Team id: PNT2022TMID50185
Project Name: AI-Based Discourse for Banking Industry

Project Report

1. INTRODUCTION

1.1 Project Overview

To build a bank chatbot which can have the following capabilities:

- It should be able to guide a customer to create a bank account.
- It should be able to answer loan queries.
- It should be able to answer general banking queries.
- It should be able to answer queries regarding net banking.

1.2 Purpose

- To create a chatbot to help the customers.
- The chatbot should work 24X7.
- The chatbot can be attached to the websites of the bank, or can be created as an app.
- The chatbot may have regional or local languages.
- The software should give the latest statictics if there is any change in banking rules.
- It should be user friendly.
- Should be easy to use.
- Should get as much queries from the customers as possible.
- Should include queris which the customers may have in the future.
- Should have polite and decent words.
- The software should not lag in time.

2. LITERATURE SURVEY

2.1 Existing problem

The customers of the banks face common issues like bad service experience, funds and
checks bouncing, no internet and system availability in the bank, no service available during lunch and break time, loan arguments, slow work progress, excessive and hidden fees withi the banking organizations and to name a few.

The customers have also emphatized that they do not get the required service on time,

and at some circumstances, they need to wait in a long queue to wait for their turn. There
are similar problems mentioned by the customers.

2.2 References

2.2.1 Chatbots in banking industry: a case study

The authors have given an introduce about the chatbots to its customers. The paper is a case study of chatbots and its impact in banking systems. Chatbots designed with AI are
one of the most promising strategies of a banking business that can lead the bank to win
the satisfaction vote of their loyal customers.
The authors have provided the details of the progress made by chatbots in Indian banking.
Conducted a case study of HDFC and Kotak Mahindra Bank regarding the Chatbots usage.
Established an insight into the views of various banks regarding the use of AI based techniques
There are limitations provided too. The dialogue capability is limited to very a very specific
set or format of questions. Chatbots have significant limitations based on accents and languages. Not all consumers are familiar with or comfortable with chatbots. The expansion of chatbot capabilities is limited by the ability to hire trained teams or partner with organizations familiar with this rather new technology.

2.2.2 Conversation to Automation in Banking Through Chatbot Using Artificial Machine Intelligence Language

Utilization of AI techniques is done here to provide and improve the chatbots in the banking sector. It makes the interaction between the bank and customers comfortable and useful. The algorithms used were Artificial Intelligence Modelling Language, Natural Language Processing and Latent Semantic Analysis.
LSA is basically a technique to identify the patterns from the text document or in simple words, to find out relevant and important information from the text document. It is clearly
an unsupervised approach. User need not only used to chat through message, he can also
voice chat.

2.2.3 Banking with a chatbot – a study on technology acceptance
The publishers try to identify the factors that influence the consumers' intention to use the chatbot technology applied in the banking industry. The measurement development and hypotheses were based on the technology acceptance model extended with compatibility, customers' perceived privacy risk and awareness of the service.
They have also highlighted the importance of perceived compatibility and perceived usefulness in the adoption of banking chatbot technology.

THEORETICAL ANALYSIS:
Services Used:
• IBM Watson Assistant

2.2.4 JAICOB: A Data Science Chatbot
The authors of have come up with a system which is implemented as a personal agent to
assist students in learning Data Science and Machine Learning techniques. It aims at researching the application of cognitive computing in blended learning environments. It is a modular cognitive agent architecture for pedagogical question answering, featuring social dialogue, small talk, improved for a specific knowledge domain.
But this software needs more analysing, creates some misunderstanding while conversations, which leads to unsatisfied customers.
2.2.5 Xatkit: A Multimodal Low-Code Chatbot Development Framework
Xatkit chatbot, a multi-channel and multiplatform chatbot modeling framework was introduced here, it proposes a set of domain-specific languages for chatbot definition from the technical details of the platform-specific aspects where the bot is going to be deployed.
Xatkit provides a set of Domain Specific Languages to define chatbots in general in a platform independent way. Xatkit also comes with a runtime engine that automatically deploys the chatbot application and manages the defined conversation logic over the platforms of choice. Xatkit's modular architecture facilitates the separate evolution of any
of its components.
At the language level it has to improve the variability of the bot specification, moving towards a product-line approach that enables companies to create and quickly update several versions of the same bot, to create a localized versions of the bot for each branch
of the company. At the framework level, it can improve on the integration of chatbot

generators, able to create partial bot specifications from existing data sources within the
company.

