

BANKING BOT

BASED ON RASA FRAMEWORK



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In the name of ALLAH, the Most benevolent, the Most Courteous

CERTIFICATE OF CORRECTNESS AND APPROVAL

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DECLARATION OF ORIGINALITY

We hereby declare that no portion of work presented in this thesis has been submitted in support of another award or qualification in either this institute or anywhere else.

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Our parents, colleagues and most of all supervisor, Dr Aleena Mirza without your guidance.

The group members, who through all adversities worked steadfastly.

Plagiarism Certificate (Turnitin Report)

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ABSTRACT

Banking Bot is an Artificial Intelligence-based Chatbot. It works like an imaginary Assistant e.g. Siri, Cortana, etc. This Banking bot is particularly designed for operations related to banks that can comprehend customer queries and then reply accordingly. The main objective of this project is to use Natural Language Understanding (NLU) for the training of Chatbot. Whenever we have any bank-related problem or questions we have to go to the bank to sort out our problem, it's so time-consuming and takes a lot of effort; On the other hand, sometimes the bank staff is also very busy to give us their time. To sort out this problem we proposed a banking bot which can understand the people's queries and give valuable responses to the customers, online which saves the valuable time of customers and banking staff both. Customers can directly chat with the bot online to solve their queries and perform the task which they want. Besides understanding queries this bot can also perform transactions, adding a beneficiary, check balance, view history of customers, mini statement, account detail, fund transfer.

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Chapter 1: INTRODUCTION

A banking bot is a Chat bot used for human interaction with a bot. It works like a simulated assistant or virtual agent, understands the customer queries, and responds according to them. Banking is a part of everyone's life. In today's era, almost every person uses the banking area to perform their special tasks. Chatbots are becoming more trending in this era because mobile and internet banking is at their highest peak. With the help of a Chatbot, bank staff also save their precious time on hard tasks and all the queries or tasks of customers are performed by a bot, it's also more helpful for the customers who don't have time to go to the bank and then wait for their turn. In this banking bot we try to perform some basic and valuable operations like adding a beneficiary, perform transactions, fund transfer, mini statement, etc.

RASA is a framework to train the Artificial Intelligent Bots. With the help of this framework we can easily train our Bot in the way which we want. RASA can understand our messages and give a reply according to that. It's an open source framework to train Bots.

NLU is also open source tool and it is used for the classification of the intents which we create. We can add the new intents or can also remove the new intents. After adding the new intent we must have to train the bot again by giving command.

CORE is acting or perform working like a conversational engine for the AI bots. Like NLU, Core is also the important component of RASA framework.

CHATBOT is software application which is used to conduct online communication between user (human) and the bot. It's working like a Virtual Assistant e.g. Siri, Cortana etc. It makes our work more efficient and also save the time by its quick response.

1.1 Overview

Banking Bots are very helpful in this technological and fast world. Our Banking Bot is based on some basic operations like make a transactions, adding beneficiary, fund transfer, mini statement, check balance, etc.

All working is based on Artificial Intelligent RASA framework. RASA has its two components Core and NLU, both components are very important for the working and training of bot. Intents are also the important concept in this project, with the help of intents we can change the performance of bot. Intents are the working of bots.

In Pakistan we did not have that types of bot which works on the training or on some learning parameters, mostly bot based on Frequently Asked Questions which are the predefined questions and information. In this one Bot can't learn any new thing or can't add new intents in it. Flow of the working of the complete project also mentioned in this document which is very helpful for understanding

1.2 Problem Statement

In the present system, a customer didn't get the authentic and valuable answer to its queries and the bot also does not perform the actions which the customer wants. If the customer asks something from the bot and the bot responds in some other way so it's unprofessional for the Bank and also wastage of time for the customer.

1.3 Proposed Solution

This bot performs all that operations in an authentic way and also responds to the user queries in a better way, this bot works for the banking sector 24/7. The system provides the following features:

- Adding a beneficiary.
- Funds transfer.
- Performing transactions.
- Mini statement.
- Maintaining a History of users' transactions and log in.
- Offering valuable Actions.
- Adding new intents.
- Learn with time.

1.4 Working Principle

Figure 1 shows the working principle of Banking Bot.

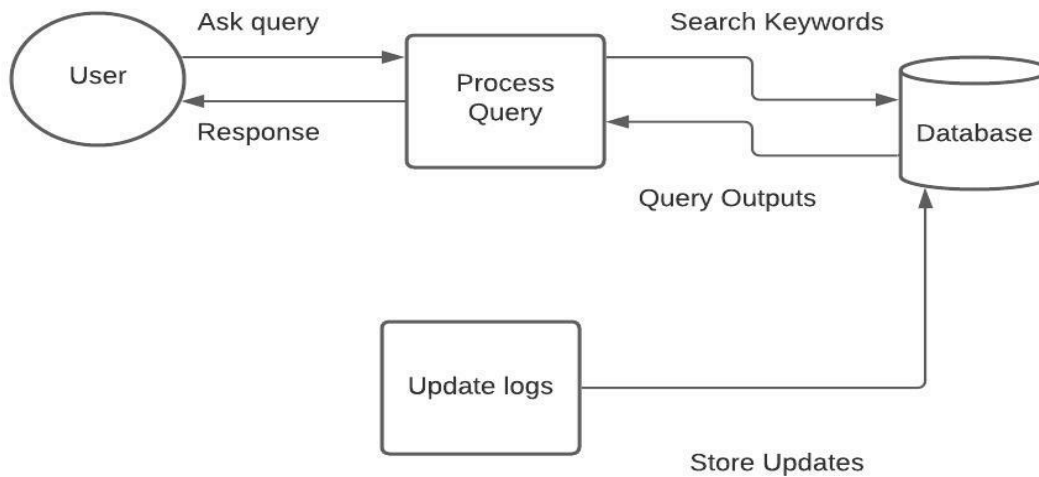


Figure 1 : Block Diagram of Proposed Banking Bot

1.4.1 System Requirements

a) End Users (Customers)

Any person having a bank account

b) Functional And Data Requirements

In this section of document all of the requirements of trained bot are described:

c) Greeting Messages:

User can send the greeting message to the bot in its way and we know that humans have different ways then bot sends the reply to the user that's called greeting intent.

d) Offer Services:

After greeting bot offer its basic services to the bot for which it is trained.

e) Select Service:

Now user select the service of its choice then bot asks the questions about that choice and wants to assist the user fully.

f) Make a Transaction:

If user selected the service of transaction, then bot asks the question for the account and how much amount he want to transfer, after fulfilling the requirements and when the amount transferred bot displays the message of “amount transferred” to the user.

