AI Based Discourse For Banking Industry

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1. INTRODUCTION

1.1. OVERVIEW

The interactions between private customers and banks are evolving. The banking sector as a whole is consistently working to gradually transition to digital platforms. This movement is adopting a move away from an account-based perspective of a banking client and towards one that sees customers as distinctive persons with various requirements. The goal is to offer digital services that enhance the consumer experience while taking into account their unique needs. Our aim is to develop a chatbot that will help clients with banking-related problems.A chatbot is a conversational agent that converses with users using natural language.Our chatbot was created using IBM Watson, an AI-powered conversational agent that makes use of IBM Watson's toolkit and technological capabilities. IBM Watson is a platform for cognitive computing that integrates natural language processing (NLP), machine learning, and other AI methods to provide chatbots the ability to comprehend and reply to user inquiries in a conversational manner. In order to determine the message's intent, the chatbot uses NLP algorithms to analyze user input. It decides the action or information requested after comprehending the user's question.To obtain pertinent information, the chatbot establishes connections with numerous backend systems, like client databases, product databases, or external APIs. Through this link, the chatbot can access account information, transaction history, or real-time data in response to customer inquiries. Through this integration, the chatbot can access account information, transaction history, or real-time data based on customer inquiries.The chatbot creates an answer that is pertinent and appropriate for the user's query using the extracted intent, entities, and contextual data.

1.2 PURPOSE

The advantages of our project include better customer service, cost savings, increased operational effectiveness, customized experiences, and increased security. While completing ordinary activities and assisting human agents round-the-clock, this complements them and frees up human resources to concentrate on complicated and high-value interactions.

- They offer round-the-clock customer service, answering frequent questions and offering immediate assistance. Numerous consumer enquiries concerning account balances, transaction histories, card activations, account statements, and general banking information can be handled by them.
- Assist clients with account-related activities such money transfers, bill payments, setting up automatic payments, contact information updates, and account preference management. Customers benefit from the ease and this helps to streamline banking procedures.
- Can accommodate clients with accessibility requirements or those that speak different languages.

2. LITERATURE SURVEY

2.1 EXISTING PROBLEM

S.No	Title	Methodology	Result
1	A New Chatbot for Customer Service on Social Media	Modern deep learning methods, such long short-term memory (LSTM) networks, are initially used to produce responses to social media customer service queries. A request is entered into the system, its vector representations are computed, it is fed to an LSTM, and finally the system outputs the response.	More than 40% of the requests are emotional without specific informational intents
2	Bringing chatbots into education: Towards natural language negotiation of open learner models	The learner model is computed and shown as a result, in a choice of seven formats to fit the learner's preferences for how to obtain the	Given technological restrictions, such as those relating to database

		material. The system infers its beliefs from students' responses to multiple-choice and short-answer questions.	access, data protection, and a feedback mechanism, as well as specifications for productive communicatio n
3	Transforming the communication between citizens and government through AI-guided chatbots	By combining data mining, machine learning, and natural language processing technologies, they created a new, "richer," and "more intelligent" digital channel of communication between the public and the government.	Its use must be carefully assessed using a set of Key Performance Indicators (KPIs), which show the applicability and simplicity of the suggested strategy.
4	Conversation to Automation in Banking Through Chatbot Using Artificial Machine Intelligence Language	Artificial Intelligence Markup Language (AIML) ,Latent Semantic Analysis (LSA) focused on the (frequently asked question) FAQ dataset	Strategies for handling dialog in the banking and finance area based on ontology

Accurately interpreting user input can be challenging. In order to deliver pertinent responses, chatbots must accurately read the intent and entities in user communications. It might be difficult to create robust natural language processing (NLP) models and entity recognition systems.For a great user experience, it is essential to create chatbots that can engage people. It can be challenging to create conversational flows, cues, and interactions that keep users engaged and drive more participation.It takes a lot of training data to create accurate and efficient chatbot