2.2.6 Using the SOCIO Chatbot for UML Modelling: A Family of Experiments

The chatbot named as SOCIO, was made by the writers. It is a collaborative tool for creating class diagrams, building models and meta-models. The chatbot is accessible from
Twitter or Telegram. The designers and stakeholders can take advantage of social network
collaborative and ubiquity to perform lightweight modelling tasks.

Here, the experiments were run to compare the usability of the SOCIO chatbot with a website named “Creately” in order to increase the reliability of the results of the baseline experiment.

They provided the analytics on the experiments that shows the usability of the SOCIO chatbot, and a list of suggestions from SOCIO chatbot users to understand the impact of
three human-computer interaction and usability characteristics like effectiveness, efficiency, satisfaction on collaborative modelling and chatbot design.

2.2.7 Entertainment Chatbot for the Digital Inclusion of People Without Abstraction Capabilities

EBER chatbot was proposed in this paper and adapts its responses based on the user’s mood. It is trained with some selected Machine Learning algorithms from the Scikit-Learn
Python library, Gradient Descent, Decision Tree and Random Forest, on some datasets.

The NLG module employs SA knowledge to avoid monotony by adjusting the polarity of the dialogue depending on the polarity of user responses.

This chatbot combines AI, ML, NLG and SA to generate short coherent contextualised dialogues as connectors between newscasts. EBER behaves realistically as an “intelligent
radio” for entertaining elderly people.

As it requires classification dialogue, more keystrokes to understand and learn, it is not predictable of giving right solution all the time.

References:

[1] Dr. Shalini Sayiwal, “Chatbots in banking industry: a case study”, 2020 JETIR June 2020, Volume 7, Issue 6.

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[7] S. García-Méndez, F. De Arriba-Pérez, F. J. González-Castaño, J. A. Regueiro-Janeiro and F. Gil-Castiñeira, "Entertainment Chatbot for the Digital Inclusion of People

Without Abstraction Capabilities," in IEEE Access, vol. 9, pp. 75878-75891, 2021, doi: 10.1109/ACCESS.2021.3080837.

2.3 Problem Statement Definition

To create a chatbot that can fulfill all the features required by the consumers and even by
the bank employees, using the IBM Watson Assistant for creating this chatbot software, as it meets all the latest features aand is easy to implement.

Banking bots can give customers financial advice on how to manage and invest their money. Professionals train them enough so that they are updated with the latest news, trends, and information. Chatbots can demystify complex banking and financial terminologies and help customers make smart financial decisions.

Artificial intelligence based chatbot applications have become a very popular form automatizing customer service processes in the financial sector, transforming communication between banks and consumers. Many banks have implemented chatbots in order to reduce costs and to improve services quality. Thus, it is essential for these institutions to identify factors that influence customer adoption of

this
technology. Perceived compatibility has a very strong effect on customers' intention to

