

AI BASED DISCOURSE FOR BANKING INDUSTRY

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1. INTRODUCTION:

1.1 PROJECT OVERVIEW

Industries are forced to evolve and update their practices due to technological advances and the contemporary market. Banking sector is one of the most developed sectors and is always looking for the latest technological solutions that improve its efficiency. Netbanking websites are complex and involve navigating through a lot of pages to find the information you need. Bank staff undergo a lot of stressful situations when communicating with clients directly. Such situations can be avoided gracefully by using chatbots. Only 32% of companies in the finance industry currently use AI chatbots, and 37% are planning to start using them within 18 months said a report from Salesforce. This results in a potential growth rate of 118% which indicates the demand in the industry . A smart chatbot takes a query from the user in natural language and gives the appropriate response for the same. This paper aims to discuss the relevance of chatbot in the banking sector and explore how chatbots can be implemented using natural language processing techniques that can be used in the banking industry.

1.2 PURPOSE

Banking chatbots are emerging as the preferred customer support platform. It is useful for financial service providers because they facilitate a 2-way communication with machines using natural language commands. As per the latest data, close to 70% of customers prefer contextual conversations with chatbots.

2. LITERATURE SURVEY:

2.1 EXISTING SOLUTION

In 1950, Alan Turing wondered if a computer program could talk to a group of people without realizing that their interlocutor was artificial. This question, named Turing test, is considered by many to be the generative idea of chatbots (Turing, 1950). The first chatbot with ELIZA name was constructed in 1966. ELIZA simulated a psychotherapist's operation, returning the user's sentences in the interrogative form Weizenbaum (1966). Its ability to communicate was limited, but it was a source of inspiration for the subsequent development of other chatbots (Klopfenstein et al., 2017). ELIZA uses pattern matching and a response selection scheme based on templates (Brandtzaeg & Følstad, 2017). A drawback of ELIZA is that its knowledge is limited, and therefore, it can discuss only in a particular domain of topics. Also, it cannot keep long conversations and cannot learn or discover context from the discussion. The development of Artificial Intelligence chatbots went one step further with the creation of smart personal voice assistants, built into smartphones or dedicated home speakers, who understood voice commands, talked by digital voices, and handled tasks like monitoring home automated devices, calendars, email and other. Apple Siri (Siri), IBM Watson (Watson Assistant |IBM Cloud, 2020), Google Assistant (Google Assistant, your own personal Google, 2019), Microsoft Cortana (Personal Digital Assistant—Cortana Home Assistant—Microsoft, 2019), and Amazon Alexa (What exactly is Alexa? Where does she come from? And how does she work?, 2019) are the most popular voice assistants. There are also many other less famous voice assistants owing unique characteristics, but the same core functions. They connect to the Internet and, in contrast to their predecessors, they create quickly meaningful responses (Hoy, 2018).

2.2 REFERENCES:

- Morgan, Blake. 2017. "5 Ways Chatbots Can Improve Customer Experience In Banking". Forbes.<https://www.forbes.com/sites/blakemorgan/2017/08/06/5-wayschatbots-can-improve-customer-experience-in-banking/>.
- R, Daria. 2018. "7 Reasons To Create An AI Chatbot For A BankingApp". Rubygarage.Org.<https://rubygarage.org/blog/chatbots-inbanking-apps>.
- Følstad, Asbjørn. "Improving Conversations: Lessons Learnt from Manual Analysis of

Chatbot Dialogues." In Chatbot Research and Design: Third International Workshop, CONVERSATIONS 2019, Amsterdam, The Netherlands, November 19–20, 2019, Revised Selected Papers, vol. 11970, p. 187. Springer Nature, 2020.

2.3 PROBLEM STATEMENT DEFINITION

Karthik is a business man who needs a way to create a bank account instantly because he doesn't have time to create manually.

Praveena is a home maker who needs breakdown analysis of her account because she wants to track her family expenses.

