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Computational Model for Enhanced Chatbot System Using Artificial Intelligence Based on Dataset Evaluation

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Abstract— For using software applications, user interfaces that can be used includes command line, graphical user interface (GUI), menu-driven, form-based, natural language, etc. The mainstream user interfaces include GUI and web-based, but occasionally the need for an alternative user interface arises. A chatbot-based conversational user interface fits into this space. The chatbot is a class of bots that have existed in the chat platforms. The user can interact with them via graphical interfaces or widgets, and the trend is in this direction. They generally provide a stateful service i.e., the application saves data of each session. On an educational website, one often doesn't know where to search for some kind of information. It becomes difficult to extract information for a person who is not a student or employee there. The solution to these comes up with a college inquiry chatbot, a fast, standard, and informative widget to enhance the educational website's user experience and provide effective information to the user. Chatbots are intelligent systems being developed using artificial intelligence (AI) and natural language processing (NLP) algorithms. It has an effective user interface and answers queries related to academic activities.

Keywords— Artificial Intelligence, ChatBot, Knowledge Base, Natural Language Processing, Semantic Sentence Similarity, Wordnet

I. INTRODUCTION

We live in a world where access to information has been made easier. Dynamic changes in how humans operate on a day-to-day basis due to the advances in technology have enormously improved how we operate and work. Technology is still in its infancy and holds the key to empowering humanity and the world at large for all the generations to come.

A conversational agent (chatbot) is a piece of software that can communicate with humans using natural language. Ever since the birth of AI, modeling conversations remains one of the field's toughest challenges. Even though they are far from perfect, chatbots are now used in a plethora of applications like Apple's Siri [Apple, 2017], Google's Google Assistant [Google, 2017], or Microsoft's Cortana [Microsoft, 2017a]. To fully understand the capabilities and limitations of current chatbot architectures and techniques an in-depth survey is conducted, where related literature published over the past 3 years is examined and a recently introduced neural network model is trained using conversational data.

A chatbot as a personal assistant will be able to control your schedule on Google calendars and be able to build an immaculate resume.

A personal assistant control and handles all the home appliances with a single touch. Chatbots are computer programs that mimic human conversation using artificial intelligence and transform the way people interact with the Internet for information, assistance, and knowledge. It's not surprising that chatbot apps are considered the new browsers and the new websites. Google Now Cortana, Siri, and Alexa are all examples of chatbots. And Facebook has opened up Messenger, making it not merely an app but a platform upon which developers can build an entire chatbot system. Facebook Messenger provides over 30,000 chatbots and it also stays their main habitat.

In this today's generation, it is really important to stand out from the crowd and make a mark. It is really important to prove your worth in this era of competition. Having a basic is just not enough. So, the best way to make yourself stand out from the crowd is to use the latest technology. Using technology like Artificial Intelligence will surely make you and your professional profile stand out. So, presenting your resume in the form of a chatbot is the best way of implementing Artificial Intelligence to make your professional profile better.

However, chatbots have a big potential for implementation in personalized corporate accounts on every social media platform. Chatbots are designed to be the ultimate virtual assistant, helping you to accomplish various tasks ranging from answering questions, getting driving directions, turning up the thermostat in your smart home, playing your favorite tunes, and even drafting a question-and-answer survey.

Chatbots are being made to ease the pain that the industry is facing today. The purpose of chatbots is to support and help scale business teams in their relationship with customers and consumers simultaneously.

To design and implement a scalable, easily maintainable, proof of concept mobile Artificial Intelligence Chatbot system that promotes remote interaction with users. It should serve as a communication layer in providing instant information to questions asked by the respective user.

Contribution of this paper is

1. To process extracted data into a model using NLP

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2. To design and develop an android mobile Chatbot system to respond to questions

3. To design Equipment, the dynamic chatbot system.

3. To design land on the descriptive web page for the system.

II. Related Work

Lee et. al. (2018) designed AI integrated ChatBot system to respond to user questions according to defined response rules. This system is gradually expanded from simple inquiry responses for intelligent virtual assistant service, weather, traffic, schedule, etc. to service provisions through user pattern analysis, to solidify its position as a lifestyle service. As a result, research on AI integrated ChatBot platform has become necessary. Therefore, this study suggests the design and implementation of an intelligent chatbot service platform for small businesses [3].