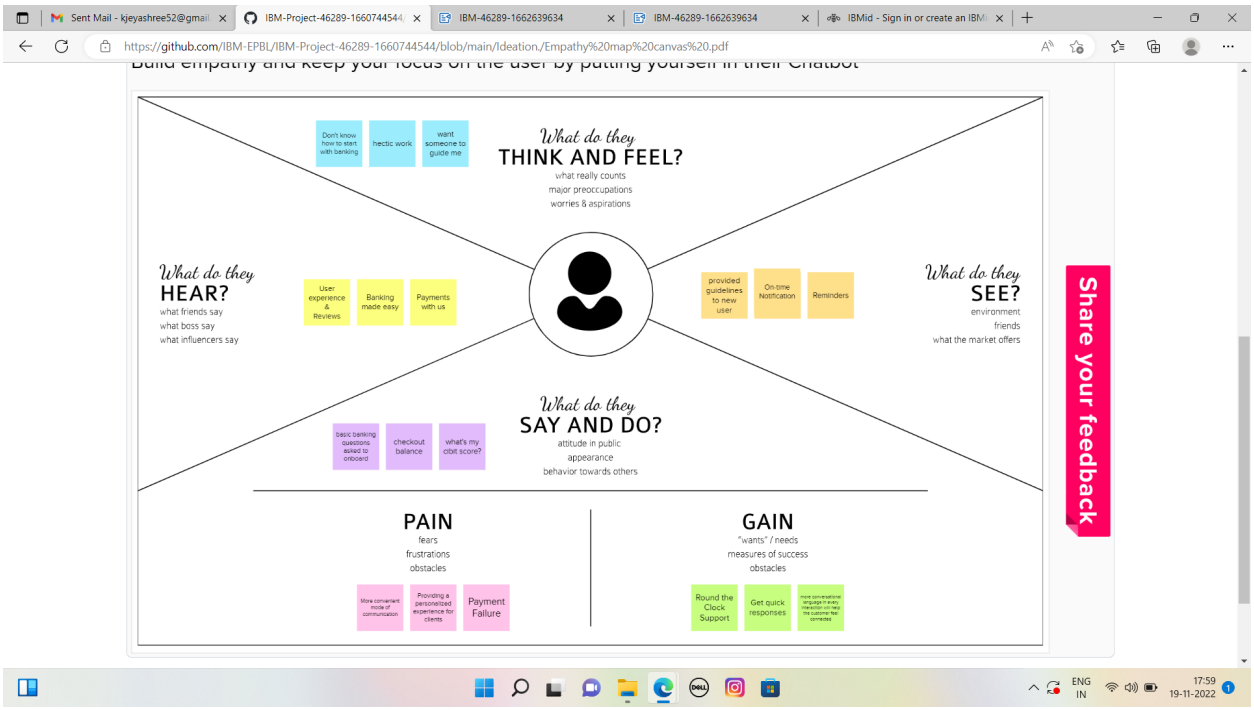
use banking chatbots which is consistent with earlier findings of i-banking and m-banking adoption research. The results indicate that the higher is consumers'

perception of the banking chatbot being compatible with their lifestyle, the higher their willingness is to adopt the technology.

3. IDEATION & PROPOSED SOLUTION

3.1 Empathy Map Canvas

An empathy map is a simple, easy-to-digest visual that captures knowledge about a user's behaviours and attitudes.



Queries related to bank is fast
Open new account for me User friendly
Branches of bank? Easy to use
Bank timings? Provide solutions to me