1.4.2 Design Considerations

1.4.2.1 Algorithm used by Banking Bot

This is related to AI learning bot for quick responses so we used the String matching and Pattern Algorithm.

1.4.2.2 Data Set

We created the data set by our self-according to the scenario, so firstly we created flows and then according to these flows we created the data set of questions and answers but it's not FAQs so we can add the new intent and train the bot.

1.4.3 Strategies for the management of Project

The project management strategy is that, that stays that bot active 24/7 for the better results and good performance of bot

1.4.4 Development Method

This project is using a PyCharm IDE, Python, RASA, NLP, and NLU.

1.4.5 Future Enhancements / Plans

In future we are going to plan this technology in banking sector with several modifications keeping in view the requirements of a bank.

1.5 Objectives

The main projects of this project are as under

- Development of a smart and intelligent system
- To implement NLU and simulate the results
- To increase productivity by working in a team
- To design a project that contributes to the welfare of society

1.6 Scope

This project finds its scope wherever there is a user with a bank account. It is an innovating state of the art web based application from which the users will have a better chance to get authentic answers to their queries and can perform several tasks, without compromising sensitive information. The software will be actively available 24/7 and will respond according to the user queries.

1.7 Deliverables

Several deliverables of the Banking Bot are as under.

1.7.1 Adding new beneficiary

Registration of a new beneficiary is done in Bot by using his username, email address, account type, contact number, etc.

1.7.2 Account details

The Bot gives the beneficiary his account details i.e name of account holder, total amount, account type and account number.

1.7.3 Mini statement

The Bot can show Mini-statement of account holders which includes all transection history.

1.7.4 Fund transfer

Amount can be transferred to other account holder through Bot.

1.7.5 Amount deposit

A user can deposit money through Bot.

1.7.6 Amount withdraw

An account holder can withdraw money through cardless withdrawal option using bot services.

1.7.7 Authentication

Bot Performs authentication by generating OTP.

1.8 Relevant Sustainable Development Goals (SDGs)

1.8.1 Primary

Primary SDG for our project is Decent Work And Economic Growth. Chatbot applications streamline interactions between people and services, enhancing customer experience. At the same time, they offer banks new opportunities to improve the customers engagement process and operational efficiency by reducing the typical cost of customer service

1.8.2 Secondary

Secondary SDG of our project is Industry Innovation and Infrastructure. Modernization is embracing the market innovations at the global level and those who are still wondering whether or not to adapt to the emerging technologies will soon be left behind in the competition. Banking bots are growing innovation tools in global bank industry which is becoming integral part of its structure

1.9 Structure of Thesis

- Chapter 1 contains the Introduction to the project
- Chapter 2 has the literature review of the project

- Chapter 3 is comprised of the implementation of algorithms used in the functioning of the bot
- Chapter 4 is comprised of conclusion
- Chapter 5 incorporates the future work

Chapter 2: LITERATURE REVIEW

In Pakistan, we didn't have such bots which work on the training of the bot. AI is such a unique topic these days and most of the companies are trying to build their Chatbots for the assistance of the user. It is also helpful for the user as well as remarkable for the companies. Many banking sectors try to create their dataset for the bots but this is not an easy task.

Simons is one of the first person who said that machine is that type of entity which has the ability to think by itself, it can learn and then create something by itself. Shetty, Shah & Pamnani in

2017 said that this is one of the best technology which can do the dialogue conversation with the end user. Chat Bots are becoming more popular these days due to their productivity and efficiency. Many banks are trying to use this technology of AI in their banking sectors. To know its importance we can also perform some interviews with the bank managers and CEOs to make this Banking Bot more worthy for the banking sectors.

Artificial Intelligence is a great topic in the field of technological area as the world is living in the world of robotics. This Banking bot project is developed using the algorithms of AI, Machine learning, and Natural Language Processing that analyzes or understand the problems and questions of users and responds according to them. The queries asked by the users can be in any way so we are creating the intents of all types. Suppose we create the intent of greet, now it depends on the user's tone, some will say hi, some will say hey, some say good morning, etc. but for all these, our bot understands it like a greeting message and responds according to it.

Another main issue, we don't get any information from the busy bank staff and we have to wait, sometimes we are busy in our jobs and it's hard for us to go to the branch. In all such cases the only best way is to interact with a Chatbot without any problem which is active 24/7 . We can call the Machine learning as a science that was developed as a subfield of AI. It is a science that will enhance more and more in the future work it also have many good impacts on the technological world which is very beneficial for all. The applied machine learning are helpful in many areas or dimensions like the NLP, IP (image processing), CV (computer vision), and voice based which is called speech and the text which is handwriting recognition. We have many machine learning methods. These methods are SL which is based on learning parameters, USL which is different to SL in training of bot, SSL which is semi-supervised learning, and in the last we have RL which is reinforcement learning. In USL which is unsupervised learning, the outcomes of the data to be

trained in not given so this is the huge difference between SL and USL. It also have two more types; first one is clustering and second one is association. We also have another technique here which is the most important and interesting that is ANN. Artificial neural network works as a processing system for data and it is developed on the basis of some neural networks which have the same concept like the biological neurons. The concept of neurons are also used here. Neurons works like the processing elements and these elements are the basics of ANN. These neurons have the only five main and mandatory functions which are different to each other in working or also in action, some works as inputs, some works as a summation function, some are going to called weights of these elements, the functions for activation and in the last we have output.

NLP is a process, that how you analyzed the text in the way of computer, the understanding of text is very important here. It is a way of collecting your knowledge that how the human beings understand it and use their language. Many researchers write about (NLP) in their researches or write ups that NLP is like the field or dimension of the research and application that explains how the computers will be used to understand and performing some analyzations to understand the natural language text or speech and then use it further for the development of useful things.

RASA conversational AI powered framework is totally different from the old technology of FAQs as it is simply like the pre-defined dialogue conversation between humans. Rasa Conversational AI virtual agent normally consists of two components and they are Rasa NLU and Rasa Core. We can understand the Rasa NLU as its taking all the inputs from the user and Rasa Core is working like a decision tree which takes the right decision according to the user.

PyCharm is an IDE for Python and **Django** which providing a long range of important tools for Python developers. It is very helpful for those people who want to make the python project in this developmental framework of python .We can also have real time web apps in our life which

works in the real time. The most popular of them are the shopping platforms like Amazon, Daraz, and Shopify etc. Behind these well-working websites we have a huge amount of data and complex system to handle which gives the authentic data to users. To make our website more interactive we use the Django IDE. These type of websites manage and handle a big data, we use the Django IDE it means that if our website is over loaded or becoming slow due to network traffic, Django can tackle all these situations and remains stable.