Carisi et. al. (2019) designs a common core able to interact 24/7 using different paradigms, ranging from speech to touch screens, and through different user interfaces, including mobile phones, fixed installations, and physical robots roaming the terminal. This goal has been reached by exploiting modern cloud-based services and by designing a specially crafted modular system able to interface itself with both online information providers and legacy data sources supplied by the airport ICT infrastructure. This work describes the engineering process, from the prerequisites analysis to a functional description of the devised architecture, and the implementation details of the system presenting a working prototype of the airport chatbot [4].

Victoria Oguntosin et. al. (2021) developed a web-based chatbot called Hebron for the Covenant University Community Mall. (e chatbot is developed using Python and React.js as the programming languages and MySQL (Structured Query Language) server as the database to give a structure to the e-commerce datasets and Admin Portal process. (e-commerce chatbot application for Covenant University Shopping Mall (CUSM) seeks to provide an easy, smart, and comfortable shopping experience for the Covenant University Community [5].

Varitimiadis et. al. (2021), introduced a novel approach in developing intelligent chatbots for museums. This approach emphasizes graph-based, distributed, and collaborative multi-chatbot conversational AI systems for museums. The paper accentuates the use of knowledge graphs as the key technology for potentially providing unlimited knowledge to chatbot users, satisfying conversational AI's need for rich machine-understandable content. In addition, the proposed architecture is designed to deliver an efficient deployment solution where knowledge can be distributed (distributed knowledge graphs) and shared among different chatbots that collaborate when is needed [6].

The model suggested by Divya Madhu et. al. (2017) uses AI that facilitates individuals to establish the correct treatment for a patient's disease. There are several treatments on the market for a selected disease and nobody will probably grasp the correct treatment that is best fitted to their disease. Here the main intention is to use AI, which predicts the disease accurately with the symptoms. AI system predicts the correct illness and shows treatments [7].

Divya et. al. (2018) proposed self-diagnosis of medical chatbots using artificial intelligence techniques. The number of illnesses treatments and diagnoses appeared in the database. There will be several illnesses and therapies so that the AI system predicts the disease correctly and reliably. AI checks the age and symptoms, then forecasts the data and provides the correct advice and diagnosis [8].

Amiya et. al. (2015), developed the Doc-Bot to predict the disease and prescribe medicine. A small application was developed here to say the patient's symptoms. At the most, the user should create an account with the user's name and password, and a unique id is given. Moreover, the queries will be asked and a required blank should be filled where age is the main criteria to fix the disease of the algorithm used here. Once the disease is found by them it can be clarified by others review and multiple questions can be asked to them to clarify the efficacy of the drug and availability [9].

Rashmi and Neeta (2018) have developed a medical chatbot that uses the Google API which converts the voice-text to text-voice and is used to speak dramatically like a virtual doctor. Here NLP is used to fulfill this technology which changes the interface. Hence a patient-doctor virtual platform is created to establish cost-free services for knowing the medicine and diagnosis. The proposed system is developed based on their work [10].

Ranoliya et. al. (2017) proposed a model using an API interface which is most commonly used to create a chatbot with voice text conversion and to create a virtual platform of a hospital. It uses the FAQs for diagnosing the diseases where several queries are asked and then treatment is decided. After that medicine is given which may be again checked by feedback and questions for supplying accurate medicines [11].

Sagar, Jenila, and Agnel (2019) developed a prediction system using an ML algorithm to predict tourist attraction spots and their associated information by analyzing social media data which in turn helps the tourism industry to understand what kinds of experiences visitors have can have and how their desires can be met. Algorithms such as KNN, Kernel Density Estimation, Random Forest, and XG Boost have been used for this purpose. The findings showed that XG Boost produces performance with higher accuracy than the other three algorithms [12].

The proposed approach by Lucas et. al. (2020) used leaf spectral data to determine the amount of macro and micronutrients measured in the laboratory. The accuracy is obtained using the KNN, ANN, and RF algorithms, of which RF performed the best [13].

Imran and Shikha (2015) implemented an Artificial Intelligent Mark-up Language (AIML) based chatterbot to train the model and used a Microsoft voice synthesizer to identify a user's spoken word. Natural language processing is used for Microsoft speech comprehension and recognition [14].

Press et. al. (2019), proposed an architecture that would serve as a reference point for various psychological and medical scenarios. This research puts forward aspects that could form the basis for better collaboration between medical as well as technical experts for proper chatbot solutions [15].