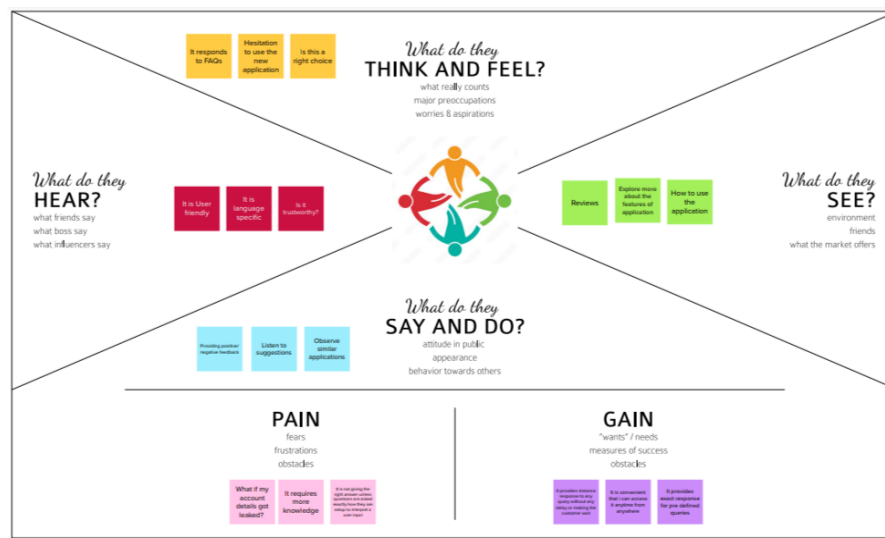
Sowmiya is a student who needs a way to communicate with the bank instantly because she wants her queries regarding banking to be answered.

Harish is an entrepreneur who wants to access his bank details 24/7 for his business purpose.

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. It is a useful tool to help teams better understand their users. Creating an effective solution requires understanding the true problem and the person who is experiencing it. The exercise of creating the map helps participants consider things from the user's perspective along with his or her goals and challenges.



3.2 IDEATION AND BRAINSTORMING

Brainstorming provides a free and open environment that encourages everyone within a team to participate in the creative thinking process that leads to problem solving. Prioritizing volume over value, out-of-the-box ideas are welcome and built upon, and all participants are encouraged to collaborate, helping each other develop a rich amount of creative solutions.

4. REQUIREMENT ANALYSIS:

4.1 FUNCTIONAL REQUIREMENTS

Following are the functional requirements of the proposed solution.

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	Savings account related	1. Type of account 2. Savings account 3. Current account
FR-2	Loan related queries	1. Types of loan 2. Other loan related queries
FR-3	Net banking	1. General queries related to net banking 2. Change password 3. Procedure to register for net banking
FR-4	General queries	1. Bank workings days 2. Branches related queries 3. Currency conversion details

4.2 NON-FUNCTIONAL REQUIREMENTS

Following are the non-functional requirements of the proposed solution.

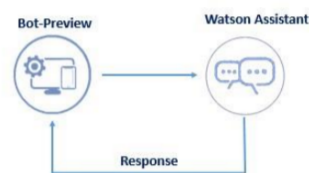
FR No.	Non-Functional Requirement	Description
NFR-1	Usability	AI chat bot can handle a customer's queries, they won't have to wait in a line. It provide a personalised experience for the user.
NFR-2	Security	The users have to authenticate themselves before being able to query information from the bot.
NFR-3	Reliability	The bot should able to interpret and understand the user query correctly. Interpreting the intention of the query is a top priority upon making the bot.
NFR-4	Performance	Faster and accurate query response for all kind of user queries.
NFR-5	Availability	Chat bot should available for 24*7, so that it can reduce the customers waiting time.
NFR-6	Scalability	It should able to handle N number of users at the same time with faster response and correct query results.

5. PROJECT DESIGN:

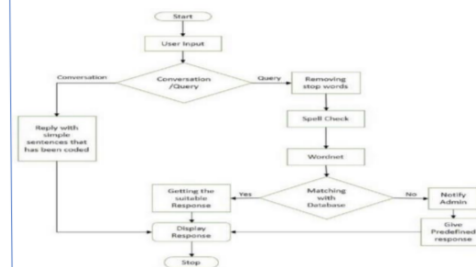
5.1 DATA FLOW DIAGRAMS

Data Flow Diagrams: A Data Flow Diagram (DFD) is a traditional visual representation of the information flows within a system. A neat and clear DFD can depict the right amount of the system requirement graphically. It shows how data enters and leaves the system, what changes the information, and where data is stored.