2.1 Existing solutions and their drawbacks

In Pakistan we didn't have such bots which work on the training of the bot, they didn't adopt the new intents easily and did not perform actions on it. Previous bots work on Frequently Asked Questions (FAQs), these bots are just trained with some pre-defined or mostly asked questions of the users. So, here is the problem in these systems because if the user has some different query then how the bot processed it. In this situation, the bot is not going to learn new things and it's also not beneficial for the user.

2.1.1 Problems in Existing system

In Pakistan mostly banks do not have an AI-based Chatbot which works as a virtual agent. If they have some Assistance for the user then on their websites they can directly send complains and queries on their WhatsApp but the issue is that the bank staff does not reply in a hurry; so it's not much beneficial for the user.

Some banks have their Chatbot's but they are not AI-based, they work on FAQs, they just respond according to the pre-defined data which fed in it

Chapter 3 : IMPLEMENTATION

- Register on the bank website with the conditions which are set by the developer. After registration login to the user account.
- On the front page of the bank website we have different options of History, Transaction history and logout.
- On the right bottom corner of the website main page we have blue chat icon of bot.
- User click the bot and send the greeting message to activate the bot.
- Bot offer services to the user for which it is designed.

- User select any service and then bot ask questions related to that.
- After performing the tasks user can logout from the account for security requirements.

3.1 Algorithm

Banking Bot is the learning AI bot worked on the framework of RASA, so it can be controlled by the intents which we give and by the components of RASA which is NLU and core. These components are very important for the training of bot. RASA bots give us the option to add data with time and upgrade the model. On each upgradation, the Bot requires training and each training data produces a new model.

3.1.1 Algorithm for Application

Step1: Activate the bot by giving command

Step2: Start the website

Step 3: Login with the credentials

Step 4: Start communicating and perform actions.

3.2 Implementation of Code

3.2.1 Actions

Figure 2. Screenshot of Actions.py shows some of the basic actions of Banking Bot.

Action file is responsible to perform all the actions of bot i.e. transection, withdrawal, deposit, mini-statement, etc.

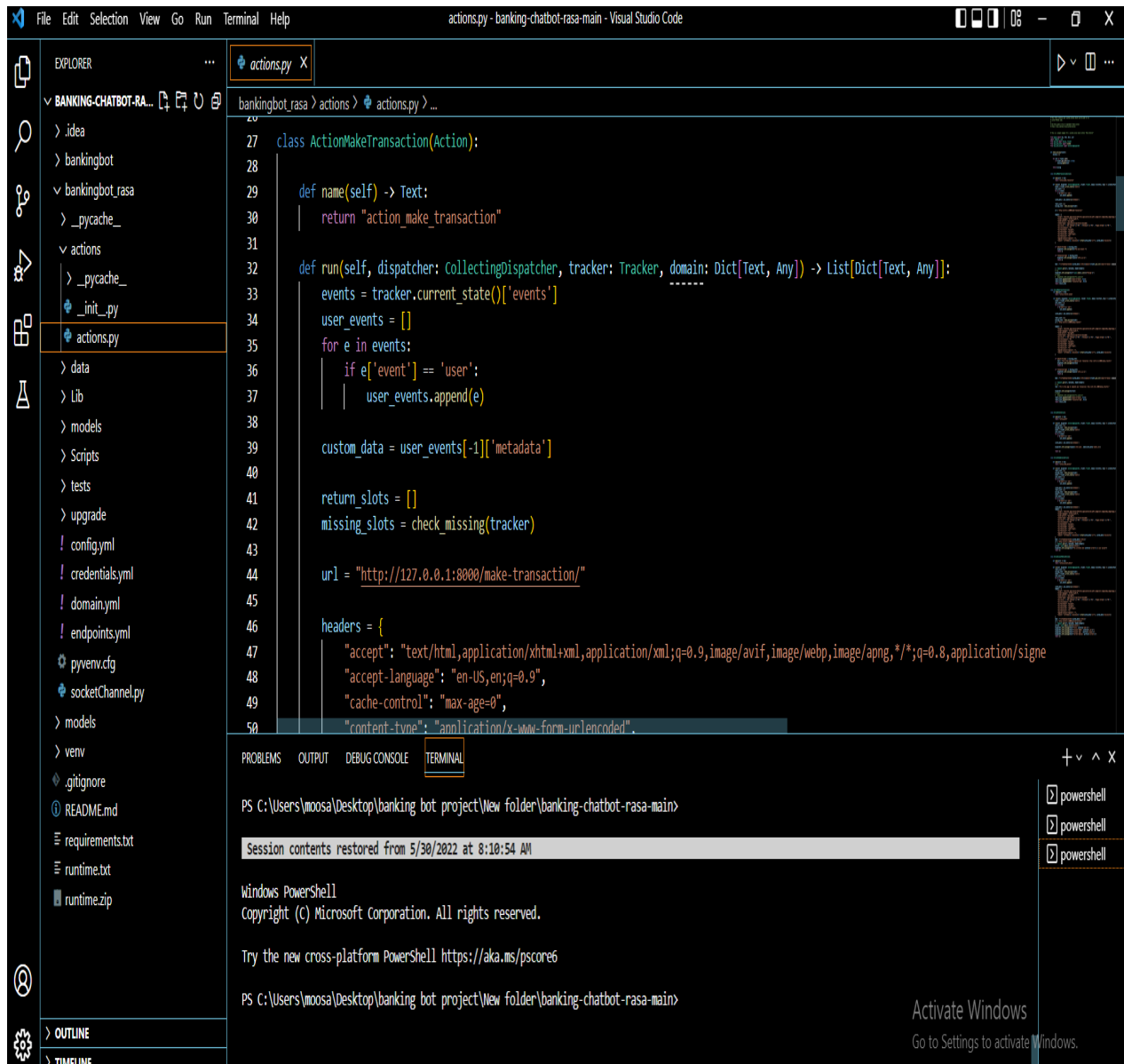


Figure 2: Screenshot of Actions.py

3.2.2 NLU

Figure 3 Screenshot of NLU which show the natural language understanding working in form of intents and their examples. Intents are custom defined and can include as much examples as required. Each example shows the natural language word/ phrases.

One type of all examples are grouped together in a single intend.