Xuewen, Xiaoping, John et. al. (2017) recommended an SVM training algorithm for human and bots' classification in text-based communication chatbots using annual Loebner competition data. At each conversation, approximate normalized entropy and inter message delays are imposed. The simulation results showed that the SVM is an effective method for the classification of chatbot data [16].

Shreyashkar Sharma's (2020) database is used in many applications for the connection of Chatbots. Every customer or user needs appropriate answers and so the database is used so that purpose can be solved. Human language can be transformed into data transformation with the help of NLP. NLP helps to transform with a blend of text and patterns because of which it gets applicable responses. There are many NLP applications programming interfaces and services that help in the development of Chatbots. And make it possible for all sorts of businesses – small, medium, or large-scale industries. The primary point here is that smart bots can help increase the customer base by enhancing the customer support services, thereby helping to increase sales [17].

Gayatri Nair et. al. (2018) proposed an idea of an artificially intelligent chatbot as a personal assistant that can serve as your resume. Also, this chatbot helps the user in fixing meetings and adding them to the calendar. The chatbot is a resume Bot. It is a resume in the form of a chatbot. A resume in the form of a chatbot is the new generation in the field of job applications. A chatbot will help the recruiter to know your personality along with all your qualifications and personal details. The chatbot will communicate with the user with the help of natural language processing and AIML files [18].

P. Shanmugapriya (2020) Main purpose of this chatbot is to reduce manpower and to satisfy the frequently asked queries by the user. Chatbots can be attached to the web browser with different operating systems and also be used as an android application. In recent days, chatbots use a machine-learning algorithm to analyze and respond to the user. This analysis helps the bot to respond to each user query perfectly. Sometimes, the response will not be so accurate for certain queries. This issue can be solved by a moderate dataset, which can be trained to the bot [19].

Himanshu Gadge et. al. (2021) designed a Conversational AI-Powered Chatbot for Medical Diagnostics using Deep Learning which mainly focuses on rural parts as well as poor and needy people of our country. The System can understand the symptoms of the patient and communicate with the Patient (End-user) through web UI. The system tries to solve their problem with the help of the symptoms provided by the Patient and help them to give the correct antibiotics/ medicines and precautions. NLTK (Natural Language Toolkit) is a module/ program in python which can able to perform symbolic and statistical Natural Language Processing for English written in Programming. It is used to analyze the input in the form of speech and generate responses that are similar to humans [20].

A. Research Gap

Artificial intelligence chatbot is a technology that makes interactions between man and machines using natural language possible. From literature, we found out that in general, chatbots are function as a typical search engine. Although the chatbot just produced only one output instead of multiple outputs/results, the basic process flow is the same where each time an input is entered, the new search will be done. Nothing related to previous output. This research is focused on enabling chatbot to become a search engine that can process the next search with relation to the previous search output. In the chatbot context, this functionality will enhance the capability of the chatbot's input processing.

III. PROPOSED METHODOLOGY

A Chatbot refers to a chatting robot. It is a communication simulating computer program. It is all about the conversation with the user. The conversation with a Chatbot is very simple. It answers the questions asked by the user. When designing a Chatbot, how does the Chatbot speak to the user? And how will be the conversation with the user and the Chatbot is very important [3]. The design of a Chatbot is represented using a diagram as follows:

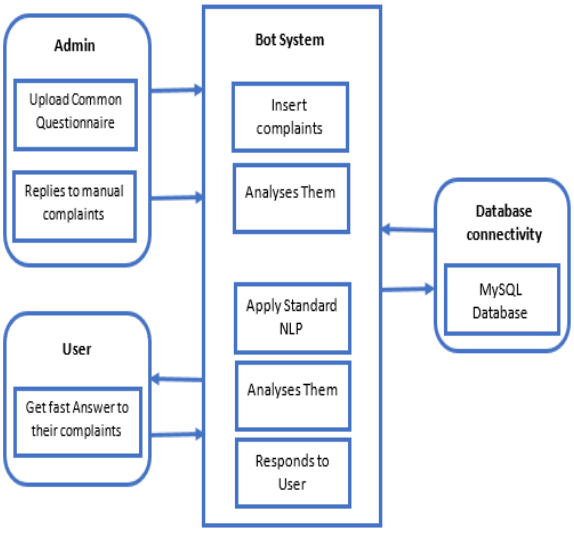

Figure 1: Block diagram of proposed Chatbot

A. Selection of OS

Windows is used for this project because it is user-friendly. It is also robust.

