SMARTER BANKING CHATFIN

Kollepalli Neelima,
PG scholar, Department of MCA, DNR college, Bhimavaram, Andhra Pradesh.
A.DURGA DEVI
(Assistant Professor), Master of Computer Applications, DNR college, Bhimavaram, Andhra Pradesh.

Abstract: ***The "Smarter Banking Chatfin" project introduces an innovative solution to revolutionize customer service within the banking industry through the integration of Artificial Intelligence (AI) and Machine Learning (ML) technologies. The project centers around the development of a sophisticated chatbot capable of intelligently addressing a diverse array of banking-related inquiries. By leveraging a meticulously curated dataset encompassing a wide range of questions and corresponding answers, the chat bot is trained to provide accurate and contextually relevant responses. The system is designed with a user-friendly web interface, empowering users to effortlessly register, log in, and engage in dynamic conversations with the chat bot and also include admin login. This interface not only enhances user experience but also facilitates seamless interactions, allowing customers to access relevant information efficiently and the system can take the input from the user according to their requirement and it can generate the unique id for the each user. Key features include continuous training and dataset expansion, ensuring the chat bot's adaptability to evolving user needs and the admin can able to check the status of the user using the unique ids of the user. The project emphasizes scalability to accommodate potential growth in user interactions and a feedback mechanism to collect valuable insights for on-going improvement. The integration of robust security measures safeguards user data, addressing the sensitive nature of banking-related inquiries***

I. Introduction

At a very basic level chat bot can be consi dered to be an agent which can interact with a user like a human (voice or text) and understand what th e user wants from it and provide a specific set of se rvices to the user according to the user's demands. Chat bot also acts as an information-gathering tool

Chat bots are used in a wide range of dom ains right from health care services to customer rela tionship management services.

A chat bot broadly comprises three subsys tems which are Natural Language Understanding(N LU) which understands what the user is trying to co mmunicate or what is the intent of the provided sen tence, Dialog Management which maintains the stat e of communication by remembering what key piec es of information have been provided by the user a nd how to drive the conversation ahead and Natural Language Generation(NLG) which handles the part where the chatbot figures out what the bot should r espond to back to the user.

RASA is an open-source Natural Languag e Processing(NLP) tool that is used to build virtual assistants and contextual chatbots. RASA provides two main modules Rasa Open Source and Rasa Act ion Server. Rasa Open Source has Rasa NLU to rec ognize the intent of communication and Rasa core t o decide what to do next and how to proceed with t he conversation. Rasa Action Server allows the hos ting of Python scripts to perform certain custom tas ks like processing or modifying databases in the ba ckend. This paper presents a chatbot deployed on a banking website that offers certain services like che cking account balance, making a transaction, and m any more to users right in the chat window.

According to the latest writings in history books, humans in the last decades and centuries ha ve made outstanding technological improvements a nd advances, developing the environment by imple menting a lot of industrial standards and qualities. This, in turn, has led to products and services that were designed to help achieve prosperity and circu mstances that had never seen before. However, the latter, which are supposed to help the system within

which they operate, could not hide the fact that they introduced unnecessary complexity to it.

In the present, as things have evolved even more, the ambition and desire for a scalable and developed system must consider the complete inclusion and exhaustive understanding of the surrounding environment. Therefore, new functionality, adjuvants, products, and services were designed and constructed to facilitate the implementation process and ensure that they do not face other impediments than imagination (we have all the workforce and raw materials to build impressive things, but what are the things we are building?) and material related (we have innumerable desires and needs, but we live in a world where the resources are not countless).

And so, one pertinent example of such improvement and enhancement is Artificial Intelligence (AI), which is a well-known and well-disputed concept, its main objective being the switch from manual labour to a more automated one.

As for the way of action, here are some relevant concepts and examples to better understand what the former can do:

● Object recognition represents the action of identifying a specific object (or a specific entity) from a collection present in a picture. As an example, consider finding a smartphone on the table with many electronic devices.