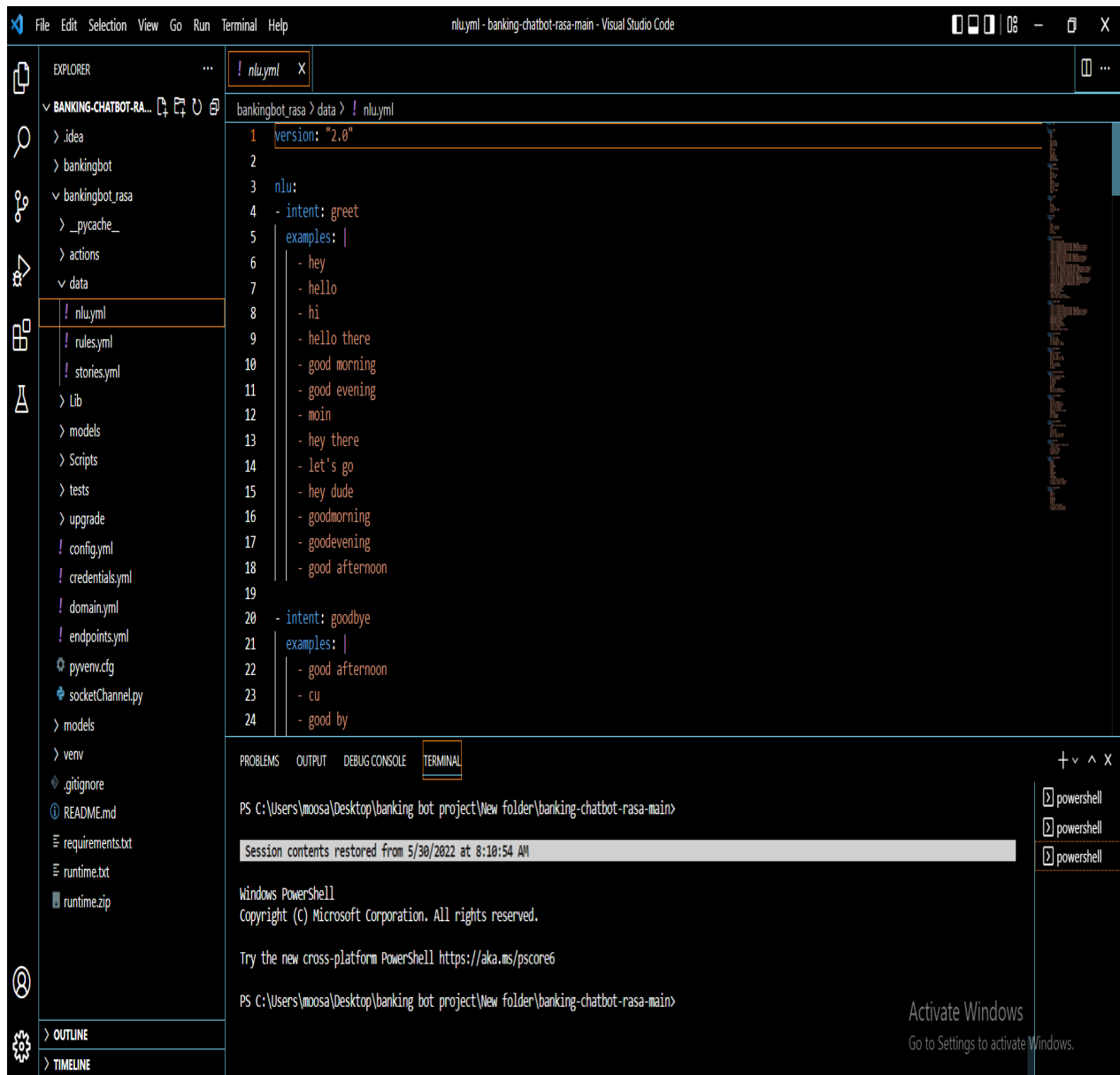


Figure 3: Screenshot of NLU

3.2.3 Stories

Figure 4 Screenshot of Stories. Stories are relationship between intents and their response.

The bot response as per response defined here. Each response can have one or many steps.

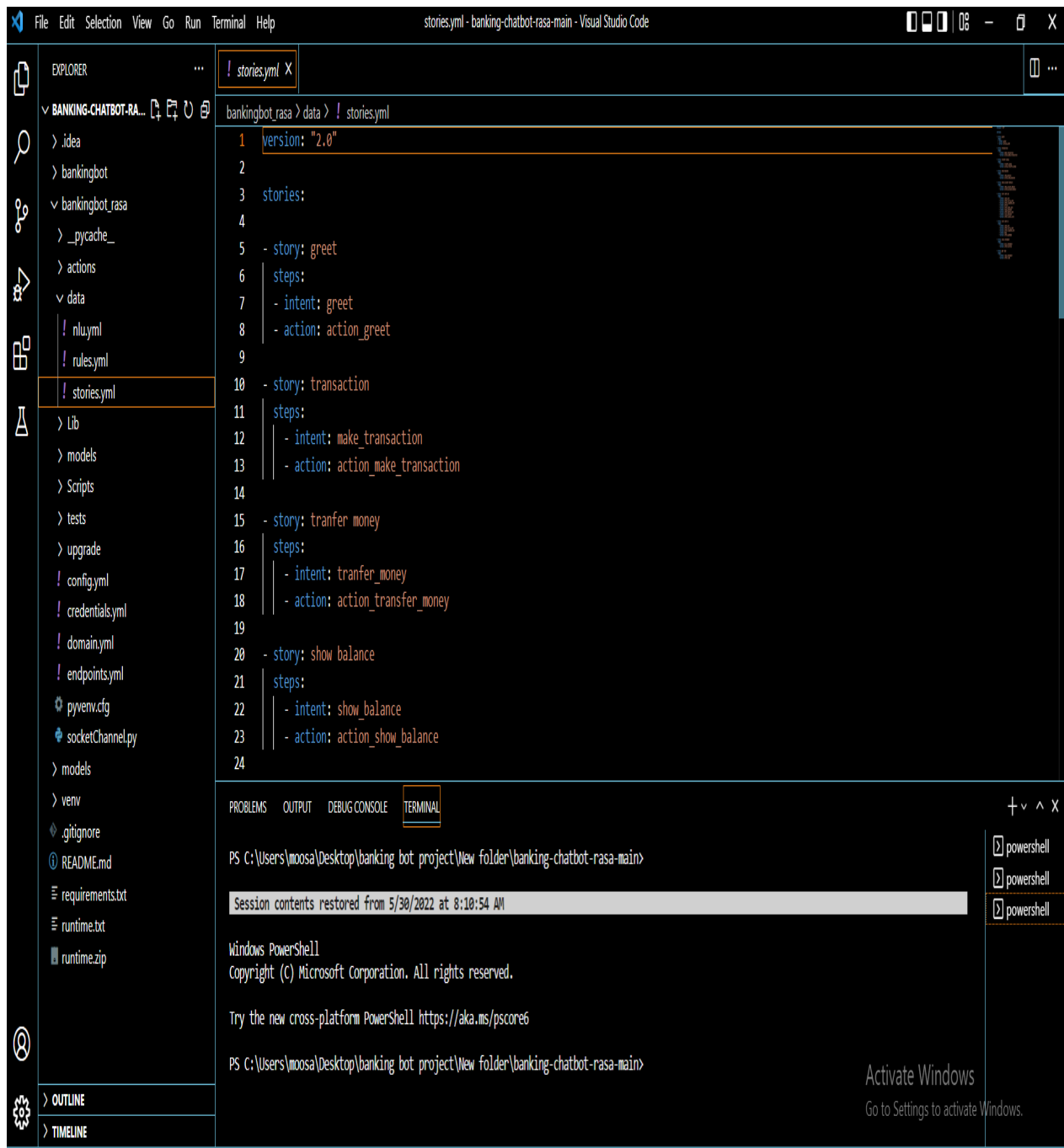


Figure 4: Screenshot of Stories

3.2.4 Domain

Figure 5 Screenshot of Domain. This part of code include all the response, actions, intents, etc.

