

# DIGITAL PUBLIC ANNOUNCEMENT AND CHATBOT SYSTEMS FOR E-GOVERNANCE

Aishwarya Jonnagiri<sup>[1]</sup>, Madhu P. Bannigol<sup>[2]</sup>, Kuruba Yashwant<sup>[3]</sup>, Y. Sai Yashwanth Reddy<sup>[4]</sup>

Department of Computer Science and Engineering Presidency University, Bangalore

Guide: Mr. G. Gnanakumar, Assistant Professor

## ABSTRACT

For both individuals and enterprises, access to government-sponsored financial schemes is essential in this age of digital revolution. This need is met by the creation of the interactive chatbot "Mega Bot," which compiles data on all government-sponsored loans and insurance plans into a single, easily accessible platform. The purpose of Mega Bot, a user-friendly virtual assistant, is to make it simple for users to obtain important information from a variety of governmental and financial organizations, including RBI (Reserve Bank of India) and NABARD (National Bank for Agriculture and Rural Development). Natural language processing and sophisticated search tools are used by this cutting-edge chatbot to help consumers locate pertinent information about loans, insurance policies, eligibility requirements, application processes, and other important facts with ease. By offering a thorough, current resource, Mega Bot gives individuals, businesses, and organizations more power.

## KEYWORDS

Financial Inclusion, Mega Bot, Government-sponsored Schemes, Virtual Assistant, RBI, NABARD, Natural Language Processing, User-friendly, Information Accessibility.

## INTRODUCTION

Access to government-sponsored financial programs has become increasingly important for both individuals and enterprises in today's quickly changing digital transformation scene. These financial programs play a critical role in stimulating economic growth, supporting rural and agricultural development, entrepreneurship, and catastrophe recovery. But for many, figuring out how to navigate the intricate web of these schemes, comprehending their nuances, and keeping up with the most recent developments can be a daunting task. A potent answer to this pressing demand is provided by the creative "Mega Bot" chatbot. The purpose of Mega Bot, an advanced interactive chatbot, is to compile and simplify data on all government-sponsored insurance plans and loans. It compiles information from several reliable sources, including the Reserve Bank of the India and the National Bank for Agricultural and Rural Development (NABARD).

With the help of natural language processing and sophisticated search tools, Mega Bot is a user-friendly virtual assistant that makes it simple for people, businesses, and organizations to locate pertinent information on loans, insurance policies, eligibility requirements, application processes, and other topics. It provides a thorough, current resource that helps in making educated judgments and streamlines the information access process.

Mega Bot is a big step toward financial inclusion, efficiency, and empowerment because it bridges the gap between government programs and the individuals they are meant to assist. It clears the path for a day when everyone can take advantage of the financial assistance provided by government programs, making sure that nobody is left behind in this age of rapid technological advancement.

**Related Work:**

C.W. Okonkwo, A. Ade-Ibijola, “Chatbots applications in education: A systematic review” *Computers and Education: Artificial Intelligence*, vol. 2, 2021, [online] Available: <https://www.sciencedirect.com/science/article/pii/S2666920X21000278>.

The systematic review titled "Chatbots Applications in Education" published in the journal "Computers and Education: Artificial Intelligence" explores the various ways in which chatbots are being used in the field of education. Chatbots, powered by artificial intelligence and natural language processing, have gained significant attention for their potential to enhance learning experiences. The review delves into how chatbots are being deployed in educational settings, such as K-12 schools, higher education institutions, and online learning platforms. It examines their roles in providing personalized and instant assistance to students, answering questions, offering educational content, and even simulating tutoring experiences. Chatbots are also used to support teachers and administrators by streamlining administrative tasks and providing data analytics.

The study investigates the effectiveness of chatbots in improving student engagement, learning outcomes, and overall educational experiences. It assesses their adaptability to various subjects and levels of education and discusses the challenges and opportunities in their implementation. In conclusion, the review provides valuable insights into the current state of chatbot applications in education, offering a foundation for further research and development in this evolving field.