● Entity recognition -- some sort of object recognition, but it is used with digital text as input and outputs relevant information.

● Clustering, the process of collecting the data from a single 'source of truth' and creating groups based on various aspects or data points.

● Natural language understanding (NLP) -- converting words into complex structures that can be understood by any machine.

● Chatbots – represent programs made by humans, specially constructed to interact with, well, humans. They can be programmed to express human-like behaviour, such as basic communication, providing information, and responding to questions. Given the nature of their implementation, they continually learn using complex and branched algorithms.

● Summarization is the ignorance of redundancy and randomness, storing essential information. The subject we are going to tackle in this paper is the chatbot.

They are automated delegates that are meant to interact and communicate with human beings. Along with their base version, they also possess functionality whose main purpose is to make the user experience more immersive. We are going to make an analysis in the context of banking, or better said, the digital variation of it.

Thus, we will begin by providing useful information from the literature that we studied, both physical and digital, and then we will describe the methods used to conduct research. In the next section, we will analyse five chatbots, giving them the spotlight and describing their capabilities (weaknesses and strengths). Finally, we will reiterate what was stated in this paper and see how artificial intelligence is influencing the domain that we chose to study.

The popularity of messaging apps such as FB Messenger, WhatsApp, Microsoft Teams or SMS, and the adoption of voice-activated assistants like Alexa, Google Home, Siri have brought conversation back into our digital banking experience. This trend has been fuelled by a rise in conversational AI solutions and natural language processing (NLP) technology allowing us to interact, transact and collaborate using natural chat.

As we move from using visual interfaces to using conversational AI, a whole new mode of engagement is enabled. Today, conversational interfaces represent one of the biggest changes in banking user interfaces to date and are altering the way they acquire and retain customers and build their brand image.

II. Literature survey

[1] Jiao, Anran. (2020). An Intelligent Chatbot System Based on Entity Extraction Using RASA NLU and Neural Network. Journal

of Physics: Conference Series. 1487. 012014. 10.1088/1742-6596/1487/1/012014.

Intelligent chatbot systems are popular issues in the application fields of robot system and natural language processing. As the development of natural language processing and neural network algorithms, the application of artificial intelligence is increasing in Chatbot systems, which are typically used in dialog systems for various practical purposes including customer service or information acquisition. This paper designs the functional framework and introduces the principle of RASA NLU for the Chatbot system, then it integrates RASA NLU and neural network (NN) methods and implements the system based on entity extraction after intent recognition. With the experimental comparison and validation, our developed system can realize automatic learning and answering the collected questions about finance. The system analysis of two methods also validate that RASA NLU outperforms NN in accuracy for a single experiment, but NN has better integrity to classify entities from segmented words. Natural language processing (NLP) is one of theoretically advanced techniques for the automatic understand human beings and representation of their languages [1]. It is one of the major areas of artificial intelligence, and thus is used in various situations like machine translation, text mining, speech recognition, and so on. There are several basic phases in NLP, including phonetics, morphology, syntax, semantics, and pragmatics. To understand human language, the machine needs to divide the whole chunk of text into paragraphs, sentences, and words. Besides, it should learn to recognize the relationships between the different words, draw the exact meaning from the text, understand sentences in different situations, and consider the prior discourse context [2]. In the early 21st century, a feed-forward neural network language model was proposed. The use of word embedding with word2vec implementation made it efficient to get a certain relation between words. More recently, feed-forward neural networks have been replaced with recurrent neural networks (RNNs) and long short-term memory networks (LSTMs) for language modelling. And current research in NLP is shown that those successfully applied deep learning methods (e.g., convolutional neural networks (CNNs), recurrent neural networks, and recursive neural networks) are replacing traditional hand-crafted models (e.g., SVM and logistic regression). Collobert et al. argued that a simple deep learning framework performs better in several NLP tasks, especially in named-entity recognition (NER). As RNNs have more “memory” information than other previous computational cells in current processing, it is increasingly popular to use an RNN language model for NLP applications in recent years. Conditional Random Fields (CRFs), a sequence labelling, is also influential in NER tasks. With these models, texts are trained to understand the structure and meaning

[2] Fathima, Sasha & Student, Suhel & Shukla, Vinod & Vyas, Dr Sonali & Mishra, Ved P. (2020). Conversation to Automation in Banking Through Chatbot Using Artificial Machine Intelligence Language. 10.1109/ICRITO48877.2020.9197825.