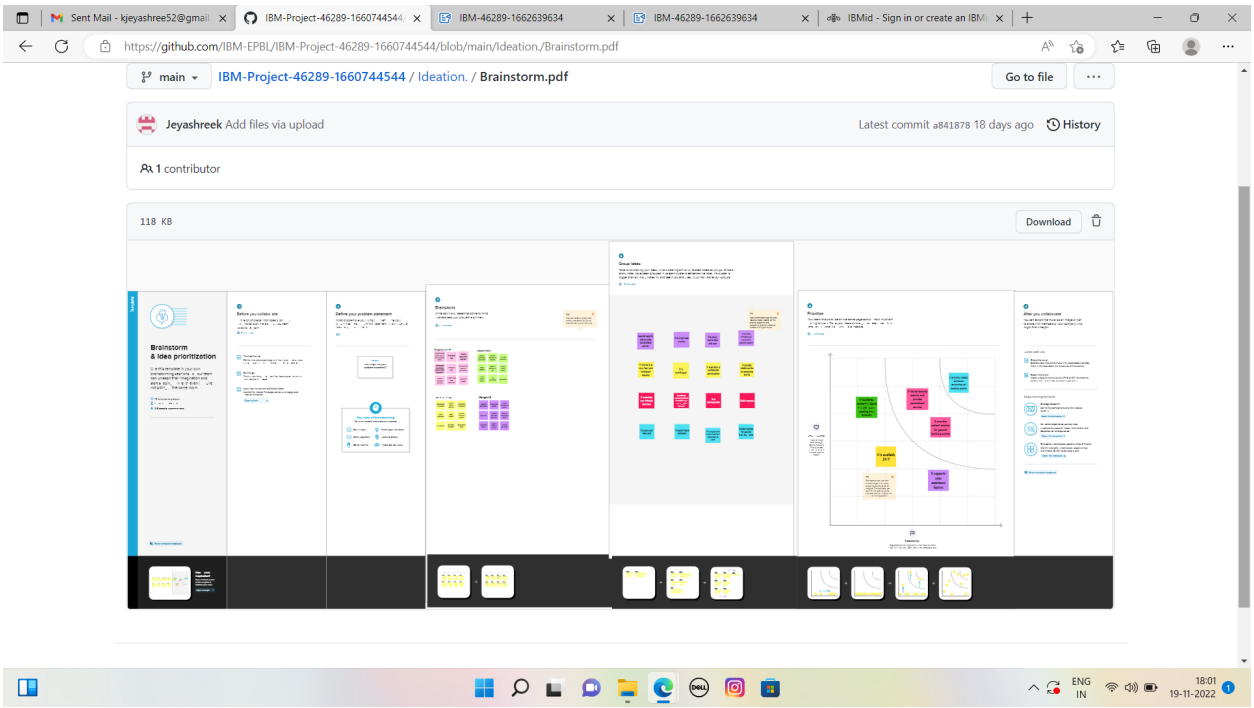
Online transfer

Logging in Secure
Type details Excited
Type password Curiosity
Access online services Efficient work

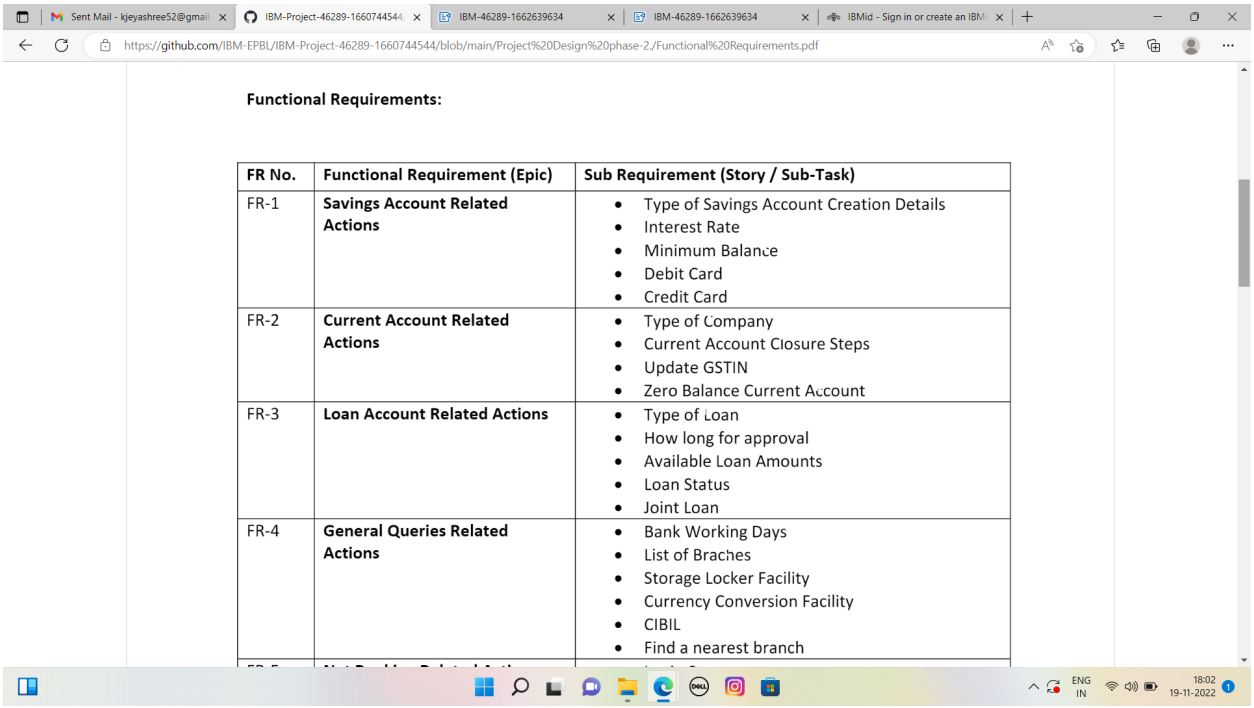
Requires internet. Has language barriers. Provides fast solutions.
Not a human-to-human interaction. Accessible anywhere.

3.2 Ideation & Brainstorming

 The chatbot may have regional or local languages.
 The software should give the latest statictics if there is any change in banking rules.
 It should be user friendly.
 Should be easy to use.
 Should get as much queries from the customers as possible.
 Should include queris which the customers may have in the future.
 Should have polite and decent words.
 The software should not lag in time.
 Create a chatbot to help the customers.