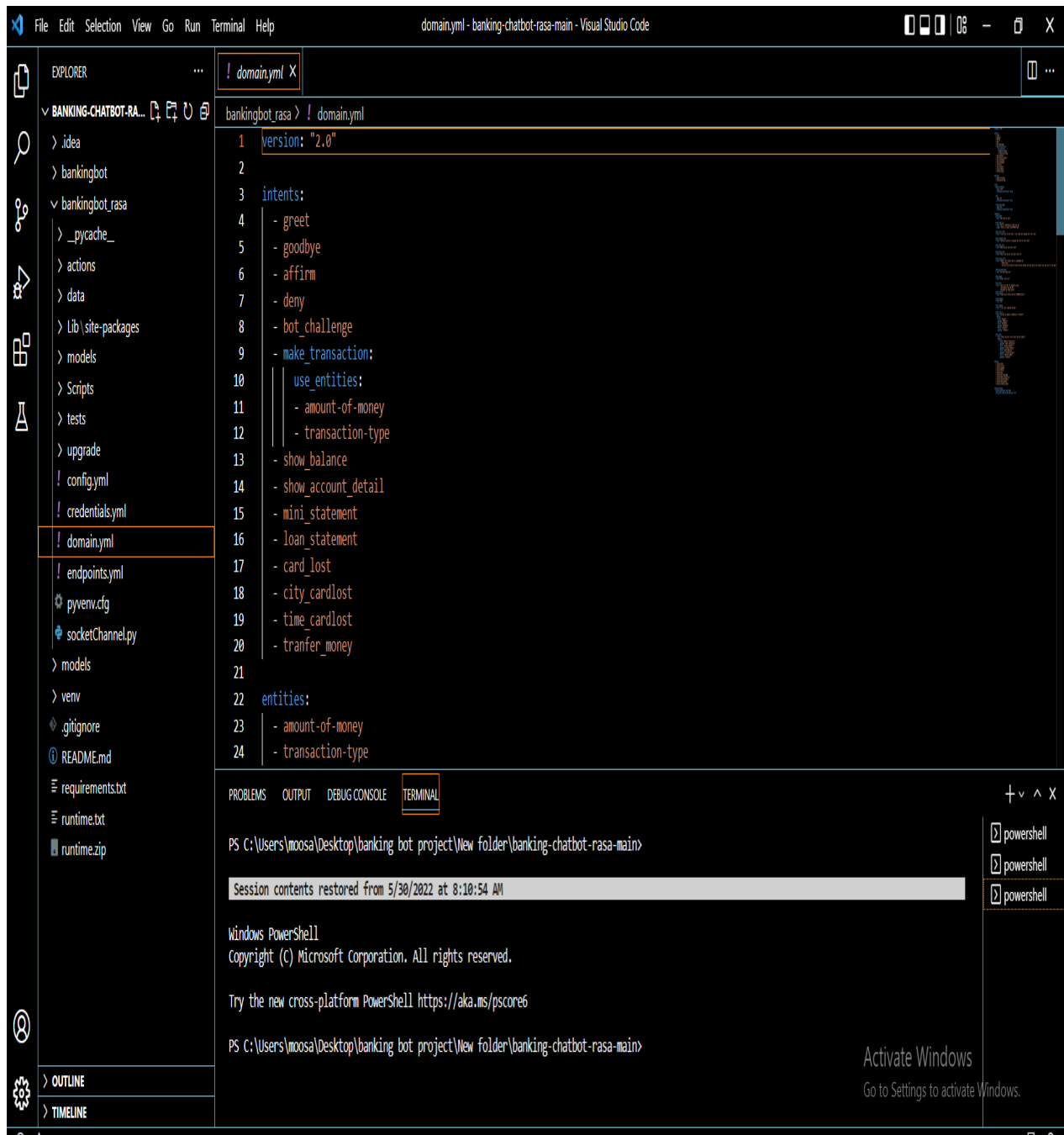


Figure 5: Screenshot of Domain

3.3 Output

3.3.1 Login Page

Figure 6 screenshot of Login Page. This is the main login page from where user can access the bot after filling his username and password or can register himself.