B. Selection of Software

An Artificial Intelligence-powered Chatbot. A python is software that provides a user-friendly interface to make the

connection easier and convenient with the internet providing valid and reliable web services.

The methodology includes API of Chatbot that will be developed with Cascading style sheet which covers all the styling part and the JavaScript is used for functioning the chatbot Back-end part will be done with Python programming language. It also contains various machine learning algorithms to learn the Chatbot by experiencing various user's responses and requests.

C. Creating a Chatbot

For creating a Chatbot, a program has to be written. Python language is used for programming. The Chatbot is created in such a way to help the user, improve communication and amuse the user.

D. Creating a Chat

The chat is created using a pattern that is known to the user and could be easy to understand. Web Page shows up to create conversation. This web page is created using CSS JavaScript, and HTML.

E. Pattern Matching

It is a technique of artificial intelligence used in the design of a Chatbot. The input is matched with the inputs saved in the database and the corresponding response is returned.

F. Simple

The design of a Chatbot is very simple. It just answers the questions asked by the user, if the question is found in the database.

G. Conversational and Entertaining

The Chatbot responses are a way known to the user. The conversation follows a Basic English language and interacts in an easy-to-read manner. The conversation between the user and the Bot is entertaining. It is like talking to another person.

H. Brute force algorithm for Pattern Matching

The simplest algorithm for string matching is a brute force algorithm, where we simply try to match the first character of the pattern with the first character of the text, and if we succeed, try to match the second character, and so on; if we hit a failure point, slide the pattern over one character and try again. When we find a match, return its starting location.
The brute-force pattern matching algorithm compares the pattern P with the text T for each possible shift of P relative to T, until either a match is found, or n all placements of the pattern have been tried

Let P be a string 0 size m

A substring $P[i\,..\,j]$ of P is the subsequence of P consisting of the characters with ranks between i *and* j
A prefix of P is a substring of the type$thethe\ type$
A suffix of P is a substring of the type $P[\,..m\ -\ 1]$

Given strings $T\,(text)$ and $P\,(pattern)$, the pattern matching problem consists of finding a substring of T equal to P

Algorithm BruteForceMatch (**T**, **P**)

Input text T of size n and pattern P of size m
Output starting index of a substring of T equal to P or -1 if no such substring exists
fo i $\leftarrow$ 0 to n $-$ m
{test shift i of the pattern}
j $\leftarrow$ 0
while j $<$ m $\wedge$ T[i $+$ j] $=$ P[j]
j $\leftarrow$ j $+$ 1
if j $=$ m
return i {match at i}
else
break while loop {mismatch}
return $-$ 1 {no match anywhere}

IV. Implementation & Result

The Implementation Phase of the chatbot process puts the paper into action.

The Implementation phase consists of three sub-phases:

a) Execution

b) Login

c) Answering the queries

a) Execution: When a project moves into the execution phase, the project team and the necessary resources to carry out the project should be in place and ready to perform project activities. During this phase the focus shifts from planning the research to participating in, observing, and analysing the work being done.

b) Answering the queries: Answering the queries plays a very important role in the successful implementation of the research.

c) Maintenance of server: Maintenance of the server is very essential for the smooth functioning of the chatbot. The chatbot purely works on the training that we have provided to it and the way we have needed the answers into the servers.

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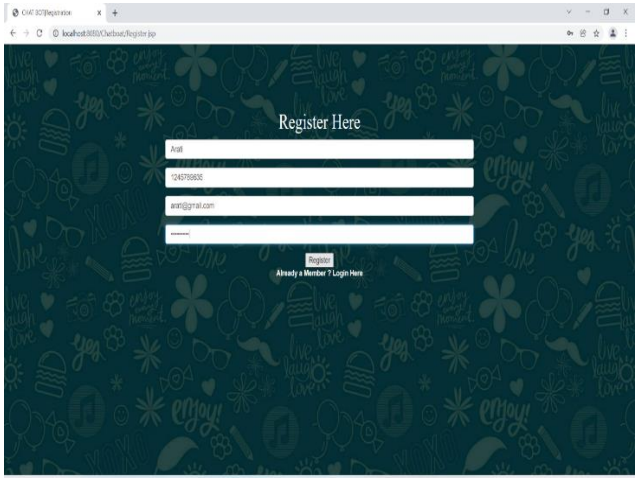