Example: [Simplified](#)

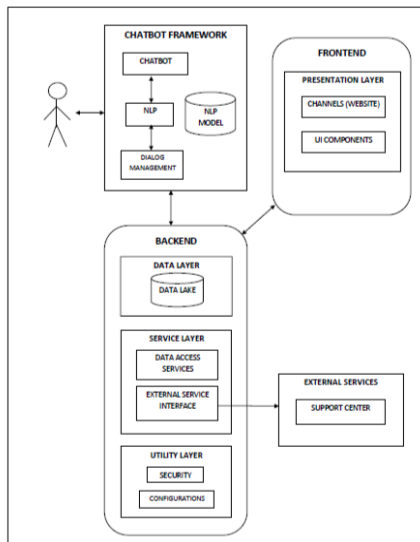


Example: DFD Level 0 (Industry Standard)



User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority	Release
Customer (Mobile user)	Registration	USN -1	As a user, I can register for the application by entering my email, password, and confirming my password.	I can access my account / dashboard	High	Sprint-1
		USN-2	As a user, I will receive confirmation email once I have registered for the application	I can receive confirmation email & click confirm	High	Sprint-1
	Login	USN -3	As a user, I can log into the application and ask FAQs	I can receive related solutions.	High	Sprint-1
	Dashboard	USN -4	As a user, I can view the new and latest bank related details	I can receive the latest bank related details	Medium	Sprint-2
Customer (Web user)	Web search	USN -5	As a user, can search all bank related queries	Happy as the customer finding numerous option	High	Sprint-3
	Query	USN - 6	As a user, can ask needed queries	I can type the queries to be answers	High	Sprint-3
	Response	USN -7	As a user, can get the needed query answered	I can access the related solutions	High	Sprint-4

5.2 TECHNOLOGICAL ARCHITECTURE



5.3 USER STORIES

User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority	Release
Customer (Mobile user)	Registration	USN -1	As a user, I can register for the application by entering my email, password, and confirming my password.	I can access my account / dashboard	High	Sprint-1
		USN-2	As a user, I will receive confirmation email once I have registered for the application	I can receive confirmation email & click confirm	High	Sprint-1
	Login	USN -3	As a user, I can log into the application and ask FAQs	I can receive related solutions.	High	Sprint-1
	Dashboard	USN -4	As a user, I can view the new and latest bank related details	I can receive the latest bank related details	Medium	Sprint-2
Customer (Web user)	Web search	USN -5	As a user, can search all bank related queries	Happy as the customer finding numerous option	High	Sprint-3
	Query	USN - 6	As a user, can ask needed queries	I can type the queries to be answers	High	Sprint-3
	Response	USN -7	As a user, can get the needed query answered	I can access the related solutions	High	Sprint-4

6.PROJECT PLANNING AND SCHEDULING

6.1 SPRINT PLANNING AND ESTIMATION

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	28 Oct 2022
Sprint-2	20	6 Days	31 Oct 2022	05 Nov 2022	20	05 Nov 2022
Sprint-3	20	6 Days	07 Nov 2022	12 Nov 2022	20	11 Nov 2022
Sprint-4	20	6 Days	14 Nov 2022	19 Nov 2022	20	18 Nov 2022

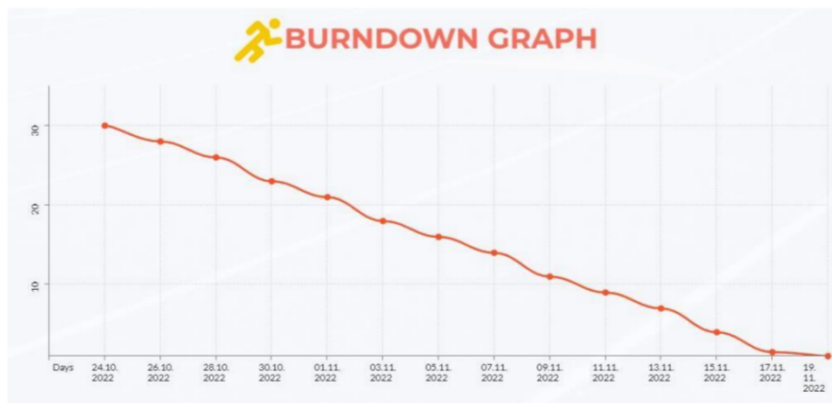
VELOCITY

The team's average velocity (AV) per iteration unit (story points per day)

$$AV = 20/6 = 3.34$$

6.2 SPRINT DELIVERY SCHEDULE

A burn down chart is a graphical representation of work left to do versus time. It is often used in agile software development methodologies such as Scrum. However, burn down charts can be applied to any project containing measurable progress over time.