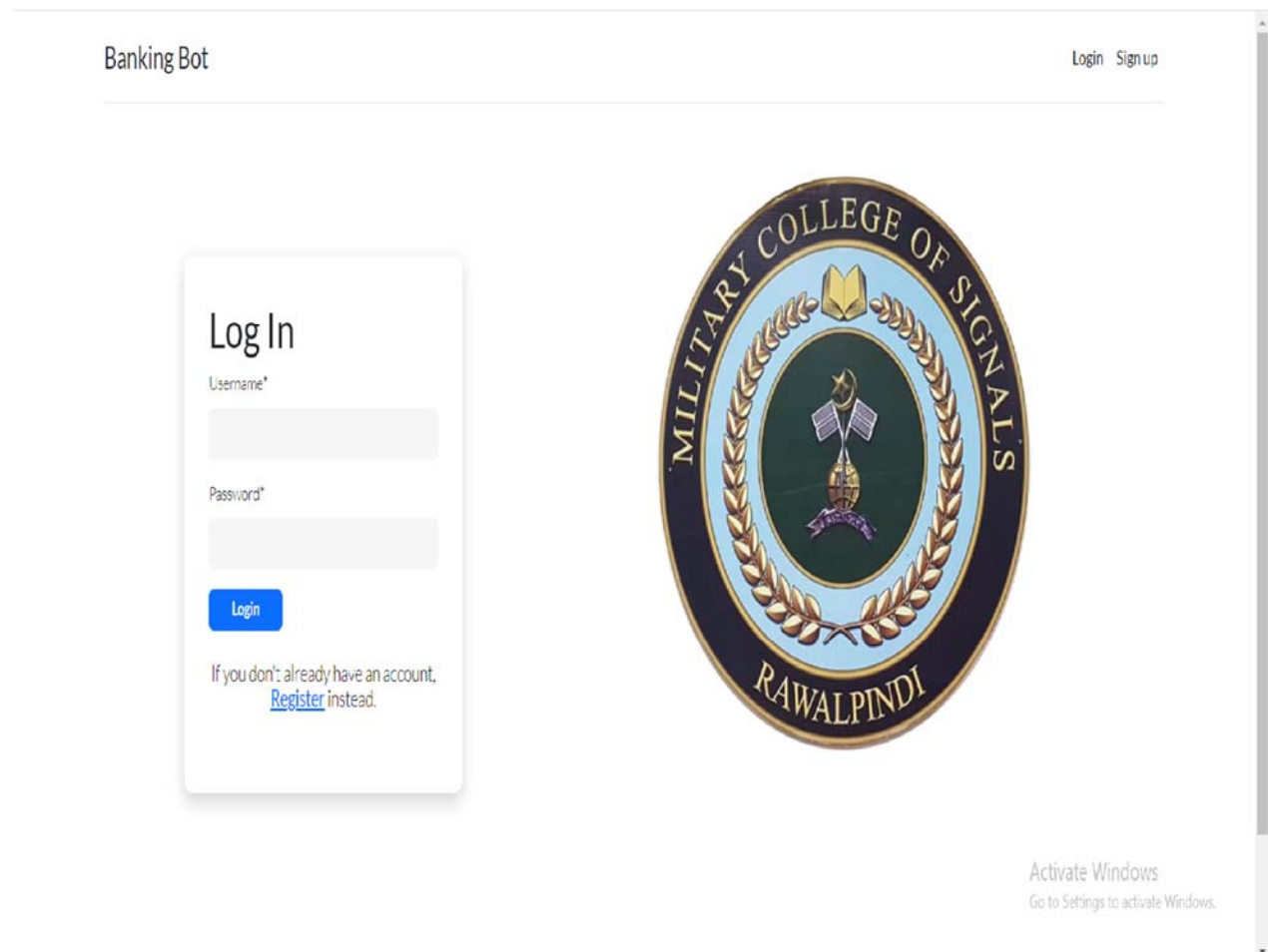


Figure 6: Screenshot of login page.

3.3.2 Registration Page

Figure 7 Screen shot of Registration page. This page is accessible from login page. After accessing the page, user needs to fill all his required information and can register himself.

The screenshot displays a registration form titled "Register". The form includes the following fields and instructions:

- Username***: A text input field. Below it, a note states: "Required. 150 characters or fewer. Letters, digits and @/+/./_ only."
- Email address**: A text input field.
- Password***: A text input field. Below it, a list of password requirements:
 - Your password can't be too similar to your other personal information.
 - Your password must contain at least 8 characters.
 - Your password can't be a commonly used password.
 - Your password can't be entirely numeric.
- Password confirmation***: A text input field. Below it, a note states: "Enter the same password as before, for verification."
- Initial balance***: A text input field.
- Postal code***: A text input field.
- Account type***: A dropdown menu with "Current" selected.
- Full name***: A text input field.
- Mobile number***: A text input field.

A blue "Register" button is located at the bottom of the form.

Figure 7: screenshot of Registration page

3.3.3 Main Page/ Chat Box

Figure 8: Screenshot of Main page. After the registration and login, user is directed to this page. Here user can interact with Chatbot.

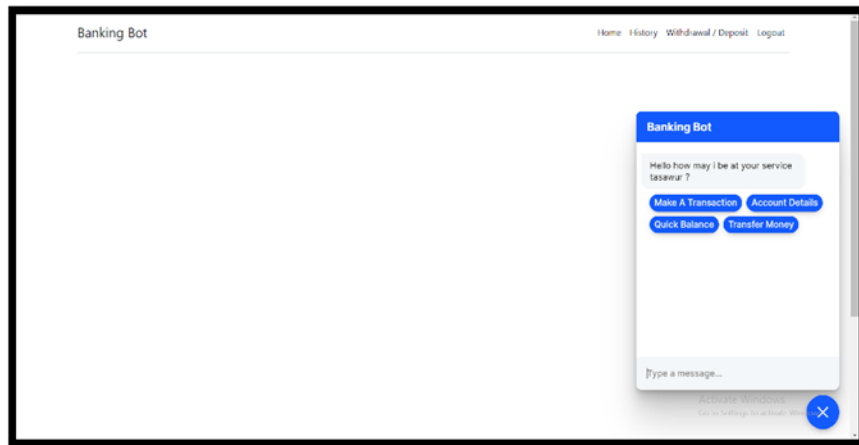


Figure 8: Screenshot of Main page

3.3.4 Banking Bot / Account Details

Figure 9 screenshot of account details. Through the bot, user has accessed the account details. Bot show the basic details like account type, current balance, name, account number.

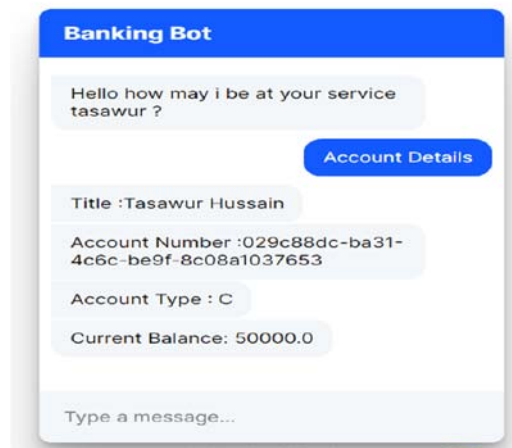


Figure 9: Screenshot of account details

3.3.5 Sample Action – Deposit Amount

Figure 10 screenshot of bot helping user to deposit money. Bot can help user to deposit money by creating a link where he will get a unique code on his mobile. By submitting this code on any ATM, he can submit the money in machine which will be directed to his account.