Figure 2: Registration Window

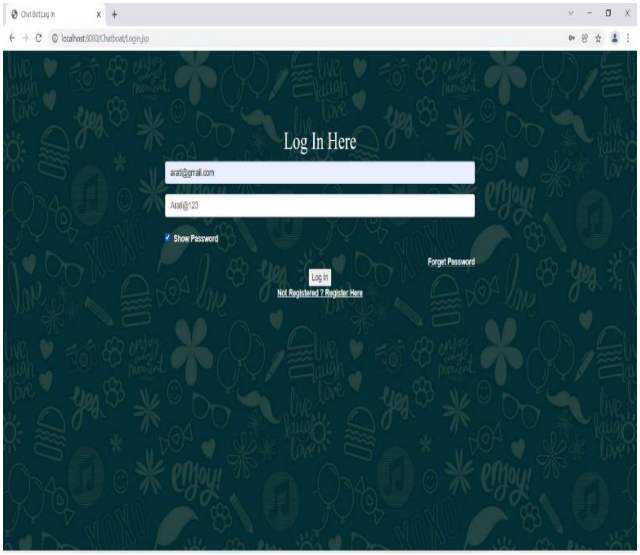

Figure 3: Login Window

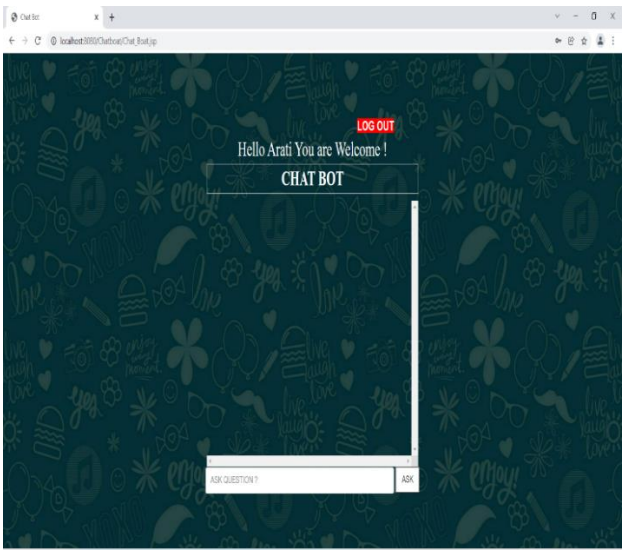

Figure 4: User Interface of chatbot

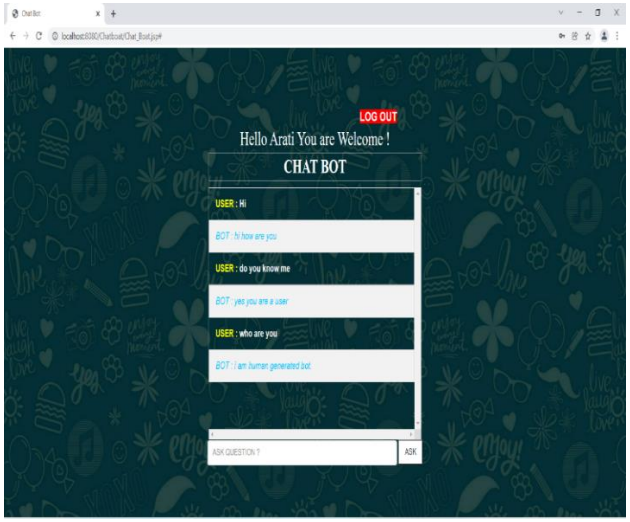

Figure 5: Interaction between user and chatbot