S.A. Shilova, A.A. Kryuchkova, “Linguodidactic potential of chatbots”, *Foreign languages in the context of intercultural communication: proceedings of the XIII All-Russian Scientific and Practical Conference with International Participation, Saratov*, pp.389- 393, 2021.

The paper titled "Linguodidactic Potential of Chatbots" was presented at the XIII All-Russian Scientific and Practical Conference with International Participation on "Foreign Languages in the Context of Intercultural Communication" held in Saratov. The focus of this paper was to explore the educational and pedagogical possibilities offered by chatbots in the field of language learning and teaching. Chatbots have gained significance in the context of language education due to their interactive and adaptive nature. They can engage learners in real-time conversations, provide immediate feedback, and offer personalized language learning experiences. The paper likely delved into how chatbots can facilitate language acquisition, assist in vocabulary and grammar practice, and enhance speaking and listening skills. Furthermore, it may have discussed the intercultural communication aspect, emphasizing how chatbots can be programmed to simulate real-life conversational scenarios, allowing learners to practice language in culturally relevant contexts. The conference paper likely highlighted the growing importance of integrating technology like chatbots into foreign language education, ultimately enhancing the effectiveness of language learning and intercultural communication.

A.S. Budnikova, O.S. Babenkova, “Use of chat-bots in learning a foreign language”, *Scholarly otes. Electronic scientific journal of Kursk State University*, no. 3 (55), 2020, [online] Available: [https://api-mag.kursksu.ru/api/v1/get\\_pdf/3712/](https://api-mag.kursksu.ru/api/v1/get_pdf/3712/).

The use of chatbots in language learning has gained substantial attention in recent years, offering innovative ways to enhance the acquisition of foreign languages. Scholarly research has explored the efficacy and advantages of integrating chatbots into language education. Chatbots provide a dynamic and interactive learning experience. They engage learners in real-time conversations, allowing



for practical application of language skills. By simulating conversations with native or fluent speakers, chatbots offer students exposure to authentic language use, promoting language proficiency. Additionally, chatbots offer personalized learning experiences, adapting to the learner's pace and level, which can be particularly valuable in diverse classroom settings. Moreover, chatbots are available 24/7, enabling learners to practice at their convenience. Their feedback mechanisms offer immediate corrections, reinforcing learning in a supportive environment. Furthermore, data analytics can be applied to track and assess learners' progress, enabling educators to tailor instruction effectively. However, it's essential to acknowledge that chatbots may have limitations in addressing nuanced language subtleties and cultural aspects. As such, their integration into language learning should be part of a comprehensive and balanced curriculum. The scholarly exploration of chatbots in language learning underscores their potential to revolutionize how foreign languages are taught and acquired.

**L.G. Petrova, O.V. Lyutova, N.N. Shevchenko, "Linguodidactic potential of the chat-bot as a means of teaching Russian as a foreign language", Problems of modern pedagogical education, №68-3, pp. 233-235, 2020.**

The chat-bot holds significant linguodidactic potential as a powerful tool for teaching Russian as a foreign language. Its interactive and personalized nature allows for engaging and immersive language learning experiences. Chat-bots can provide learners with real-time practice in conversational Russian, enabling them to apply their knowledge in practical situations and enhance their speaking and listening skills. Furthermore, these virtual assistants can adapt to individual learning paces and levels, providing tailored exercises and feedback. The chat-bot's ability to employ natural language processing and contextual understanding can help learners grasp the nuances of Russian grammar and vocabulary. Additionally, it can offer a wealth of cultural insights, providing learners with a holistic understanding of the language. Overall, chat-bots have the potential to make Russian language learning more accessible, enjoyable, and effective for individuals of varying proficiency levels, promoting linguistic and cultural

understanding.