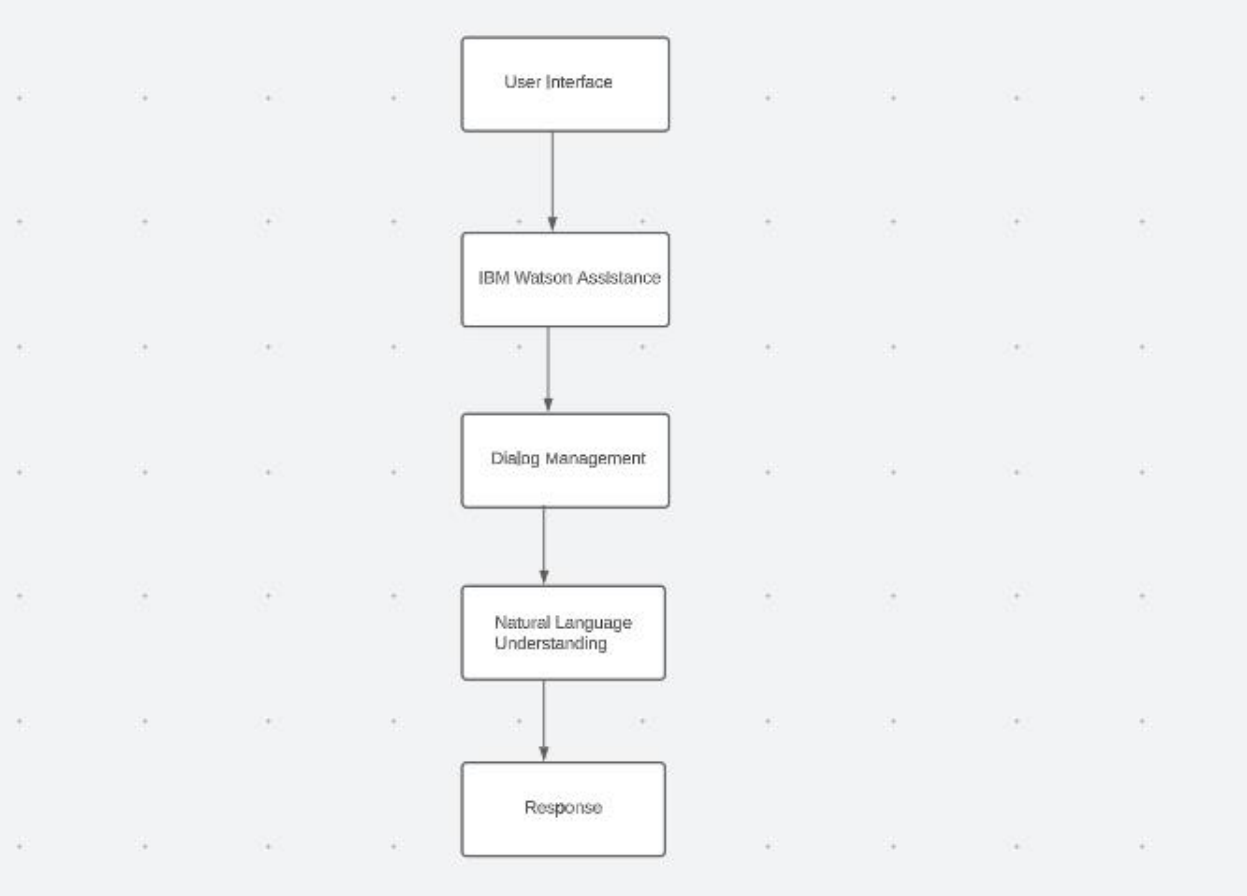
models. It might be difficult to acquire or create high-quality conversational datasets that span a range of user intents and scenarios, especially for certain topics or sectors.

2.2 PROPOSED SOLUTION

Chatbots built with IBM Watson.The accuracy and relevance of chatbot responses can be increased by training and adapting Watson's NLU models to certain sectors or areas. It offers users dynamic and context-sensitive user interactions.Developers can train chatbot models with the help of massive datasets thanks to its machine learning capabilities. Watson-powered chatbots can gradually enhance their performance, accuracy, and response quality through repeated training and fine-tuning.By providing sentiment analysis and emotion detection capabilities, it enables chatbots to comprehend human emotions and react accordingly.

3. THEORETICAL ANALYSIS

3.1 BLOCK DIAGRAM



3.2 HARDWARE/SOFTWARE DESIGNING

Hardware requirements:

General hardware requirements as it doesn't have any specific needs

- Can use a PC, laptop, tablet, or other mobile device to access IBM Watson chatbot services.
- To use IBM Watson services, you need a dependable, consistent internet connection. It makes sure that your application and the Watson APIs that are hosted on the IBM Cloud platform can communicate effectively.

Software requirements:

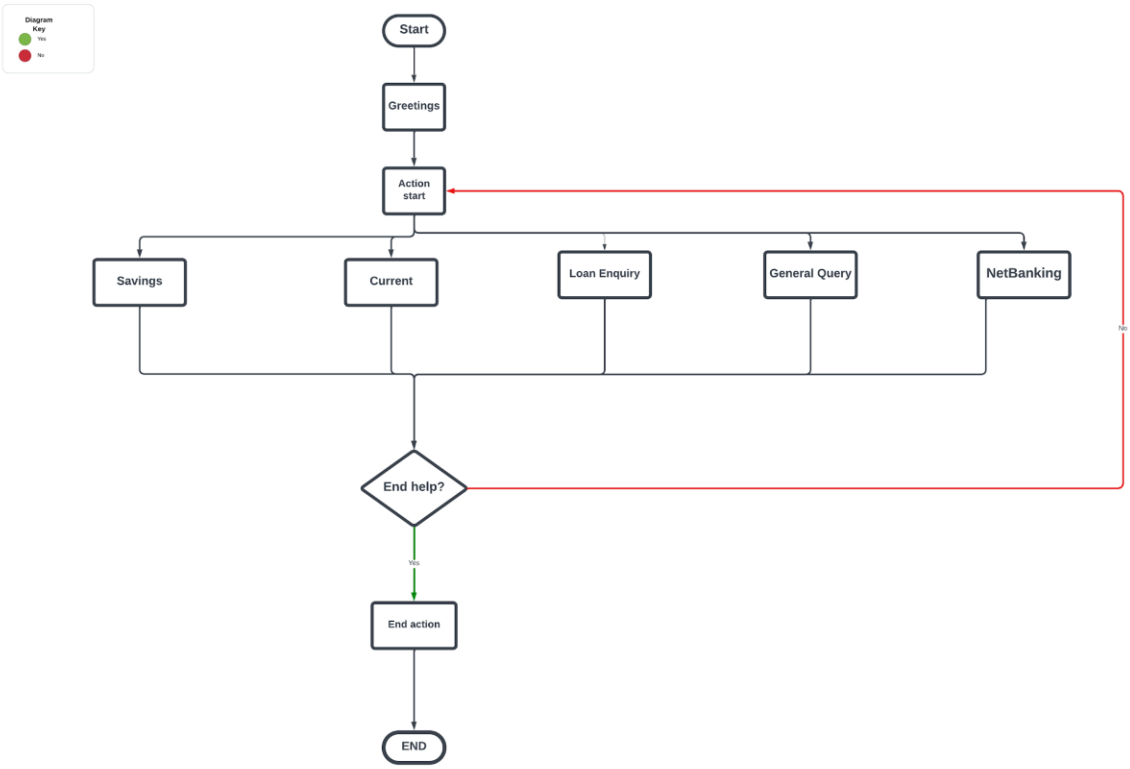
Need an IBM Cloud account to access and utilize IBM Watson services. Sign up for a free IBM Cloud Lite account, which provides a limited amount of resources and services for development and testing purposes. For production use or higher resource requirements, may need to upgrade your account or choose a suitable pricing plan.

4. EXPERIMENTAL INVESTIGATIONS

Some potential experimental investigations that were conducted are:

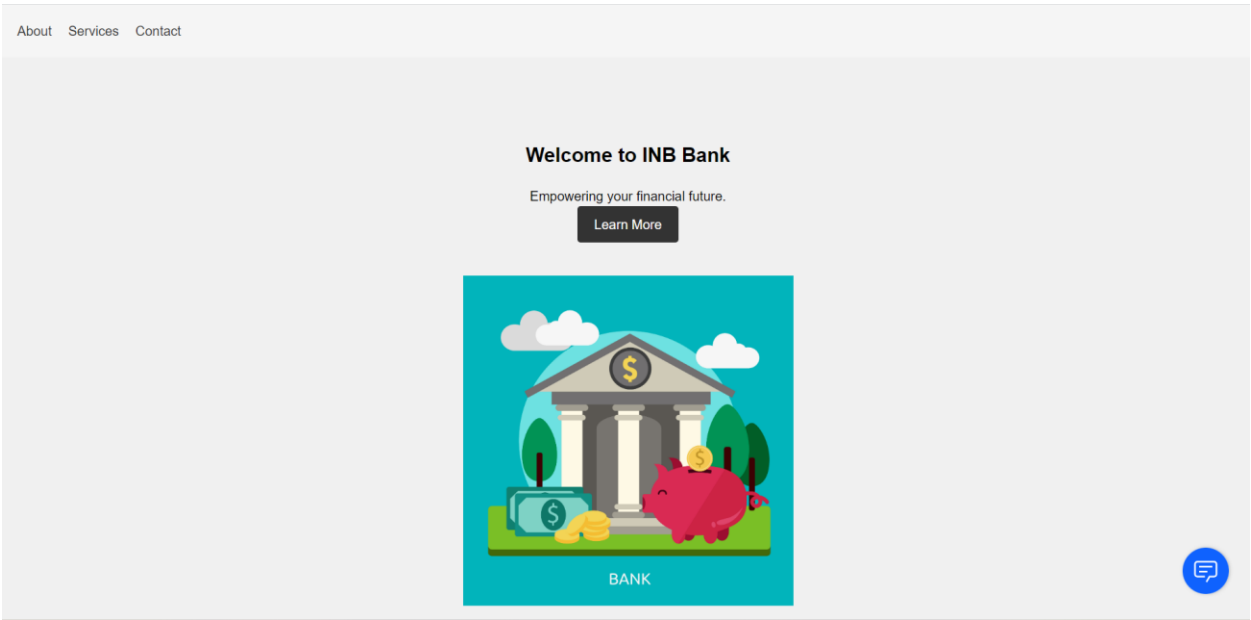
- **Customer Satisfaction Analysis:** To gauge customer satisfaction levels, compare AI-based discourse systems with conventional customer service channels. To gauge the level of service delivered, this may entail obtaining feedback from clients who engaged with both AI-based systems and human employees.
- **Accuracy and Response Time Analysis**: Assess AI-based discourse systems' accuracy and response times by contrasting their performance with that of human agents. A collection of standard questions or situations might be presented to both AI systems and human agents in this experiment, and the speed and accuracy of their responses could be evaluated.
- **Evaluating security and fraud detection**: Determine how well AI-based conversation systems work in identifying and stopping fraud and security concerns. The system's capability to recognize and react to numerous fraudulent scenarios may be tested as part of this inquiry.
- **Personalization and Recommendation Analysis**: Examine the efficiency of discourse systems based on AI in offering clients individualized recommendations and solutions. This can be achieved by evaluating the relevance and customer acceptability of the offered suggestions and contrasting the recommendations given by AI systems and those made by human agents.
- **Comparative Cost Analysis**: Perform a cost comparison between the costs of implementing and maintaining discourse systems based on AI and those of conventional customer service channels. This study can assist establish whether deploying AI in the banking sector will be cost-effective and result in possible cost savings.