Artificial Machine Intelligence is a very complicated topic. It involves creating machines that are capable of simulating knowledge. This paper examines some of the latest AI patterns and activities and then provides alternative theory of change in some of the popular and widely accepted postulates of today. Based on basic A.I. (Artificial Intelligence) structuring and working for this, System-Chatbots are made (or chatter bots). The paper shows that A.I is ever improving. As of now there isn't enough information on A.I. however this paper provides a new concept which addresses machine intelligence and sheds light on the potential of intelligent systems. The rise of chatbots in the finance sector is the latest disruptive force that has changed the way customers interact. In the banking industry, the introduction of Artificial Intelligence has driven chatbots and changed the face of the interaction between bank and customers. The banking sector plays an important role in development into any country. It also explores the existing usability of chatbot to assess whether it can fulfill customers ever-changing needs. A chatbot is a conversational agent which uses the natural language to communicate with users. There are several chatbots required for serving in various

domains. Nevertheless, chatbots knowledge base is hand-coded in their brain. This paper provides a summary of ALICE chatbot, its AIML structure and our experiments for automatically creating various ALICE prototypes based on a corpus method. A summary of the program built that translates readable text (corpus) into AIML format is provided along with a review of the various corpora we used. Our tests revealed the likelihood that practical prototypes could be produced without the need for sophisticated natural language processing or advanced machine learning techniques. These prototypes have been used as tools for practicing different languages, for visualizing corpus and for answering questions [1]. The emergence of chatbots is the new disruptive force in the financial sector that has changed the way consumers communicate. In particular, the banking industry, the introduction of chatbots driven by Artificial Intelligence has changed the face of the bank-customer interface. This paper explores the feasibility of the growing use of chatbot by the banking industry. The banking sector in any country plays a major role in the economy of country. It also tests the latest chatbot features to decide if it can satisfy the ever-changing needs of consumers. The concept of Chabot's isn't new. Over the past few years, however, the use of bots has attracted industries. Chatbots were first set up in the 1960s and have come a long way from their initial development. There are two different types of chatbots (Fig.1). The most common type of chatbot is based on rules, and the more advanced chatbot is powered by artificial intelligence

[3] Singh, Netra & Singh, Devender. (2019). Chatbots and Virtual Assistant in Indian Banks. Industrija. 47. 75-101. 10.5937/industrija47-24578.

This paper discusses the adoption of chatbots and virtual Assistants by different category of banks (private sector banks and public sector banks) in India. The research paper presents a brief introduction of banking industry in India, history, characteristics, and architecture of chatbots and virtual assistants. The research paper also included basic features, way to connect, services offered, accuracy, technology providers of chatbots and virtual assistants implemented by Indian banks. Research paper concluded that Indian banks are aggressively investing in chatbots and virtual assistant technology but features are limited. Most of the questions answered by chatbots/ virtual assistant are routine for which data is already available on websites of the banks. Secondly, awareness of chatbots/ virtual assistants is very low among the customers and employees of the banks. It necessitates enhancement of existing capabilities of chatbots/ virtual assistant deployed by Indian banks and awareness with respect to usefulness among employees and customers.