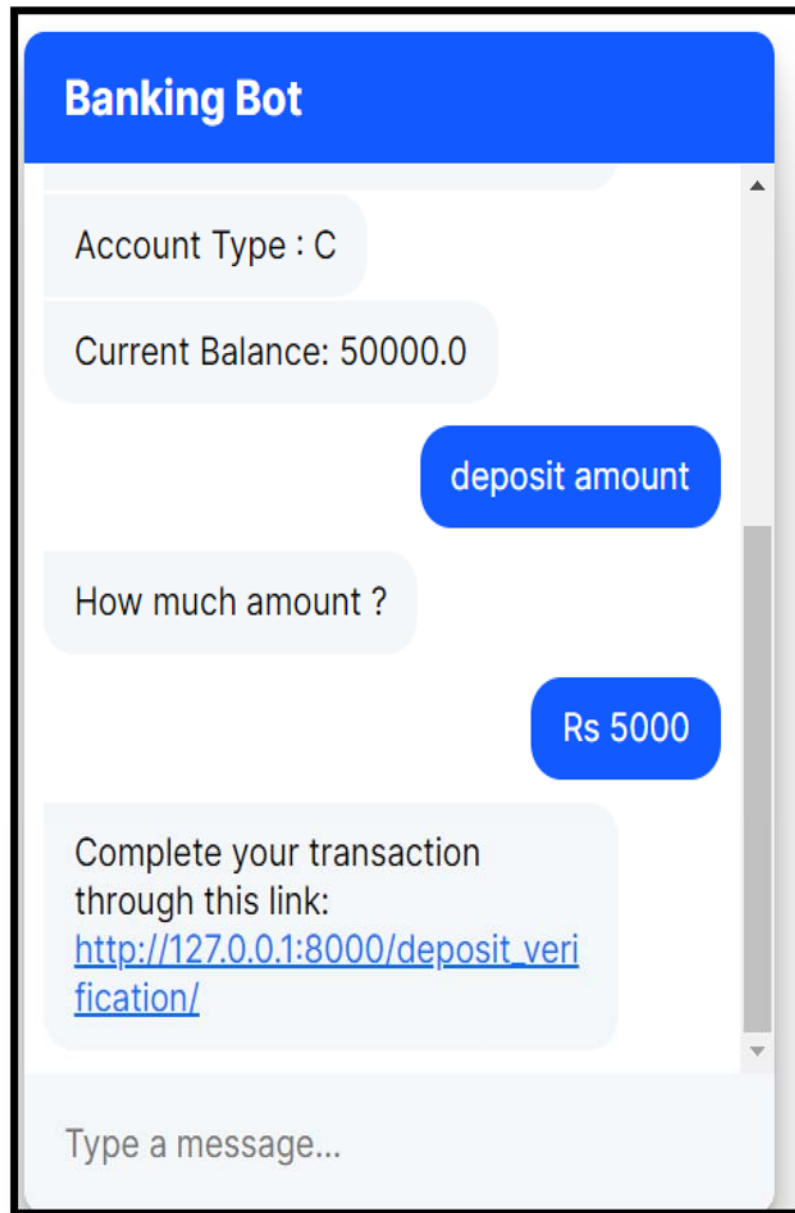
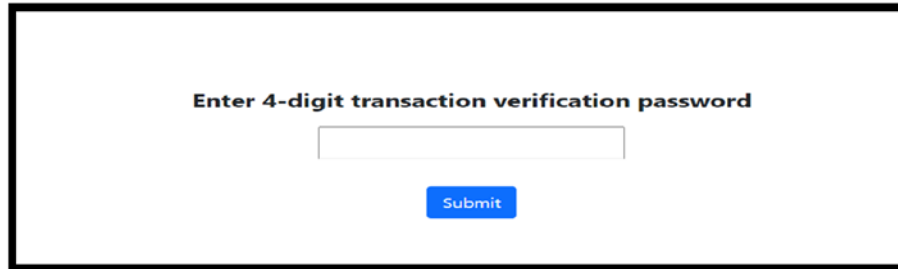


Figure 10: screenshot of bot helping user to deposit money

3.3.6 OTP Authentication

Figure 11 Bot generated verification. User has to enter 4 digit OTP code received on his registered contact number.



The screenshot shows a white rectangular box with a black border. Inside the box, the text "Enter 4-digit transaction verification password" is centered at the top. Below the text is a single-line text input field. At the bottom center of the box is a blue button with the word "Submit" in white text.

Figure 11: Bot generated verification

3.3.7 OTP Message on Mobile

Figure 12 OTP received on Registered Contact number. Bot generated OTP will be received on registered contact number which will be used for authentication onwards.

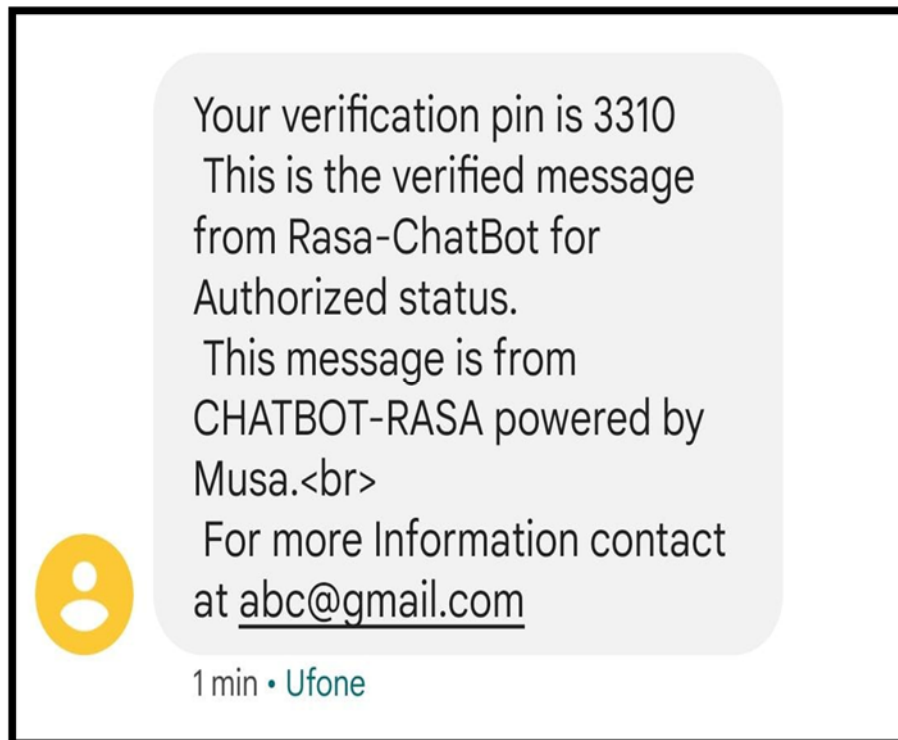


Figure 12: OTP received on Registered Contact number

3.3.8 OTP Verification

Figure 13 Authentication done by Bot through OTP. User is authenticated and action is completed.