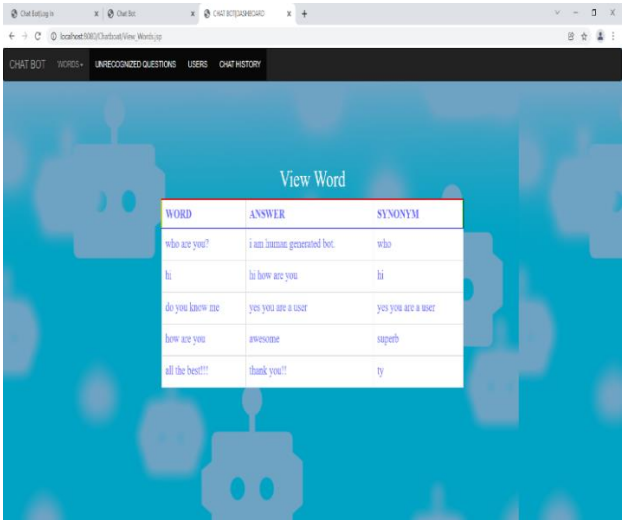

Figure 6: Total View Word

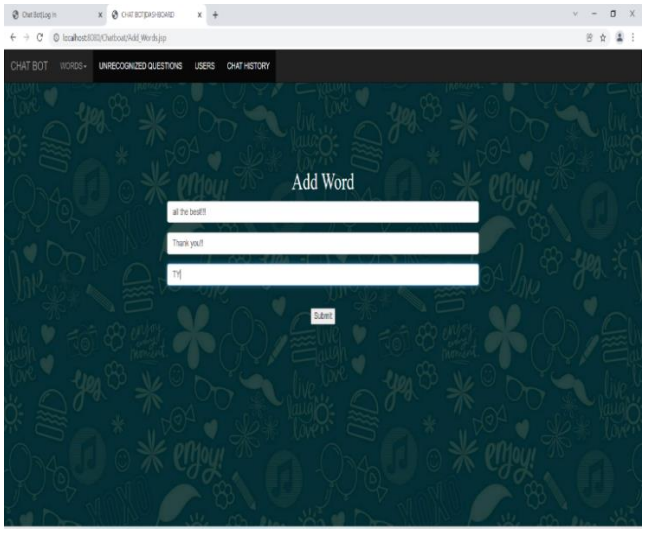

Figure 7: Add word window

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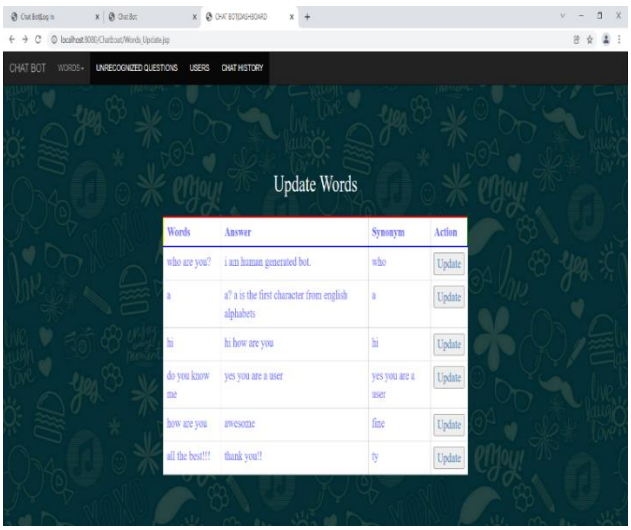