 The chatbot should work 24X7.
 The chatbot can be attached to the websites of the bank, or can be created as an app
Functional requirement:



Functional Requirements:

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	**Savings Account Related Actions**	• Type of Savings Account Creation Details • Interest Rate • Minimum Balance • Debit Card • Credit Card
FR-2	**Current Account Related Actions**	• Type of Company • Current Account Closure Steps • Update GSTIN • Zero Balance Current Account
FR-3	**Loan Account Related Actions**	• Type of Loan • How long for approval • Available Loan Amounts • Loan Status • Joint Loan
FR-4	**General Queries Related Actions**	• Bank Working Days • List of Braches • Storage Locker Facility • Currency Conversion Facility • CIBIL • Find a nearest branch

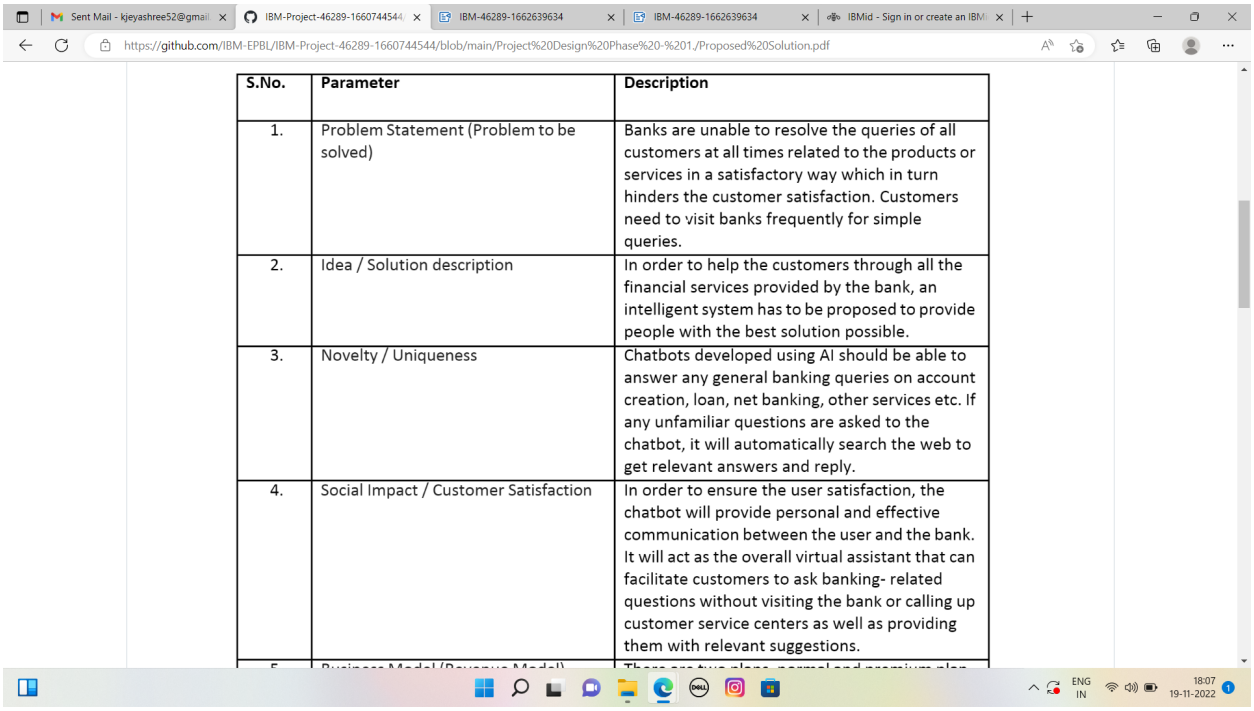
3.3 Proposed Solution

Our proposed solution consists of using IBM Watson Assistant service to create a bank chot which will help the customers to get the required service on time and also to provide

the answer for the most frequently asked queries. This chatbot will be useful during the times of inavailabilities of the banks, to get instant suggestions and much more. It will befree to use and will have user friendly interface.

Using banking chatbots for scaling customer support can reduce the need for human resources for handling thousands of queries manually. Custom support agents can help customers with complex queries that chatbots cannot resolve. With automation, the

cost of
customer support can be reduced considerably. With the use of AI Chatbots for banking, banks and the financial sector have seen 75% of cost reduction with quality and timely query resolution.