[4] Petr Lorenc, "Joint model for intent and entity recognition" in arXiv: 2109.03221v1 [cs.CL] 7 Sep 2021

The semantic understanding of natural dialogues composes of several parts. Some of them, like intent classification and entity detection, have a crucial role in deciding the next steps in handling user input. Handling each task as an individual problem can be wasting of training resources, and also each problem can benefit from each other. This paper tackles these problems as one. Our new model, which combine intent and entity recognition into one system, is achieving better metrics in both tasks with lower training requirements than solving each task separately. We also optimize the model based on the inputs. In recent years, a significant amount of smart speakers have been deployed and achieved great success, such as Amazon Echo, Google Home, and many others, which interact with the user through voice interactions. Natural language understanding (NLU) is critical to the performance of spoken dialogue systems. NLU typically includes many parts, typically based on the usage, but the core usually contains the intent classification and entity recognition. For example, we have a sentence 'I would like to move to London.' We want to extract the information that the intent is 'change_address' and also recognize that the entity is 'London'. We can use this information to query a database or other knowledge resource. In some cases, for example, in chatbot system Alquist1 , we require to catch not only the valid named entities defined here [5] but also pseudo-entities. An excellent example of pseudo-entity is 'rock music' in a sentence: 'Let's listen to rock music.'

III. Proposed method:

In this project we have employed Artificial Intelligence technique to process text data and then employ machine learning algorithms to predict answers for user questions. Chatbot will take user queries and then employ ML algorithm to predict answer and then this answer will be given as output to the user.

A. Problem definition

Technology use in today's banking sector continues to be high, pushed by the ever-increasing need for more banking services. In the competitive banking area, the customer expects quick responses increasing the load for banks to catch up with the re quirements. This project aims to develop a website with a chatbot that is not only capable of having co nversations with the customer but also has the abilit y to listen to commands and make changes to the d atabase.

B. Dataset

The custom dataset is created which contains i n total of thirty-six intents out of which twenty are domain-specific intents these are the ones that are r elated to common banking queries and sixteen inte nts are written for basic utterances while in a conve rsation. Dataset consists of eleven entities(transacti on_amount, email_id, location, phone_no, etc) that can be recognized by the model and will further be stored in slots which in turn will drive the conversa tion. For domain-specific intents, on average appro ximately fifteen examples are provided per intent. Here are some of the example sentences from the in tent 'pin_change':-

1. I would like my pin to be [6711](pin);
2. set pin to [6665](pin);
3. I want my new pin to be [1234](pin);
4. pin change;

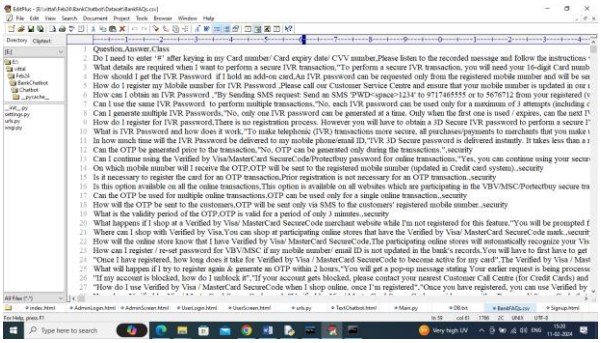
C. Technology Used

1. *Chatbot Framework:* RASA
2. *Website backend:* Django
3. *Frontend:* HTML5, CSS/BootStrap, JavaScript
4. *Database:* PostgreSQL

3.1 Proposed Work

To get accurate answer we have evaluate performance of multiple algorithms like Random Forest, KNN and SVM. In all algorithms Random Forest is giving best accuracy.

To train above algorithms we have utilized banking question and answers dataset showing in below screen



In above dataset we have questions and answers and Chatbot will get trained using above dataset to predict answers for users questions.

To implement this project we have designed following modules

1) Admin Login: using this module admin can login to system using username and password as 'admin' and then can train ML algorithms. Admin can view list of sign up users and can view all interaction between all users and Chatbot.
2) New user sign up: using this module user can sign up with the application
3) User Login: registered user can login to system
4) Interact with Chatbot: using this module user can communicate with Chatbot.