Figure 8: Update Word Window

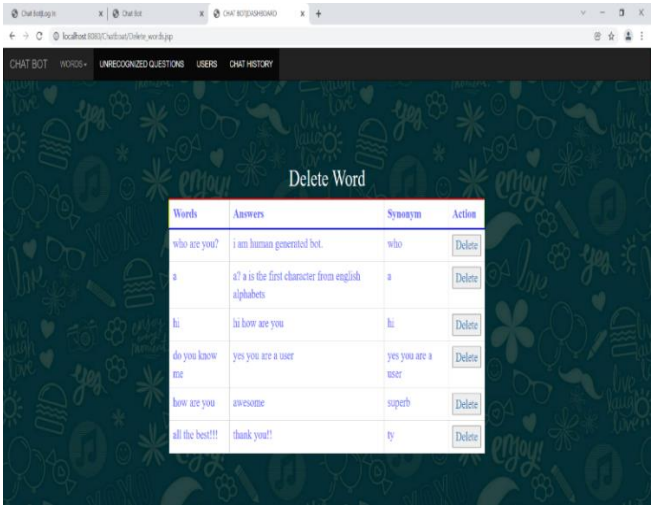

Figure 9: Delete Word

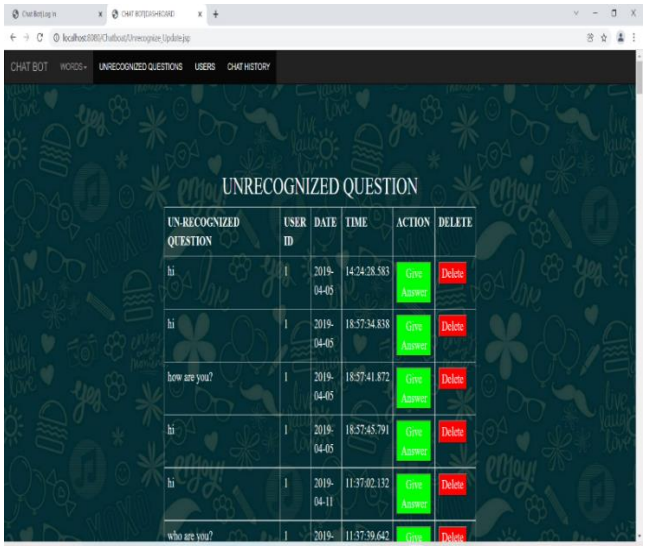

Figure 10: Unrecognized Question

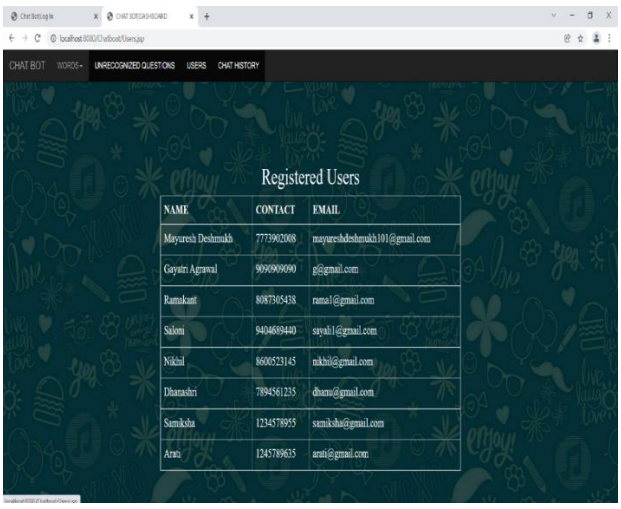

Figure 11: Total User Registered

V. Result Analysis

- Traditionally, the chat system isn't identified to those that don't seem to be a lot into the technology.
- Even if there exists a conversation system, it's not a lot of correct in proving the solution or solutions.
- Students got to manually visit the faculty to urge their queries answered by the faculty facilitate table.
- This method consumes a ton of your time likewise as cash because the client is required to go to school if it's miles far from home.
- Also, this method might result in a communication gap between students and institutions.

Conclusion

Technology is changing at a very fast rate today. Artificial Intelligence is perhaps the most interesting as well as challenging field of research today. It has already proven itself for solving some major problems for mankind. In near future, Artificial Intelligence will present itself on a larger canvas and will become integrated into our day-to-day lifestyle. Using a Chatbot to provide quick answers to daily active users has shown the potential of how Artificial Intelligence can impact lives in the future. Auto responses and general automation will change mining in the future. This will further enhance Mining operations and reduce human errors that usually lead to day-to-day incidences. Therefore, a chatbot can be used not only to chat and get information but it takes artificial intelligence into a whole new light. The main advantage of a chatbot is that it can provide services at any given rate. They respond immediately to the users' demands with precisely relevant information. This enhances the rate of the communication operation. In simple terms, chatbots make your service faster and as a personal assistant, it is the best. You can use it for the betterment of common people.
It is often impossible to get all the data on a single interface without the complications of going through multiple forms

and windows. The college chatbot aims to remove this difficulty by providing a common and user-friendly interface to solve the queries of educational institutions of students and teachers. The purpose of a chatbot system is to simulate a human conversation. Its architecture integrates a language model and computational algorithm to emulate information online communication between a human and a computer using natural language. The educational institution's student and employees can freely upload their queries. The chatbot provides a fast and efficient search for answers to the queries and gets the relevant links to their question. Background research took place, which included an overview of the conversation procedure and tries to find out the relevant keywords related to that query to provide the proper link. The database storage includes information about questions, answers, words, keywords, and logs. We have also developed an interface. The interface developed will have two parts, one for users and the other for the administrator.

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