**L.K. Fryer, K. Nakao, J. Thompson, "Chatbot learning partners: Connecting learning experiences, interest and competence", Computers in Human Behavior, no. 93, pp. 279-289, 2019.**

"Chatbot Learning Partners" is an innovative concept aimed at enhancing educational experiences by leveraging the capabilities of chatbots. These learning partners are designed to connect the dots between a learner's interests, competence, and their overall learning journey. The key idea behind Chatbot Learning Partners is to create a personalized and adaptive learning environment. By utilizing natural language processing and machine learning, these chatbots can engage with learners in conversations to understand their individual interests and competence levels. They can ask questions, analyze responses, and gather data on a student's preferences, strengths, and weaknesses. With this information, Chatbot Learning Partners can then recommend relevant educational resources, courses, or learning materials that align with the learner's interests and are suitable for their competence level. They can also provide guidance, answer questions, and offer assistance throughout the learning process. By continuously adapting to the learner's needs, these chatbots aim to make education more engaging and effective. Chatbot Learning Partners aim to create a more personalized and efficient learning experience by connecting a learner's interests and competence with the appropriate educational content and support, ultimately fostering a more enjoyable and effective learning journey.

## SYSTEM ARCHITECTURE & DESIGN

### Existing System

Information about insurance plans and loans supported by the government is dispersed and frequently difficult to find. It is complex and time-consuming for firms and citizens to consult different sources. The absence of a centralized platform makes it more difficult to distribute important information effectively and may deter potential recipients from using these priceless resources.

**Drawbacks:**

**Information Overload**

Users are overloaded with a multitude of sources as a result of the fragmentation, which makes it challenging to locate important details.

**Time-consuming**

It takes a lot of time for users to search across several platforms, which delays their access to important information.

**Difficulty**

It might be difficult to navigate different sources, which could result in incorrect interpretations of the requirements for eligibility and the application process.

**Missed Opportunities**

Users may lose out on government-sponsored cash benefits to which they are legally entitled if there is no unified platform.

**Inefficiency**

The government's attempts to promote these programs are hampered by the less effective dissemination of vital information in the absence of an integrated system.

**Proposed System**

An integrated platform is suggested, with the goal of simplifying access to a range of financial initiatives funded by the government. It uses a chatbot interface to compile information from reliable sources, such as RBI and NABARD, and provides in-depth details on insurance plans and loans. Users can quickly access, evaluate, and apply for pertinent programs with the assistance of natural language processing, fostering financial inclusion and well-informed decision-making.

**Benefits:**

**Centralized Access**

By combining data, the platform provides customers with a single point of contact for a variety of government-sponsored financial services.

**Time Efficiency**

By reducing the need to explore several sources, users can quickly get crucial information, saving time.

**Clarity**

Users can more easily comprehend eligibility, processes, and advantages thanks to the chatbot interface's simplification of complex data.

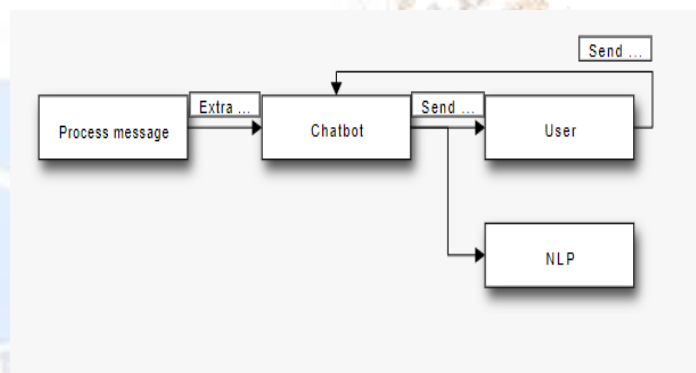
**Enhanced Participation**

By encouraging more firms and citizens to participate in government financial projects, centralized information fosters inclusivity.

**Informed Decision-Making**

Users may quickly evaluate alternatives and choose wisely, making the most use of government-sponsored insurance plans and loans.