7. CODING AND SOLUTIONING

7.1 FRONTEND DESIGN

INDEX.HTML

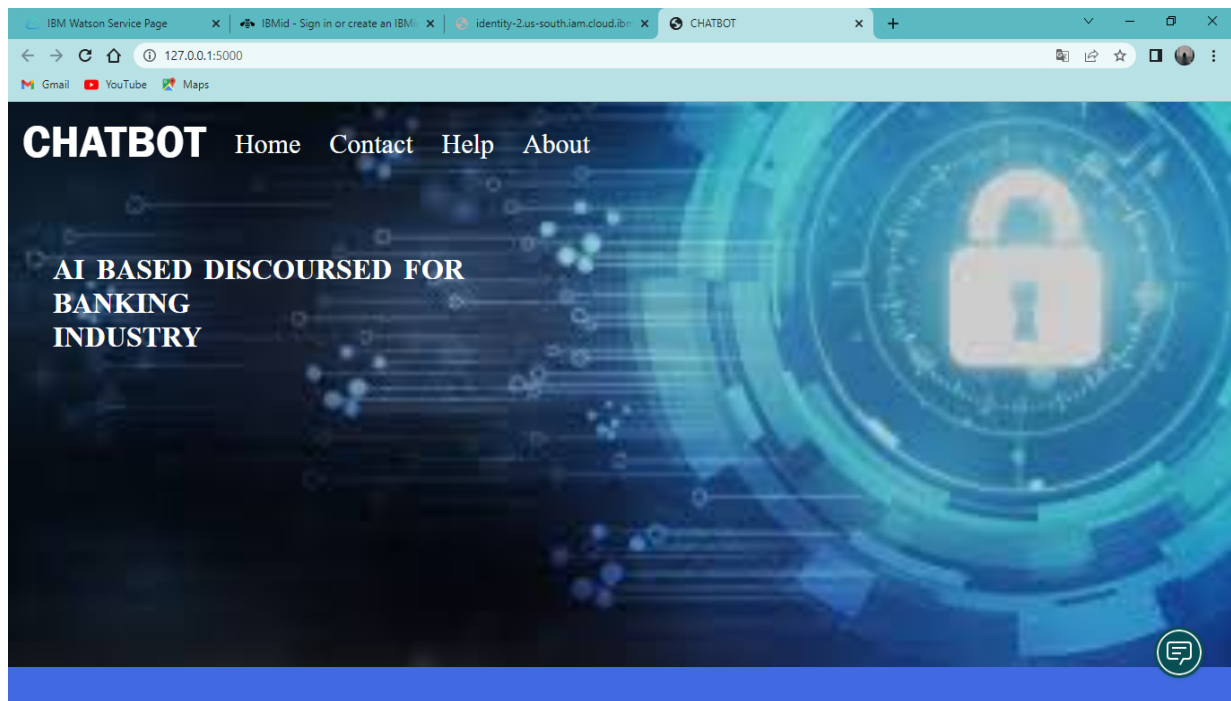
```
<!DOCTYPE html>
<html lang="en">
<head>
  <meta charset="UTF-8">
  <meta http-equiv="X-UA-Compatible" content="IE=edge">
  <meta name="viewport" content="width=device-width, initial-scale=1.0">
  <title>CHATBOT</title>
  <link rel="stylesheet" href="\staticFiles\style.css">
</head>
<body>
  <div class="navbar">
    <ul>
      <li><a class="active" href="#home" style="font-size: 50px;">CHATBOT</a></li>
      <div class="items">
        <li style="font-family:'Times New Roman', Times, serif"><a href="#home">Home</a></li>
        <li style="font-family:'Times New Roman', Times, serif"><a
href="#contact">Contact</a></li>
        <li style="font-family:'Times New Roman', Times, serif"><a
href="#contact">Help</a></li>
        <li style="font-family:'Times New Roman', Times, serif"><a href="#about">About</a></li>
      </div>
      </ul>
    </div>
    <h1 class="head" style="font-family:'Times New Roman', Times, serif;">AI BASED
DISCOURSED FOR <br>BANKING <br>INDUSTRY</h1>
  </div>
</div>
<script>
window.watsonAssistantChatOptions = {
  integrationID: "e5775fcd-13f7-4f60-82e2-2c8e7cb6913b", // The ID of this integration.
  region: "us-south", // The region your integration is hosted in.
  serviceInstanceID: "ea723f0a-d6a0-414a-8f2a-9ce24206b596", // 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>  
</body>  
</html>
```