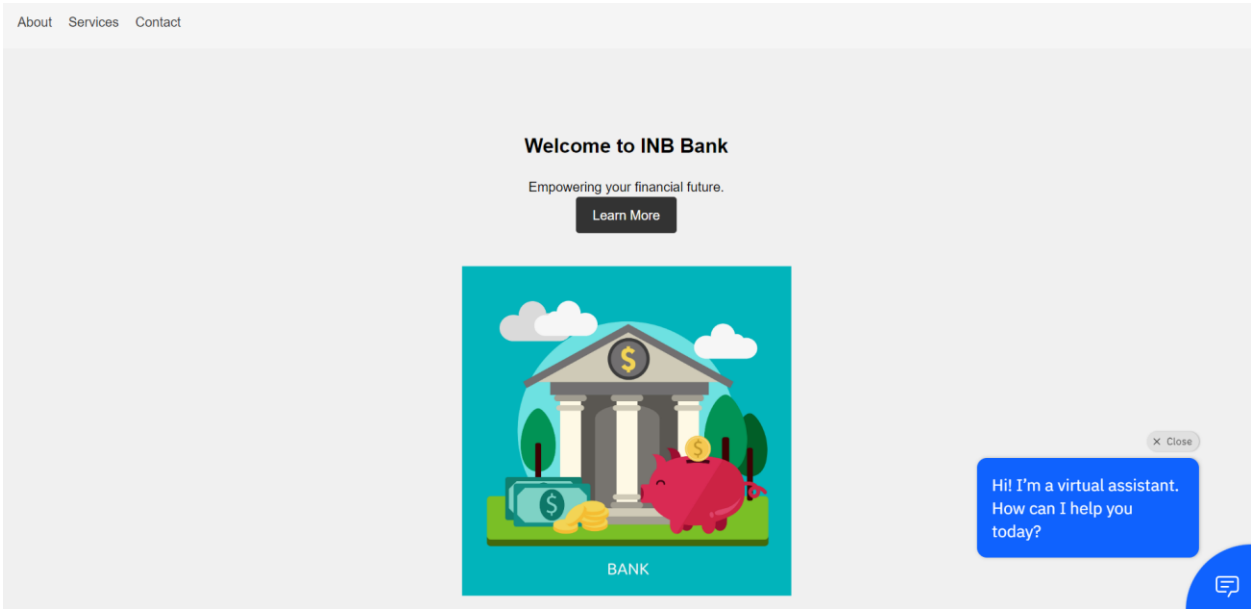
5. FLOWCHART



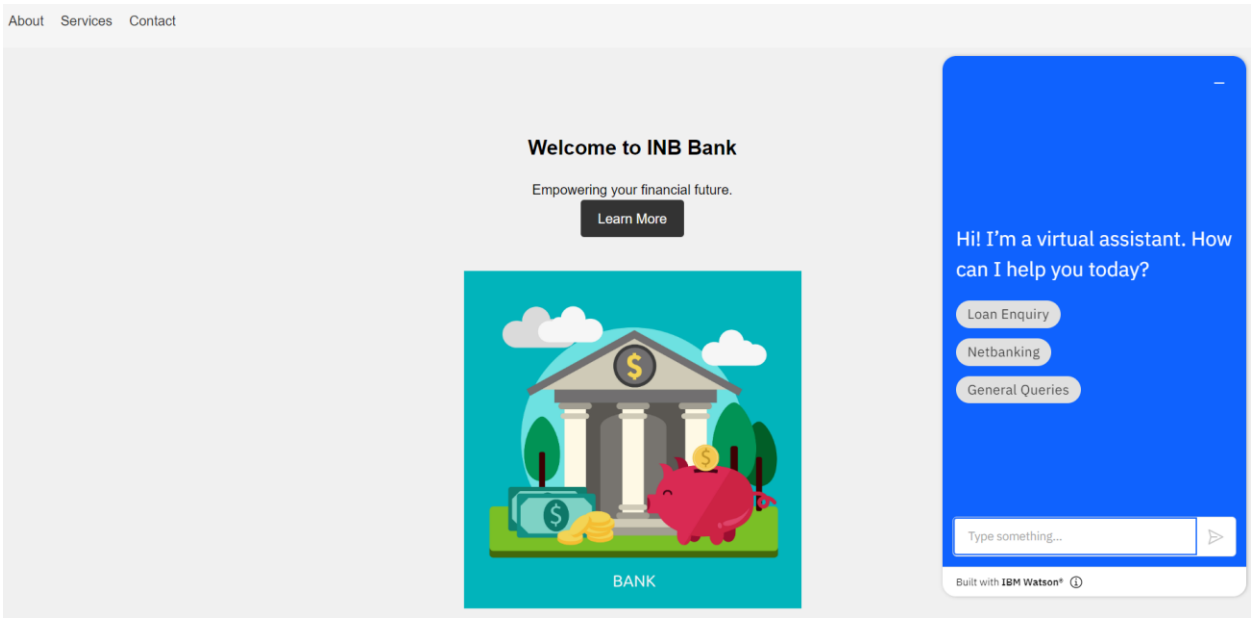
6. RESULT

Homepage :