3.2. Architecture

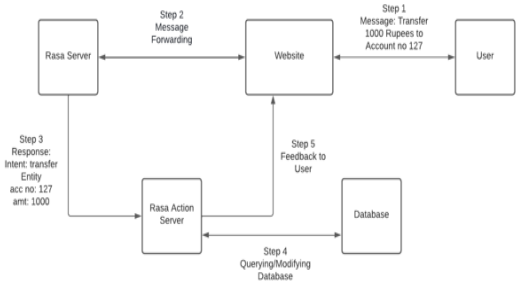


Fig. 1 This figure represents basic blocks of the whole system consisting of chatbot, website and database and how communication occurs between them.

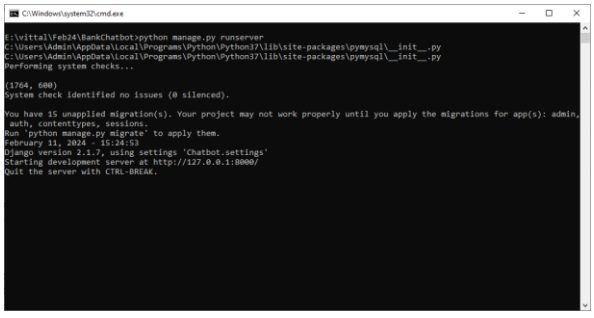
As shown in Fig. 1, firstly the user will pr ovide a message on the website through the chat wi ndow, this message will be passed over to the RAS A server by the website. The Rasa server will proce ss the message and then recognize the intent of the message and extract entities if they are present.

If this is a simple conversational text then the Rasa server will utter a predefined response and will wait for the next message from the user or else the Rasa server will pass on the extracted entities to the Rasa action server that will call upon a certain a ction which will establish a connection with the dat abase to either read/modify the database. Once all t he processing is done, a feedback message will be u ttered by the action server back to the user mentioni ng the status of the queried process.

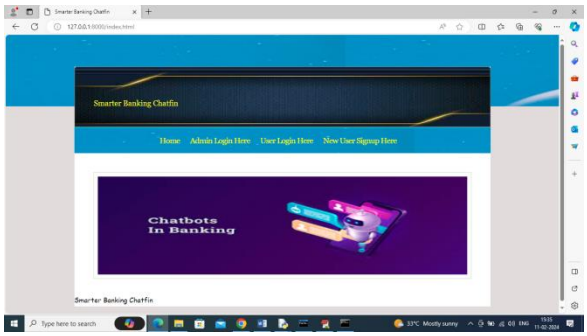
Result

To run project install MYSQL and then install python 3.7 and then copy content from DB.txt file and paste in MYSQL console to create database.

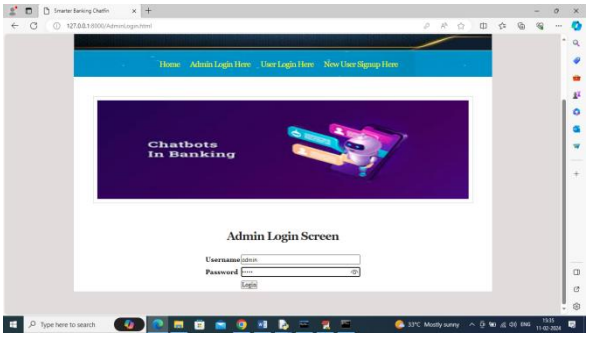
Double click on run.bat file to start python web server and then will get below page



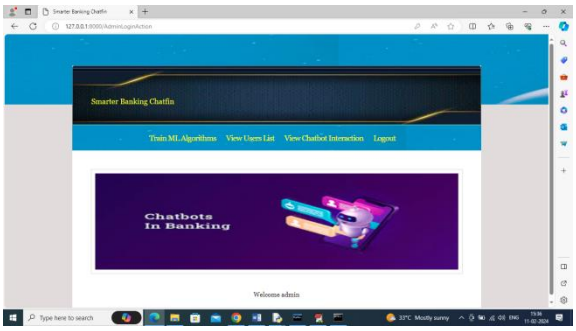
In above screen python server started and now open browser and then enter URL as http://127.0.0.1:8000/index.html and then press enter key to get below page