S.No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	Banks are unable to resolve the queries of all customers at all times related to the products or services in a satisfactory way which in turn hinders the customer satisfaction. Customers need to visit banks frequently for simple queries.
2.	Idea / Solution description	In order to help the customers through all the financial services provided by the bank, an intelligent system has to be proposed to provide people with the best solution possible.
3.	Novelty / Uniqueness	Chatbots developed using AI should be able to answer any general banking queries on account creation, loan, net banking, other services etc. If any unfamiliar questions are asked to the chatbot, it will automatically search the web to get relevant answers and reply.
4.	Social Impact / Customer Satisfaction	In order to ensure the user satisfaction, the chatbot will provide personal and effective communication between the user and the bank. It will act as the overall virtual assistant that can facilitate customers to ask banking- related questions without visiting the bank or calling up customer service centers as well as providing them with relevant suggestions.

It will provide the following capabilities:

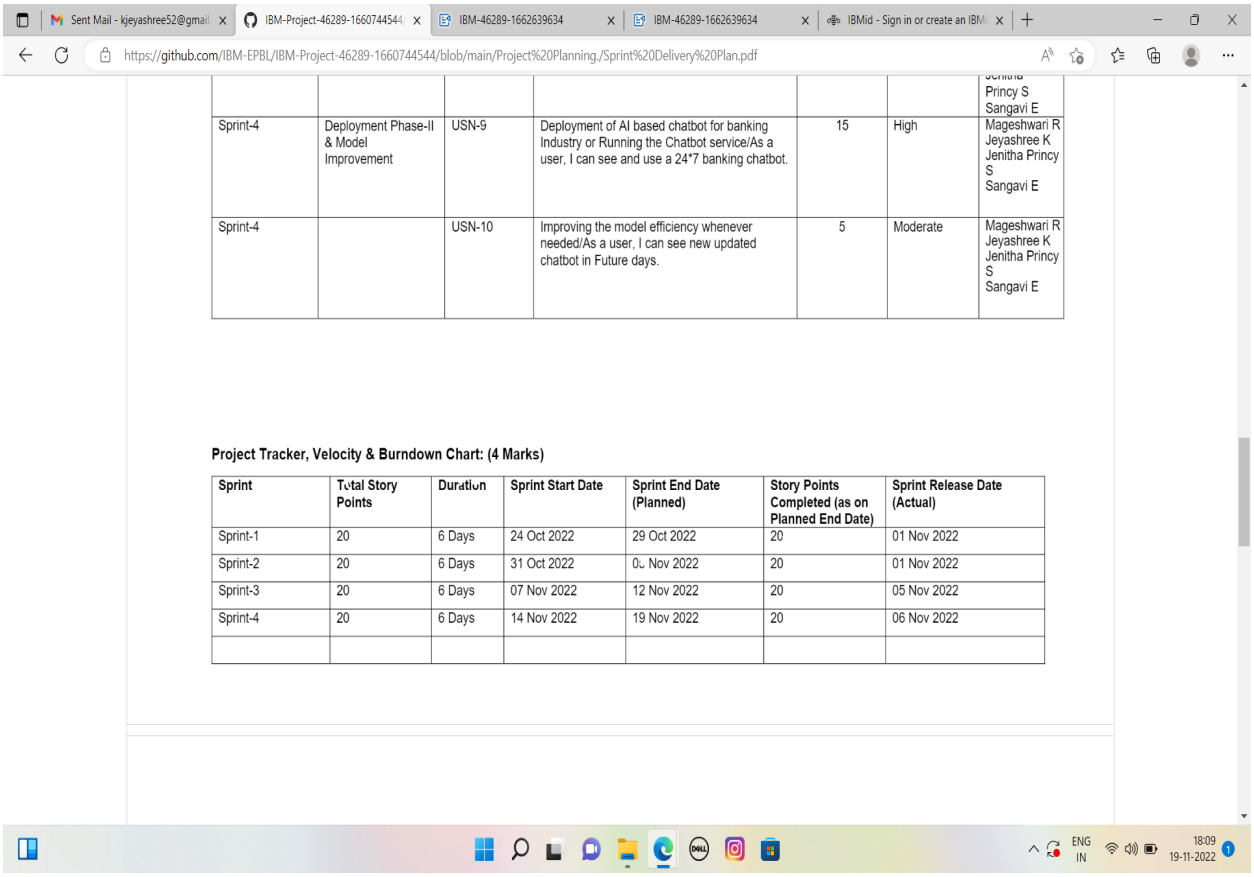
- Guide a customer to create a bank account.
- Be able to answer loan queries.
- Should answer general banking queries.
- To answer queries regarding net banking, and much more.

