversational agents or chatbots. It is an XML-based language that is used to define patterns and responses for chatbots to interact with humans.

AIML is often used in conjunction with natural language processing (NLP) techniques to build chatbots that can understand and respond to natural language inputs. AIML defines the knowledge base for the chatbot, which includes rules for understanding user inputs and generating appropriate responses.

AIML relies on pattern matching to identify user inputs and generate responses. A pattern is defined as a sequence of words or phrases that a chatbot can recognize, while a response is the corresponding output that the chatbot generates based on the recognized pattern. AIML supports wildcards and variables that enable chatbots to match more complex patterns and generate more diverse responses.

D. Deep Learning

Deep learning is a subfield of machine learning that involves training artificial neural networks with multiple layers to learn and make predictions from complex data. Deep learning has been applied extensively in natural language processing (NLP) and has led to significant breakthroughs in areas such as sentiment analysis, language translation, and speech recognition. One of the most popular deep learning models for NLP is the recurrent neural network (RNN), which is well-suited for processing sequential data such as text. RNNs are designed to capture dependencies between words in a sentence by using the output from previous steps as input to the current step. This allows RNNs to maintain a state or memory of the previous inputs, which is important for understanding the context of a sentence.

V. Implementation of chatbot using natural langauge processing

There are various ways to implement a chatbot using natural language processing (NLP) techniques, depending on the specific requirements and use case. Some of the common types of implementations are Rule-Based Chatbots, Retrieval-Based Chatbots, Hybrid Chatbots

A. Rule-Based Chatbots

Rule-Based Chatbots are one of the earliest and simplest types of chatbots that can be implemented using natural language processing (NLP) techniques. These chatbots are built using a set of predefined rules that specify the actions to be taken in response to specific user inputs. The rules are typically created by subject matter experts or developers and are based on the common queries and responses related to a specific domain. For example, a customer service chatbot for a telecom company may have rules for handling queries related to billing, network coverage, and service plans.

When a user inputs a query, the chatbot matches the input with the predefined rules and selects the appropriate response based on the closest match. If the input does not match any rule, the chatbot may provide a default response or prompt the user to rephrase the query. Rule-based chatbots are relatively easy to build and maintain, and can be effective for handling simple and straightforward queries.

However, they may not be able to handle complex queries or understand natural language inputs that deviate from the predefined rules. As a result, rule-based chatbots may require frequent updates and may not provide the best user experience for all types of queries.

B. Retrieval-Based Chatbots introduction

Retrieval-Based Chatbots are another type of chatbot that can be implemented using natural language processing (NLP) techniques. These chatbots are designed to retrieve predefined responses from a database or knowledge base in response to user inputs. The responses in the database are typically generated by subject matter experts or developers based on the common queries and responses related to a specific domain. For example, a customer service chatbot for a telecom company may have a database of responses for queries related to billing, network coverage, and service plans. When a user inputs a query, the chatbot matches the input with the most similar question in the database and retrieves the corresponding response.

The matching algorithm can use techniques such as keyword matching, semantic similarity, or machine learning algorithms to find the closest match. Retrieval-based chatbots can be trained to understand natural language inputs and retrieve the most relevant response, but they may not be able to generate new responses. As a result, these chatbots may provide limited flexibility and may not provide personalized responses for each user. Retrieval-based chatbots can be useful for handling a wide range of queries in a specific domain and can be relatively easy to build and maintain compared to generative chatbots. However, they may require frequent updates to the knowledge base to keep up with changes in the domain and user queries.

C. Hybrid Chatbots

Hybrid Chatbots are a type of chatbot that combine the strengths of both rule-based and retrieval-based chatbots. These chatbots use a combination of predefined rules and machine learning algorithms to provide more flexible and personalized responses to user inputs. The rules in the chatbot can be used to handle simple queries or provide default responses, while the

machine learning algorithms can be trained on large datasets to understand natural language inputs and provide personalized responses.

Hybrid chatbots can also incorporate additional features such as sentiment analysis, context awareness, and personalized recommendations to improve the user experience.

One of the advantages of hybrid chatbots is that they can provide a more human-like conversational experience by generating more diverse and personalized responses. They can also handle more complex queries and adapt to changes in user behavior and preferences. However, building and maintaining a hybrid chatbot can be more challenging than building a rule-based or retrieval-based chatbot due to the need for machine learning expertise and large datasets for training the algorithms.

VI.DESIGN

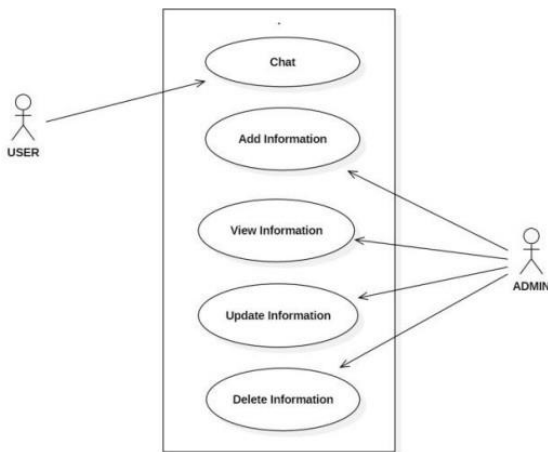### A. *Use Case Diagram: (User and admin roles)*