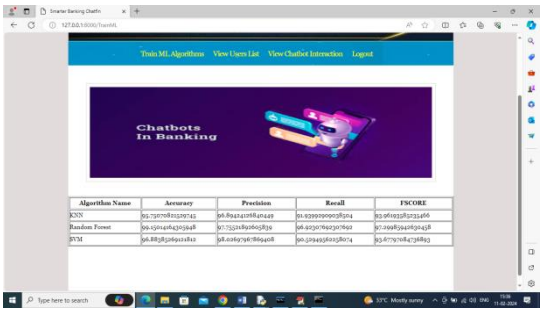
In above screen click on 'Admin Login Here' link to get below login page



In above screen admin is login and after login will get below page

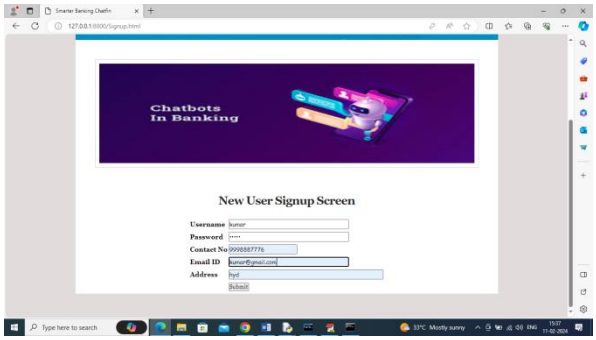


In above screen click on 'Train ML Algorithms' link to train algorithms and get below page

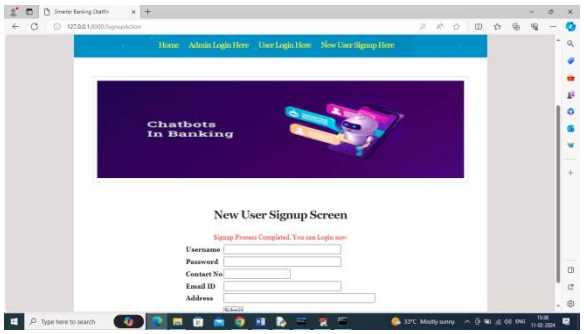


In above screen can see result of all ML algorithms and in all algorithms Random Forest got high accuracy and now 'Logout' and sign up new user

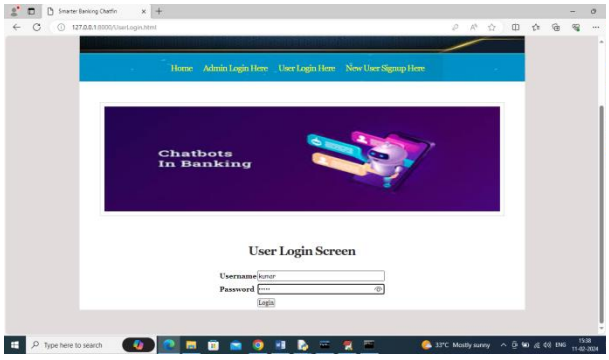
ISSN 2277-2685
IJESR/April-June. 2025/ Vol-15/Issue-2s/186-194



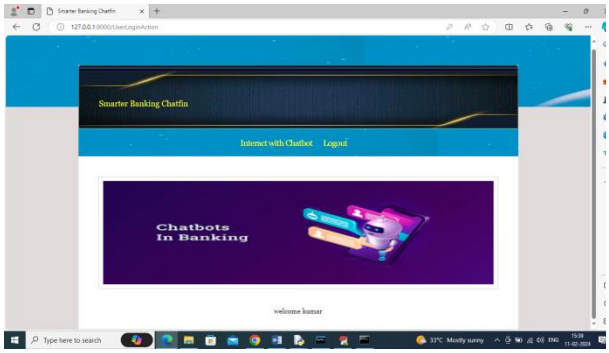
In above screen user is entering sign up details and then press button to get below page