STYLE.CSS

```
body{  
  margin: 0px;  
  color: red;  
  background-color:royalblue;  
  background-image: url(images.jpg);  
  background-repeat: no-repeat;  
  background-size: cover;  
  font-size: 30;  
}  
ul {  
  list-style-type: none;  
  margin: 0;  
  padding: 0;  
  overflow: hidden;  
  background-color: transparent;  
}  
  
li {  
  float: left;  
}  
  
li a {  
  display: block;  
  color: white;  
  text-align: center;  
  padding: 14px 16px;  
  text-decoration: none;  
}  
  
/* Change the link color to #111 (black) on hover */  
li a:hover {  
  background-color: #111;  
}
```

```
.items{
  margin-top:15px;
  font-size: 30px;
}
.head{
  margin-top: 80px;
  margin-left: 50px;
  color: white;
  text-align: start;
  word-spacing: 5px;
}
```



8. TESTING

8.1 USER ACCEPTANCE TESTING

8.1.1 TEST CASE ANALYSIS

This report shows the number of test cases that have passed, failed, and untested

Section	Total Cases	Not Tested	Fail	Pass
Print Engine	0	0	0	0
Client Application	25	0	0	25
Security	0	0	0	0
Outsource Shipping	0	0	0	0
Exception Reporting	0	0	0	0
Final Report Output	25	0	0	25
Version Control	0	0	0	0

8.1.2 DEFECT ANALYSIS

Resolution	Severity 1	Severity 2	Severity 3	Severity 4	Subtotal
By Design	0	0	2	1	3
Duplicate	0	0	0	0	0
External	0	0	0	0	0
Fixed	0	0	2	1	3
Not Reproducible	0	0	0	0	0
Skipped	0	0	0	0	0



Worth Fix	0	0	0	0	0
Totals	0	0	4	2	6

9. RESULTS

9.1 PERFORMANCE METRICES

The accuracy of the chatbot is 75%.

10. ADVANTAGES AND DISADVANTAGES

ADVANTAGE:

- Faster Customer Service.
- Increased Customer Satisfaction.
- Lower Labor Costs.
- Variety of Uses.
- Make Customer Service Available 24/7.
- Make Marketing More Targeted.
- Help Grow Your Business.

DISADVANTAGE:

- Limited Responses for Customers. Customers Could Become Frustrated.
- Complex Chatbots Could Cost More.
- Not All Business Can Use Chatbots

11. CONCLUSION

Chatbots are being adopted in the banking sector at a very fast rate. They are not only being used for answering customer's questions but also for providing a wide range of services which include bill payment, fund transfer, view recent transactions and much more.

Chatbots are also getting smarter due to integration of natural language processing and machine learning. By helping customers round the clock, they help banking staff focus on other important tasks. Therefore, we can say that chatbots have become an essential part of the banking system. In this paper we have discussed the role chatbots play in the banking sector, the anatomy of chatbots and advantages of using chatbots in the banking sector.

12. FUTURE SCOPE

Chatbots are Now Based on Natural Language Processing(NLP)

The goal is to allow users and Artificial Intelligence to communicate naturally and understand complex requests. This would mean that customer service agents would be able to focus on other tasks while the AI takes care of customers' queries.

Chatbots can automate tasks performed frequently and at specific times. This gives employees time to focus on more important tasks and prevents customers from waiting to receive responses. Proactive customer interaction.

13. APPENDIX

FLASK INTEGRATION CODE:

```
from flask import Flask, render_template
app = Flask(__name__, template_folder='templateFiles', static_folder='staticFiles')

@app.route('/')
def home():
    return render_template('index.html')
if __name__ == '__main__':
    app.run(debug=True)
```


The image shows a Visual Studio Code editor window with a Python file named `deploy.py` open. The code is a simple Flask application that serves an `index.html` template at the root URL. The terminal at the bottom shows the command to run the application and its output, including a warning about the development server and the debug mode being on.

```
1 from flask import Flask, render_template
2 app = Flask(__name__, template_folder='temp', static_folder='staticss')
3
4 @app.route('/')
5 def home():
6     return render_template('index.html')
7 if __name__ == '__main__':
8     app.run(debug=True)
```

Terminal Output:

```
PS C:\Users\Admin> & C:/ProgramData/Anaconda3/python.exe c:/Users/Admin/Desktop/deploy.py
* Serving Flask app "deploy" (lazy loading)
* Environment: production
  WARNING: This is a development server. Do not use it in a production deployment.
  Use a production WSGI server instead.
* Debug mode: on
* Restarting with watchdog (windowsapi)
* Debugger is active!
* Debugger PIN: 954-369-439
* Running on http://127.0.0.1:5000/ (Press CTRL+C to quit)
```

GITHUB LINK :

<https://github.com/IBM-EPBL/IBM-Project-3851-1658654267>

PROJECT DEMO :

https://drive.google.com/drive/folders/1BfswfpxxbccciG_FGYHekLS0eVYhoRx