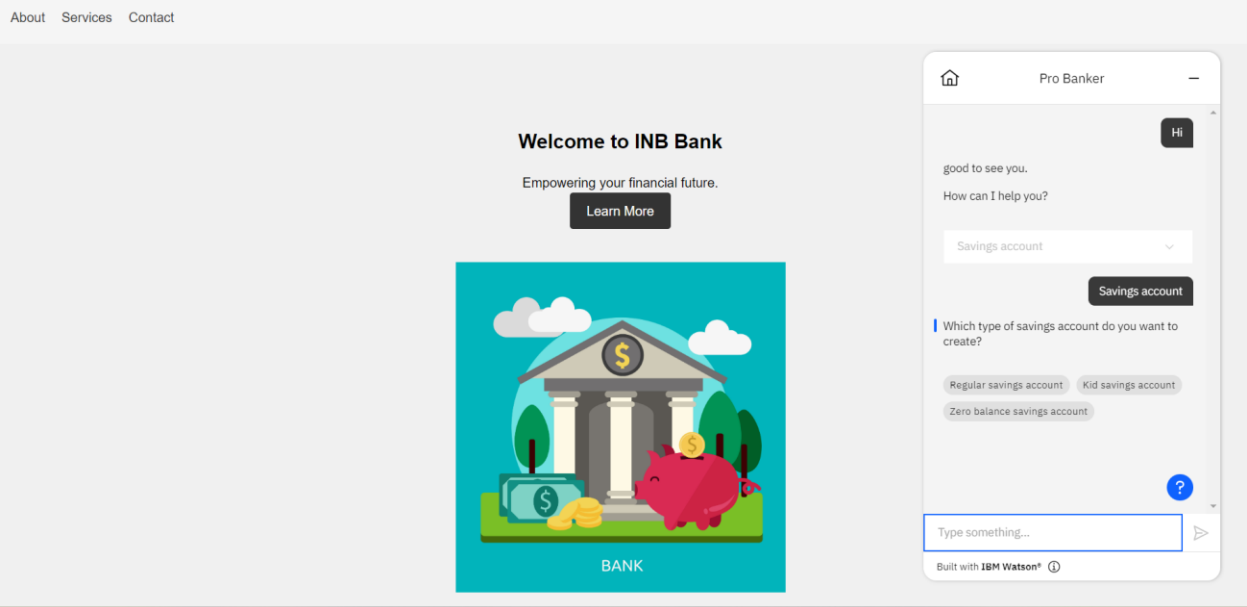


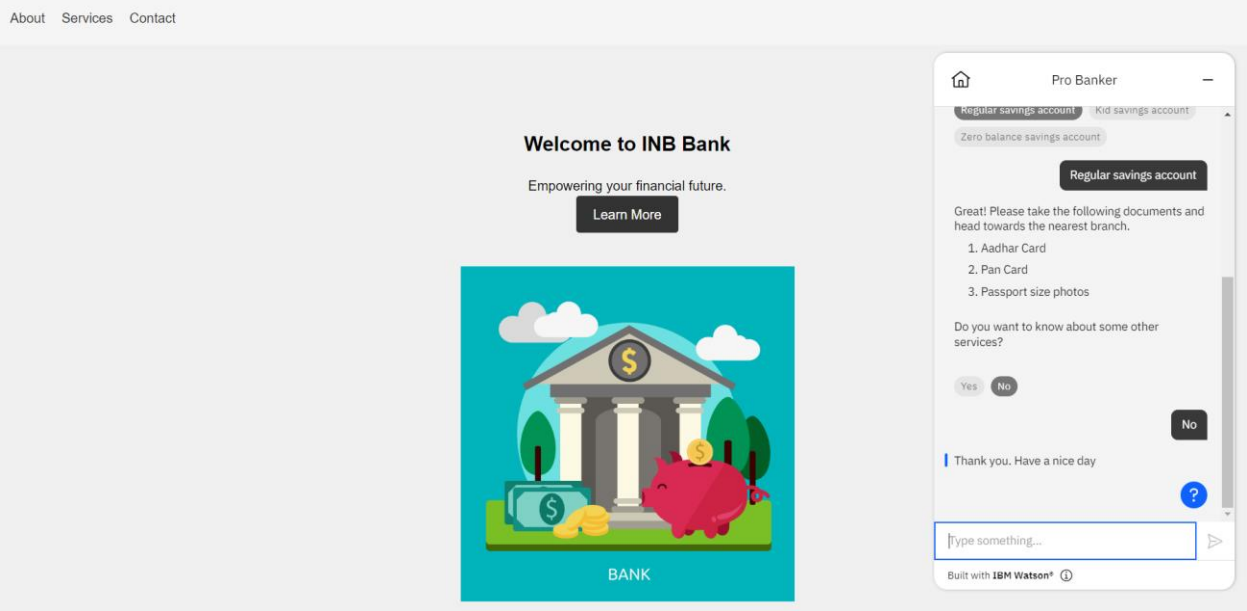
Assistant main menu:



Demo chat :

Asking for details about savings account:





7. ADVANTAGES AND DISADVANTAGES

The Benefits of AI-Based Discourse in the Banking Industry:

1. Efficiency: AI-powered discourse systems can manage several customer queries at the same time, resulting in speedier response times and increased efficiency. Customers can receive immediate solutions to their questions without having to wait for a human assistant, resulting in higher customer satisfaction.

2. Cost savings: By automating regular processes and minimising the need for human customer service representatives, AI-based conversation systems can help banks cut operational costs. This has the potential to result in significant cost savings for the banking industry.

3. Availability around the clock: AI-based conversation systems can run around the clock, giving users access to banking services and support at any time of day. This ease of access improves client convenience and satisfaction.

4. Scalability: AI-based systems are extremely scalable since they can handle a big volume of consumer queries and transactions at the same time. As the banking business expands and client demands rise, AI systems can easily handle the increased workload.

5. Personalization: Artificial intelligence systems may analyze client data and deliver personalized recommendations and offers based on individual preferences and financial behavior. This customized strategy has the potential to increase client involvement and strengthen the bank-customer relationship.

Disadvantages of AI-Based Conversation in the Banking Industry:

1. Lack of human touch: Because AI-based discourse systems lack the human element, they may not deliver the same level of empathy and emotional understanding as human customer support representatives. For more difficult or sensitive concerns, some consumers may choose to engage with human representatives.

2. Complex requests: While AI systems are capable of advanced natural language processing, they may fail to grasp complex queries or nuanced terminology. This can result in incorrect responses and misinterpretation of consumer demands.

3. Technical constraints: AI-based discourse systems rely on algorithms and machine learning models, which are not perfect and can occasionally make mistakes or deliver false information. To minimise such technical restrictions, banks must spend in comprehensive training, testing, and maintenance.

4. Security issues: Using AI-based conversation systems necessitates the handling of sensitive client data. Banks must use strong security measures to protect client information from potential breaches or misuse.

5. Initial setup and maintenance costs: Putting AI-based discourse systems in place necessitates a substantial upfront investment in infrastructure, technology, and training. Furthermore, ongoing maintenance and updates are required to keep the system up to date and running properly.

8. APPLICATIONS

In the banking industry, AI-based conversation can be used to improve client service, streamline procedures, and increase overall efficiency. Here are some examples of AI-based conversation applications in the banking industry:

1. Customer service and problem resolution: AI-powered chatbots can manage customer inquiries about banking services such as opening a savings, current, or loan account. These chatbots may answer questions regarding account features, interest rates, eligibility

requirements, and documentation. They can also provide general information about banking policies, procedures, and product offerings.