6.2 Sprint Delivery Schedule

Sprint Delivery Plan:

Month OCT OCT OCT Oct Nov

Date 19 20 21 22 23 24 25 26 27 28 29 30 31 1 2 3 4



						Princy S Sangavi E
Sprint-4	Deployment Phase-II & Model Improvement	USN-9	Deployment of AI based chatbot for banking Industry or Running the Chatbot service/As a user, I can see and use a 24*7 banking chatbot.	15	High	Mageshwari R Jeyashree K Jenitha Princy S Sangavi E
Sprint-4		USN-10	Improving the model efficiency whenever needed/As a user, I can see new updated chatbot in Future days.	5	Moderate	Mageshwari R Jeyashree K Jenitha Princy S Sangavi E

Project Tracker, Velocity & Burndown Chart: (4 Marks)

Sprint	Total Story Points	Duration	Sprint Start Date	Sprint End Date (Planned)	Story Points Completed (as on Planned End Date)	Sprint Release Date (Actual)
Sprint-1	20	6 Days	24 Oct 2022	29 Oct 2022	20	01 Nov 2022
Sprint-2	20	6 Days	31 Oct 2022	0[illegible] Nov 2022	20	01 Nov 2022
Sprint-3	20	6 Days	07 Nov 2022	12 Nov 2022	20	05 Nov 2022
Sprint-4	20	6 Days	14 Nov 2022	19 Nov 2022	20	06 Nov 2022

Sprints Sprint - 1 Sprint – 2 Sprint – 3 Sprint - 4

Create a bank website

Create IBM cloud account

Create a chatbot instance

Create Savings Account action

Create Current Account action

Create Loan Account action

Create General Query action

Create Net Banking action

Run the application

Test the application

Integrate chatbot in the bank website

Deploy the application for public use

The various activities in the project are:

1. Create a bank website
2. Create an IBM cloud account

3. Create a chatbot instance
4. Create Savings, Current, Loan Account actions
5. Create General Query, Net banking and other actions
6. Run and test the chatbot
7. Integrate chatbot in the bank website
8. Deploy the application for public use

i. Create a bank website:

A new website will be created for the bank, in case the bank doesn't has it own website. This website will not only hold a chatbot, but also the necessary details of the bank. To be done by Rakesh-Kumar and Srimukund.

ii. Create an IBM cloud account:

Using an institutional or organizational mail id, a new IBM cloud account is generated. To be done by Rakesh Kumar and Srimukund.

iii. Create a chatbot instance:

After making an IBM Cloud Account, an IBM Watson Assistant cloud service free subscription is acquired. This will be used to create the chatbot for helping the bank customers. To be done by Hariharan and Kailash.

iv. Create Savings, Current, Loan Account actions:

On providing a suitable name to the chatbot, the actions, descriptions and replies for savings account, loan account, current account, and responses for its sub actions are created and saved. To be done by Rakesh Kumar and Srimukund.

v. Create General Query, Net banking and other actions:

The rest of the actions for General Query, Net Banking, Credit Cards, Personal Details are generated along with the replies which they will give when prompted by a customer. To be done by Hariharan and Kailash.

vi. Run and test the chatbot:

After creating the chatbot, it is tested under the "Preview Section" of the Watson Assistant. The working of the chatbot is verified here. Any bugs, if found, will be rectified.

To be done by Hariharan and Kailash.

vii. Integrate chatbot in the bank website:

Under the integrations section of IBM watson, copy the chatbot's javascript code for embeding the chatbot with the website. The javascript code is to be embedded in the HTML code of the website. To be done by Rakesh Kumar and Srimukund.

viii. Deploy the application for public use:
The files of the HTML code and the background image is uploaded in the GitHub for the public to use it anytime and anywhere. To be done by Rakesh Kumar and Srimukund.