In above screen sign up task completed and now click on 'User Login' link to get below page

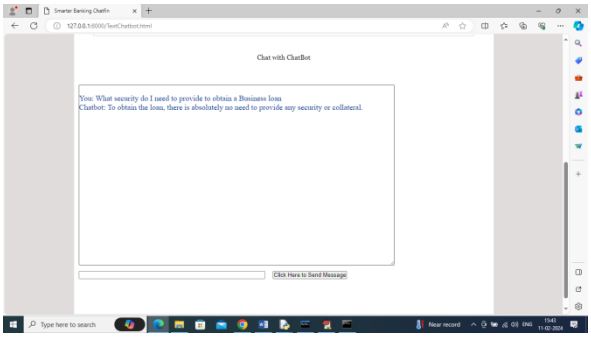


In above screen user is login and after login will get below page



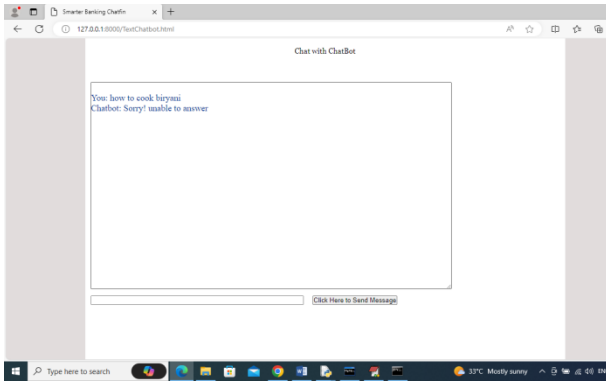
In above screen click on 'Interact with Chatbot' link to get below page

In above screen in text box I entered some text and then press button to get reply from Chatbot like below page

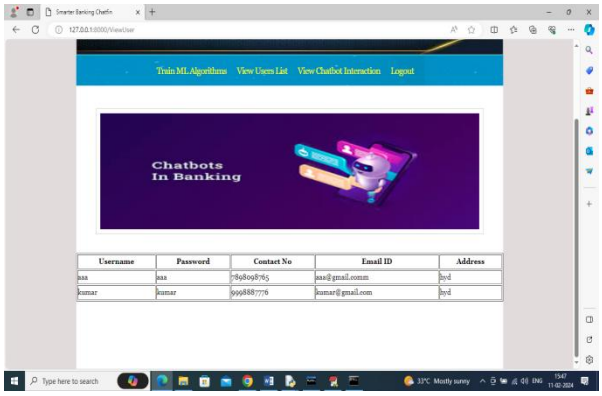


In above text area 'You' refers to user question and then can see Chatbot answer and similarly you can ask any question from dataset and get reply

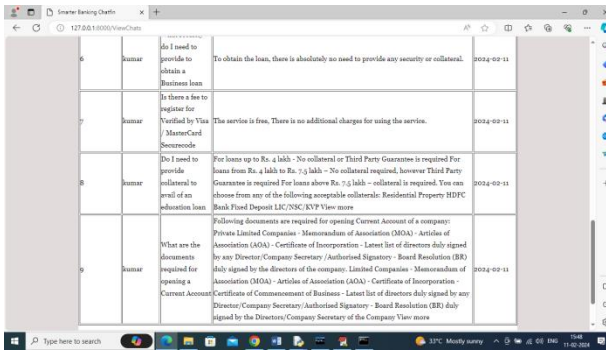
In above screen I entered some questions and then Chatbot replied for all questions



In above screen if we ask unrelated questions then Chatbot will reply with error message and now logout and login as 'admin' to view all interaction



In above screen admin can click on 'View Users List' link to get all registered users list and now click on 'View Chatbot Interaction' link to get all interactions list



In above screen admin can view which users ask what questions and what is the Chatbot reply along with date can be viewed by admin.