2. Transaction and Account Management Assistance: AI can help with ordinary banking transactions and account management chores. Customers, for example, can utilise AI-powered virtual assistants to check their savings account balances, move funds between accounts, schedule regular payments, and update personal information. Similarly, AI may help with current-account-specific tasks including generating bank statements, maintaining overdraft limits, and answering cheque book requests. Checking eligibility, calculating loan repayments, and starting the loan application procedure are all examples of loan-related actions.

3. Personalized Financial Recommendations: To deliver personalized financial advice, AI systems can analyze consumer data such as transaction history and spending trends. AI can recommend appropriate investment options, savings plans, and lending products by knowing customer preferences and goals. These suggestions can assist clients in making informed financial decisions based on their unique circumstances.

4. Fraud Detection and Prevention: AI-based systems can monitor banking transactions in real-time and detect suspicious activity using advanced pattern recognition algorithms. Unusual transactions, possible fraud attempts, or anomalies can be identified, causing the bank's security team to take rapid action. AI can also aid in the prevention of fraud by analyzing past data and identifying potential security flaws.

5. Support for Net Banking and Mobile Apps: AI-powered virtual assistants can help customers navigate net banking platforms and mobile applications. They can walk consumers through a variety of features and functionality, such as bill payments, fund transfers, setting up standing orders, and managing beneficiaries. AI can also provide personalized advice and ideas for improving the user experience.

6. Risk Assessment and Credit Scoring: By analyzing consumer data and credit histories, AI can be used to assess creditworthiness. Banks can automate the credit scoring process by adding numerous factors and machine learning algorithms, resulting in more accurate risk assessments and speedier loan acceptance decisions.

Overall, AI-based discourse in the banking industry provides a variety of benefits, such as 24-hour customer service, faster response times, personalized advice, more operational efficiency, and enhanced security measures.

9. CONCLUSIONS

AI-based conversation systems have transformed the banking business by combining a wide range of features and functions to improve client experience and streamline banking procedures. Saving account activities enable users to manage their funds more efficiently, monitor transactions, and receive personalised advice. Current account actions give clients with real-time information, allowing them to effectively monitor their transactions, make payments, and watch their balance.

Loan account actions integrated inside AI-based conversation systems enable easy loan application processes, rapid approvals, and personalised loan recommendations based on customer profiles. This feature saves both clients and financial institutions time and effort.

Customers can also quickly and accurately learn about banking services, products, policies, and procedures thanks to the general query action feature. The AI-based discourse system intelligently comprehends customer questions and provides them with accurate answers, increasing customer happiness and minimizing the need for human interaction.

The ability to conduct a variety of banking operations via digital platforms is provided by net banking actions, as well. Customers may securely access their accounts, make payments, transfers, and other financial activities with the AI-based conversation system quickly and easily.

The banking sector has been dramatically changed by AI-based discourse systems with capabilities including saving account action, current account action, loan account action, general enquiry action, and net banking action. These technologies promote client interaction, optimise operational efficiency, and contribute to the overall growth and success of the banking sector in the digital era by automating operations, enhancing customer service, and offering personalised suggestions.

10. FUTURE SCOPE

Here are some opportunities and potential advancements:

1. Advanced Fraud Detection: AI systems are capable of examining massive amounts of banking data, transaction patterns, and client behaviors to identify possible fraudulent activity. AI can assist banks in preventing financial crime and enhancing security measures by monitoring and highlighting questionable transactions in real-time.
2. Personalized Financial suggestions: AI systems can use client data to provide tailored suggestions and advice on finances. Artificial intelligence (AI) can recommend suitable investment options, savings plans, or loan products suited to specific clients by analyzing spending patterns, income sources, and saving behaviors.
3. Risk Assessment and Credit Scoring: AI algorithms can help banks make more accurate judgements about the creditworthiness of loan applicants. AI can give a more thorough assessment of loan risks and speed up the loan approval process by analyzing a variety of data sources, such as credit history, financial documents, and social media presence.
4. Speech and Facial Recognition: As speech and facial recognition capabilities in AI systems improve, they can be employed for secure authentication in net banking operations. Customers can add an additional degree of security and convenience to online banking by using their voice or facial features as a biometric authentication method.

Overall, the potential for AI-based dialogue in the banking sector to improve client experiences, increase operational effectiveness, and spur innovation across a range of banking services is enormous.

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[2] Kerlyl, A., Hall, P., & Bull, S. (2006, December). Bringing chatbots into education: Towards natural language negotiation of open learner models. In *International conference on innovative techniques and applications of artificial intelligence* (pp. 179-192). London: Springer London.

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[4] Suhel, S. F., Shukla, V. K., Vyas, S., & Mishra, V. P. (2020, June). Conversation to automation in banking through chatbot using artificial machine intelligence language. In *2020 8th international conference on reliability, infocom technologies and optimization (trends and future directions)(ICRITO)* (pp. 611-618). IEEE.