Fig 1: Use Case Diagram of user and admin roles
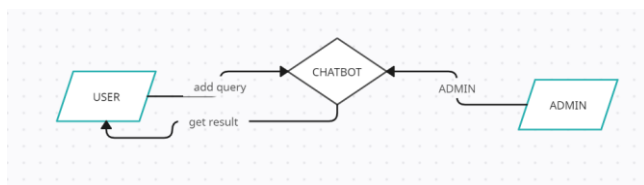
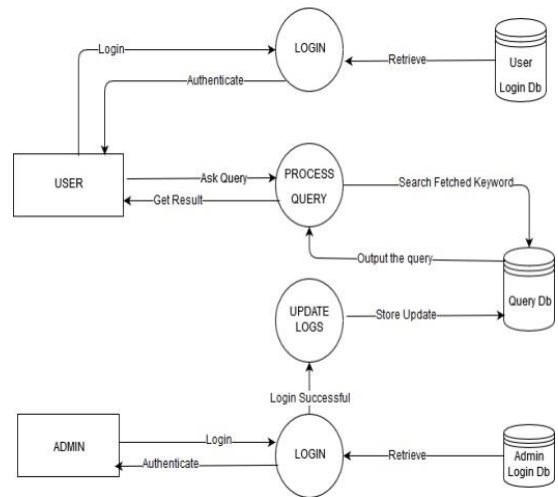### B. *Data Flow Diagram:*

Fig 2: Zero level DFD of Chatbot system

Fig 3: First level DFD of Chatbot system

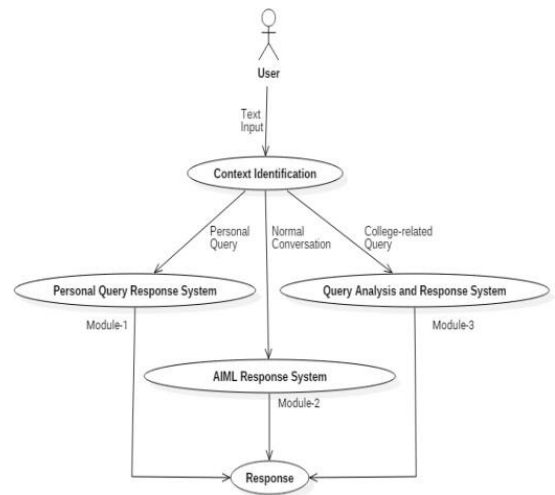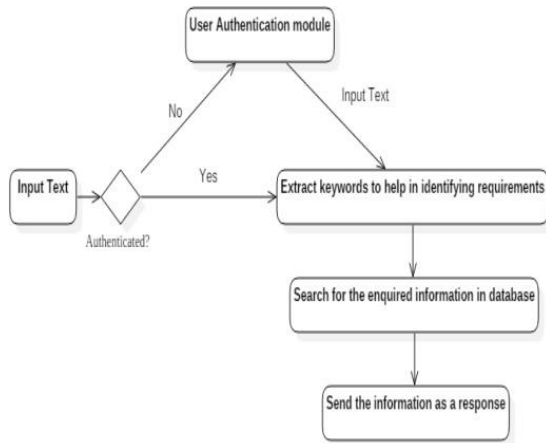### C. *Use Case Diagram: (Context identification)*

Fig 4: Use Case of context identification

D. *Activity Diagram:*

Personal Query Response Activity (Module-1):

Fig 5: Activity Diagram of Personal Query Response Activity

VII. CONCLUSION

The concept of chatbots has been round for a long time. Only now are they rising from the colleges and research laboratories and becoming prepared for primetime use. Apart for the overall advances in generation there are three primary motives why we accept as true with that Chatbots are actually ripe for exploitation by means of businesses: First the generation to supply chatterbots as dynamic and speak me avatars is now prepared for mass-marketplace use making chat bots a much richer and engaging experience than strains of text on a display. The richer bots (with animation facilities) require truthful quantity of bandwidth for serving all its functions. The huge adoption of broadband by means of agencies, and domination of broadband within the domestic marketplace way that this richness can now be introduced across the net to nearly any user. In future the bot could be in a position solution accurate and somehow it is able to additionally replace human beings in stay support so one can shop lot of infrastructure and aid cost. User analytics may have the way to track in which the bot did not help and analyze through the years

VIII. FUTURE ENHANCEMENTS

As chatbots using natural language processing (NLP) become more popular and advanced, there are several future enhancements that can be made to improve their functionality and user experience. Here are some potential future enhancements for chatbots using NLP:

Integration with Other Technologies: Chatbots can be integrated with other technologies such as augmented reality and virtual reality to provide more immersive experiences.

A. FUTURE SCOPE

The feature scope for a chatbot using natural language processing (NLP) depends on the specific use case and goals of the chatbot. However, here are some common features that may be included in a chatbot using NLP

Natural Language Understanding (NLU) - The chatbot should be able to accurately understand and interpret the user's natural language input, including identifying the intent behind the user's message and extracting relevant entities.

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