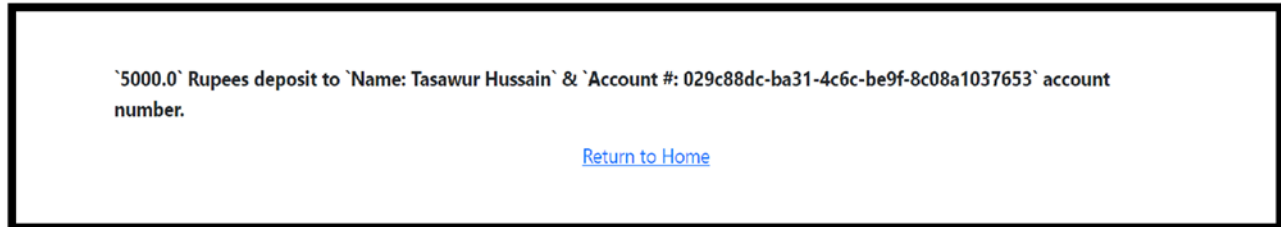


Figure 13: Authentication done by Bot through OTP

3.3.9 Mini-Statement/ Account History

Figure 14 Mini statement. User has accessed the mini-statement or account history through bot.

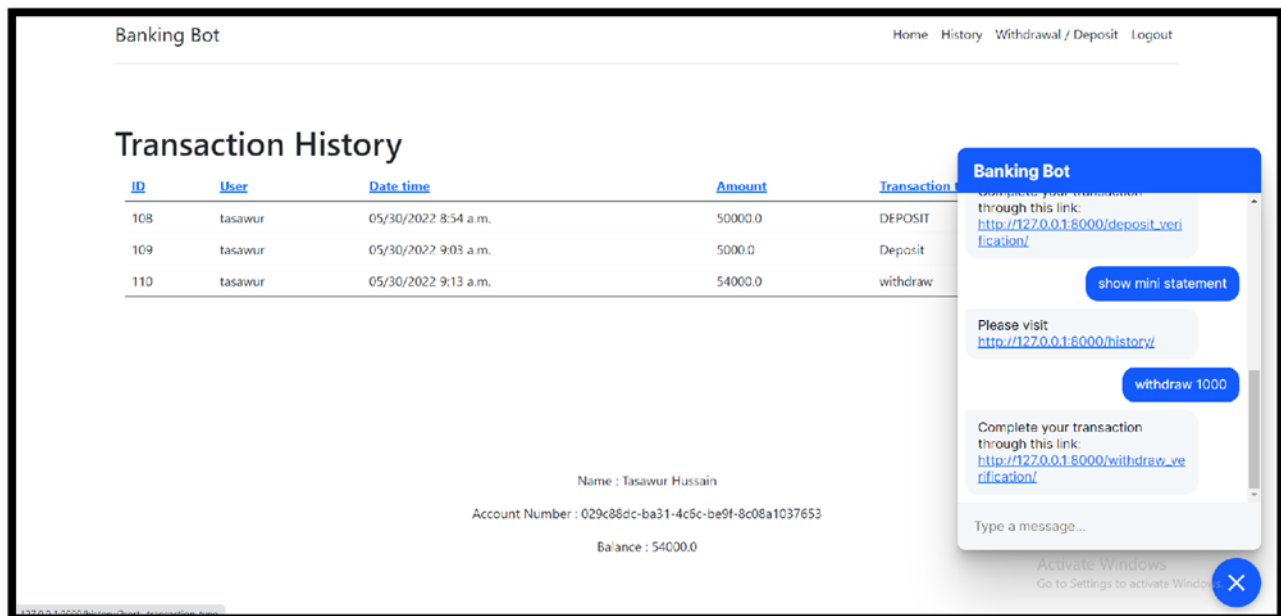


Figure 14: Mini statement

Chapter 4: CONCLUSION

This project “Banking Bot” is designed for the easiness of banking users or customers. The customers who did not want to go to the branch for complains and issues, they can successfully perform their all works and get the authentic answer of their problematic questions through this bot. We can also say that this bot is for the social purpose like a social welfare to make people life more easier which are connected with the bank. To develop this bot and to get its specified output we used python, Django, RASA and many other important techniques and languages. RASA is one of the curios and interesting technology because it is responsible for the training of bot. RASA has its two main components which are Core and NLU, both have its separate functions and responsibilities. The most important feature of RASA is that, is somebody does not have the deep knowledge of Machine learning and it’s training algorithms for bots, still they can use the RASA because have their own ML algorithms to train the bot. All the working is done by RASA itself, we just have to set the flows and the coding in Python. For the working of bot we have to active it by giving command in the PyCharm interface, We have mainly 3 to 4 running consoles, so all the commands are running one by one, In the console 4, we get some IP address, through which we can access this project and then after login we can interact with the bot directly. The banking chat bot system is very useful for bank user and bank to interact with each other within less time and user will get an appropriate response to their query. The banking chat bot system is very useful for bank user and bank to interact with each other within less time and user will get an appropriate response to their query. This system will be helpful to reduce the workload of employees and increase the productivity of bank service and due to ML algorithms accurate and quick answers will be given to user. The non-educated persons also easily interact with the bank system using voice input facility.

Chapter 5: FUTURE WORK

The Digital Transformation feature will allow banking to be a better experience for your customer in this sense and improve on the level of technology. Continuously engaging the visitor feature of your website can allow the app to shorten the bot time between purpose and purchase by performing repetitive tasks such as qualified directors.

The Natural Language Generator feature will allow you to suggest feedback based on interpersonal interactions between users and assistants. It also speeds up the maintenance of the chat-bot database. Customizing your bots based on audience segmentation will allow you to choose who the bot is talking to and how it responds based on conditions such as customer disengagement, type of business, etc.

The lead route for a quick conversion feature will focus on what your team does its best to ensure smart bots, and that your visitor gets the best experience while visiting your website.

Voice based Chatbot is also the hottest implementation in the field of robots that makes interaction easier. If we want to develop the first bot of the most based voice and text chat in our country we can train it according to our national language, Urdu, this idea can also be used at other national levels to make the bot more desirable.

Chatbot's Role in Banking Beyond COVID-19 As financial institutions adopt an urgent approach to adopting new technologies to help provide the highest number of consumers with digital channels than ever before, Chatbot's role in banking in the coming years will be significant and growing. Banks have been using Chatbot to help handle common tasks such as resetting a mobile bank password, transferring funds between accounts, paying off debts or even opening a new test

account. As technology evolves and as the recent consumer acceptance of this technology continues, Chatbot banking will improve to be able to manage more complex tasks, such as helping a customer be pre-authorized to get a loan.

Most importantly, Chatbot in banking will eventually greatly improve its ability to communicate with the consumer at the human level, transforming previously traded transactions into something that could be closer to real life. People still want to bank with people, even if that connection is digital. The future of the improved customer experience will be a mix of customer supply both personally and physically.

With the flexible flexibility of the cross channel, the future of bots will likely provide even more lively information to users with advanced channel flexibility. The development of strategies that include text, Chatbot interactive voice, and other forums is emerging very quickly.

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