7. CODING & SOLUTIONING
7.1 Feature 1:
Creating HTML based website for the bank, using Github.

ADVANTAGES & DISADVANTAGES
Advantages:
a. High engagement of the customers and clients with the chatbots made through IBM Wason.
b. Customizable chatbot with low cost deployment.
c. High query response time.
d. High accuract rate when replying to complex customer queries.
e. Compatible o attach with social media websites.
f. Easy to train the bot in Watson Assistant.
g. User friendly and simple interface.
Disadvantages:
a. Can be tough to troubleshoot en error.
b. No feature to upload or capture responses from users.
c. For admin, large data visualization is not easy.
11. CONCLUSION

Thus this project banking bot will be more efficient while it is been put into practice and it
helps the customers to easily perform the user's action of performing various banking tasks.
It allows the user having various bank accounts to integrate into a single interface and he/she
can add their account details into this bot account and easily perform their banking operations within seconds.Natural language processing is a vital component of intelligent
Chatbot systems is used. In this paper The user will definitely have accounts in various banks.
It will be tedious for the user to login to the various internet banking site every time so

this
bot will be handy at this situation and it is interactive too. Customer expectations are growing
with increasing technological development.
Customer satisfaction is very important to businesses and enterprises because if the customers are not satisfied with the service customers never return.If we consider the bot's
safety, it is been secured through the one time password. So user will have no issues in using
this bot. This banking bot will be really helpful when it is been integrated with the payment
gateway. Still no such development like this is not been implemented in real time environment. When this is been implemented in the real time the customers will be able to
access all the banking information from a single integrated site that can be any like social
media or web application.

12. FUTURE SCOPE

The extent of this exploration is to decide whether AI-empowered Chatbots can change the
clientexperience and assist the Banks with developing their business by accomplishing supportable upperhand and satisfying the client's requests. This exploration likewise assists
with figuring out theimpression of clients when a bank carries out innovation like a Chatbot.
This exploration will likewisefocus on the issues and limitations of the chatbot application The
share of banks that use AI solutions and chatbots in particular is constantly rising. As another
factor, the use of smartphones and other smart devices is also a rapidly growing trend. These
two driving forces determine the near future of artificial intelligence assistants in the banking
industry.
More and more banks tend to integrate chatbots into their mobile apps. This is a convenient

way to stay in touch with their clients and, at the same time, reduce the involvement of human personnel. According to estimations calculated by Juniper Research, in 2023, chatbot
interactions will save many million hours for banks, which will lead to save billions of cost
worldwide.

13. APPENDIX

Source Code
Python code:

```
from flask import Flask , render_template
app = Flask(__name__)
@app.route("/")
@app.route("/home")
def home():
return render_template("index.html")

if __name__ =='__main__':
app.run(debug=True , port=5000)
```

HTML code:

```
<html>
<head><title>Banking Chatbot</title>
<style>
body {
background-color: #cccccc;
}
</style>
</head>
<body background="bank-build.jpg">

<script>
window.watsonAssistantChatOptions = {
integrationID: "53b1979f-abf1-46ac-b3d3-b759ead203be", // The ID of this integration.
region: "us-south", // The region your integration is hosted in.
```

```
serviceInstanceID: "c3f40e7b-6277-4577-b2cb-9c99871180a5", // The ID of your service instance.
onLoad: function(instance) { instance.render(); }
};
setTimeout(function(){
const t=document.createElement('script');
t.src="https://web-chat.global.assistant.watson.appdomain.cloud/versions/"+
(window.watsonAssistantChatOptions.clientVersion || 'latest') +
"/WatsonAssistantChatEntry.js";
document.head.appendChild(t);
});
</script>

<h1>Welcome to our Bank<br>
Use the Chatbot given below.</h1>
</body>
</html>
```

GitHub & Project Demo Link:
Link to view deployed chatbot:https://login.ibm.com/authsvc/mtfim/sps/authsvc?PolicyId=urn:ibm:security:authentication:asf:basicldapuser&Target=https%3A%2F%2Flogin.ibm.com%2Foidc%2Fendpoint%2Fdefault%2Fauthorize%3FqsId%3D https://us-south.assistant.watson.cloud.ibm.com/crn%3Av1%3Abluemix%3Apublic%3Aconversation%3Aus-south%3Aa%2F40be6402cdfa4df9b40f47194de32229%3Ac266b661-47b3-4ea3-882d-27982a40c290%3A%3A/login

Github link to view our project documents:https://github.com/IBM-EPBL/IBM-Project-46289-1660744544https://github.com/IBM-EPBL/IBM-Project-46289-1660744544