Similarly by following above screens you can run entire project.

Conclusion

Implementation of this project would make the user experience of a customer on the website, more friendly and seamless. A chatbot can also act as an information-gathering tool that would help the organizations to inspect the needs of customers and then implement them. In an era marked by digital transformation, Smart Banking Chatfin stands as a testament to the power of AI and ML in reshaping the banking landscape. By offering personalized assistance, round-the-clock availability, enhanced security measures, and predictive analytics, this innovative platform redefines customer engagement and sets new standards for efficiency and convenience in banking services. As financial institutions continue to embrace technological advancements, Smart Banking Chatfin remains at the forefront, driving innovation and delivering unparalleled value to customers worldwide.

REFERENCES

[1] Jiao, Anran. (2020). An Intelligent Chatbot System Based on Entity Extraction Using RASA NLU and Neural Network. Journal of Physics: Conference Series. 1487. 012014. 10.1088/1742-6596/1487/1/012014.

[2] Fathima, Sasha & Student, Suhel & Shukla, Vinod & Vyas, Dr Sonali & Mishra, Ved P. (2020). Conversation to Automation in Banking Through Chatbot Using Artificial Machine Intelligence Language. 10.1109/ICRITO48877.2020.9197825.

[3] Singh, Netra & Singh, Devender. (2019). Chatbots and Virtual Assistant in Indian Banks. Industrija. 47. 75-101. 10.5937/industrija47-24578.

[4] Petr Lorenc, "Joint model for intent and entity recognition" in arXiv: 2109.03221v1 [cs.CL] 7 Sep 2021

[5] The Rasa documentation. [Online]. Available: https://rasa.com/docs/rasa/2.x

[6] Django documentation. [Online]. Available: https://docs.djangoproject.com/en/4.0/

[7] Bayan .A, Eric .A, 2007,"ALICE CHATBOT:TRIAL AND OUTPUT" https://www.researchgate.net/publication/289684788_ALICE_chatbot_ Trials_and_outputs

[8] Chatbot Pack, "Introduction to Chatbot 2019", [online] https://www.chatbotpack.com/what-is-chatbot-2019/

[9] Forbes, Naveen Joshi, 2018, "Yes, Chatbots And Virtual Assistants Are Different!",[online] https://www.forbes.com/sites/cognitiveworld/2018/12/23/yes-chatbotsand-virtual-assistants-are-different/#41894a2f6d7d

[10] Drift, "An Introduction to A.I. Chatbots", [online] https://www.drift.com/learn/chatbot/ai-chatbots/

[11] Srinivasan, Nguyen, & Tanguturi, 2018," CHATBOTS ARE HERE TO STAY", [online] https://www.accenture.com/_acnmedia/pdf77/accenture-research-conversational-ai-platforms.pdf

[12] Hackernoon, Shane Barker, 2019 "Deep Learning Chatbots", [online] https://hackernoon.com/deep-learning-chatbot-everything-you-need-toknow-r11jm30bc

[13] Bhavika R. Ranoliya, Nidhi Raghuwanshi, Sanjay Singh, "Chatbot for university related FAQs", 2017 International Conference on Advances in Computing, Communications and Informatics (ICACCI) [14] Arati A. Dobariya, Ajaykumar T. Shah, "Banking Inquiry Chat Bot", IJSTE - International Journal of Science Technology & Engineering | Volume 5 | Issue 7 | January 2019

[15] UX Collective, Takuma.K," Is the chatbot a hype of the past? What are the key takeaways?", [online]https://uxdesign.cc/is-the-chatbot-a-hypeof-the-past-what-are-the-key-takeaways-3922a6895500