APPENDIX

A. SOURCE CODE

main.py

```
from flask import Flask, render_template


app = Flask(__name__)



@app.route('/')
def home():
```

```
    return render_template('index.html')



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

index.html

```
<!DOCTYPE html>
<html>
<head>
    <title>Banking Site - Welcome</title>
    <style>
        /* Reset default browser styles */
* {
    margin: 0;
    padding: 0;
    box-sizing: border-box;
}

/* Global styles */
body {
    font-family: Arial, sans-serif;
    line-height: 1.5;
}
```

```
.container {
    max-width: 960px;
    margin: 0 auto;
    padding: 40px;
}

h1, h2 {
    margin-bottom: 20px;
}

ul {
    list-style-type: none;
}

a {
    text-decoration: none;
    color: #333;
}

.btn {
    display: inline-block;
    padding: 10px 20px;
```

```
    background-color: #333;
    color: #fff;
    border-radius: 4px;
    transition: background-color 0.3s ease;
}

.btn:hover {
    background-color: #555;
}

/* Header styles */
header {
    background-color: #f5f5f5;
    padding: 20px;
}

nav ul {
    display: flex;
}

nav li {
    margin-right: 20px;
}
```

```
/* Hero section styles */
#hero {
    position: relative;
    background-color: #f0f0f0;
    padding: 100px 0;
}

.hero-content {
    text-align: center;
    margin-bottom: 40px;
}

.banking-vector {
    display: block;
    max-width: 400px;
    margin: 0 auto;
}

/* About section styles */
#about {
    background-color: #fff;
    padding: 100px 0;
```

```
    text-align: center;
}

.about-vector {
    display: block;
    max-width: 400px;
    margin: 0 auto;
}

/* Services section styles */
#services {
    background-color: #f5f5f5;
    padding: 100px 0;
    text-align: center;
}

/* Contact section styles */
#contact {
    background-color: #fff;
    padding: 100px 0;
    text-align: center;
}
```

```
.contact-vector {
    display: block;
    max-width: 400px;
    margin: 0 auto;
}

/* Footer styles */
footer {
    background-color: #333;
    color: #fff;
    padding: 20px;
    text-align: center;
}

    </style>
</head>
<body>
    <header>
        <nav>
            <ul>
                <li><a href="#about">About</a></li>
                <li><a href="#services">Services</a></li>
                <li><a href="#contact">Contact</a></li>
```

```
            </ul>
        </nav>
    </header>

    <section id="hero">
        <div class="hero-content">
            <h1>Welcome to INB Bank</h1>
            <p>Empowering your financial future.</p>
            <a href="#about" class="btn">Learn More</a>
        </div>
        <img src="https://vectorified.com/image/bank-vector-10.jpg" alt="Banking Vector"
class="banking-vector">
    </section>

    <section id="about">
        <div class="container">
            <h2>About Us</h2>
            <p>Lorem ipsum dolor sit amet, consectetur adipiscing elit. Vestibulum ultricies erat vel
nulla auctor, in fermentum urna pellentesque. Quisque id pulvinar lectus, at tempor sem.</p>
        </div>
        <img src="https://tse1.mm.bing.net/th?id=OIP._yQR3-
fembIlNBnCRMlTkgAAAA&pid=Api&P=0&h=180" alt="About Vector" class="about-
vector">
```

```
    </section>

    <section id="services">
        <div class="container">
            <h2>Our Services</h2>
            <ul>
                <li>Personal Banking</li>
                <li>Business Banking</li>
                <li>Loans and Mortgages</li>
                <li>Investment Management</li>
            </ul>
        </div>
        <img
src="https://tse2.mm.bing.net/th?id=OIP.WbqnJ3erobmj1IxsvaU23QHaHa&pid=Api&P=0&h=
180" alt="Services Vector" class="services-vector">
    </section>

    <section id="contact">
        <div class="container">
            <h2>Contact Us</h2>
            <p>Feel free to reach out to us for any inquiries or assistance.</p>
            <form>
                <input type="text" placeholder="Name">
```

```
            <input type="email" placeholder="Email">
            <textarea placeholder="Message"></textarea>
            <button type="submit" class="btn">Send Message</button>
          </form>
        </div>
        <img src="https://thumbs.dreamstime.com/b/contact-us-icons-web-icon-set-vector-illustration-182467306.jpg" alt="Contact Vector" class="contact-vector">
    </section>

    <footer>
        <div class="container">
            <p>&copy; 2023 XYZ Bank. All rights reserved.</p>
        </div>
    </footer>
    <script>
  window.watsonAssistantChatOptions = {
    integrationID: "18379061-4e15-44db-a1aa-f307987fc449", // The ID of this integration.
    region: "us-south", // The region your integration is hosted in.
    serviceInstanceID: "3d523b17-9f52-4724-a002-232e428dbf2a", // 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>
```