**Block Diagram:**



**REQUIREMENT ANALYSIS**

**Both functional and non-functional prerequisites:**

Analysis of requirements is a crucial step in determining if a system or software project will be successful. There are two main categories of requirements: functional requirements and non-functional requirements.

**Functional requirements:**

Functional requirements are those that the end user expressly requests the system provide as a minimum set of features. As stipulated in the contract, each of these features must be included into the system. These are expressed or depicted as the expected output, the action carried out, and the input to be supplied to the system. Unlike non-functional needs, these are essentially user-stated criteria that are visible in the finished product.

## Functional requirements include things

### like:

- 1) User authentication each time they log in to the system;
- 2) System shutdown in the event of a cyberattack.
- 3) Every time a person registers for the first time on a software system, they receive a verification email.

## Non-functional requirements

In essence, these are the quality requirements that the system must meet in order for the project to be completed on schedule. Each project has a different priority or level of implementation for these aspects. We also refer to them as non-behavioral needs.

They mostly address the following problems:

- mobility
- security
- dependability
- scalability
- performance
- reusability
- flexibility

Non-functional requirements include the following:

- 1) Emails from such an activity shall be sent no later than 12 hours later.
- 2) Every request should be processed in no more than ten seconds.
- 3) When there are more than 10,000 concurrent users, the website should load in three seconds.

## Hardware Requirements

Processor	- I7/Intel Processor
Hard Disk	- 160GB
Key Board	- Standard Windows Keyboard
Mouse	- Two or Three Button Mouse
Monitor	- SVGA
RAM	- 8GB

## Software Requirements:

Operating System	: Windows 11
Server-side Script	: HTML, CSS & JS
Programming Language	: Python
Libraries	: Django, Pandas, NumPy,
IDE/Workbench	: PyCharm
Technology	: Python 3.6+

## Architecture:



## SYSTEM DESIGN

### Introduction of Input Design:

The unprocessed data that is used to create output in an information system is called input. The input devices, such as PC, MICR, OMR, etc., must be taken into account by the developers throughout the input design.

As a result, the system's output quality is determined by the quality of its intake. The following characteristics of well-designed input forms and screens are present:

- It should efficiently fulfill a certain goal, such as saving, recording, and retrieving information;

- It guarantees accurate and correct completion.
- It should be simple to fill out and easy to understand.
- Consistency, simplicity, and user attention should be its main priorities.
- The understanding of fundamental design concepts pertaining to
  - o What are the inputs required for the system is used to achieve all of these goals.
  - o How end users react to various form and screen features.



## Objectives for Input Design:

The aims of input design encompass the following: creating data entry and procedures; decreasing the volume of input; creating source documents for data capture or coming up with alternative techniques; creating input data records, data entry screens, user interface screens, etc.; employing validation checks and creating efficient input controls.

## Output Design:

In any system, output design is the most important task. During output design, developers decide which output kinds, report layout prototypes, and output controls are required.

### Objectives of Output Design:

The following are the goals of input design:

- To create output designs that fulfil requirements and prevent undesirable output from being produced.
- To create an output design that satisfies the needs of the final user.
- To deliver the appropriate volume of output.
- To prepare the output in the proper format and send it to the correct individual.
- To provide timely access to the output so that wise decisions can be made.

## UML DIAGRAMS

Unified Modeling Language is known as UML. An industry-standard general-purpose modeling language used in object-oriented software engineering is called UML. The Object Management Group developed and oversees the standard.

The intention is for UML to spread as a standard language for modeling object-oriented software. The two main parts of UML as it exists now are a notation and a meta-model. In the future, UML may also include other processes or methods that are connected to it.

A common language for business modeling and other non-software systems, as well as for defining, visualizing, building, and documenting software system artifacts, is

called the Unified Modeling Language.

The UML is a collection of cutting-edge engineering methods that have been effectively used to represent intricate and substantial systems.

The UML is essential to the software development process and to the creation of objects-oriented software. Software project design is mainly expressed by graphical notations in the UML.

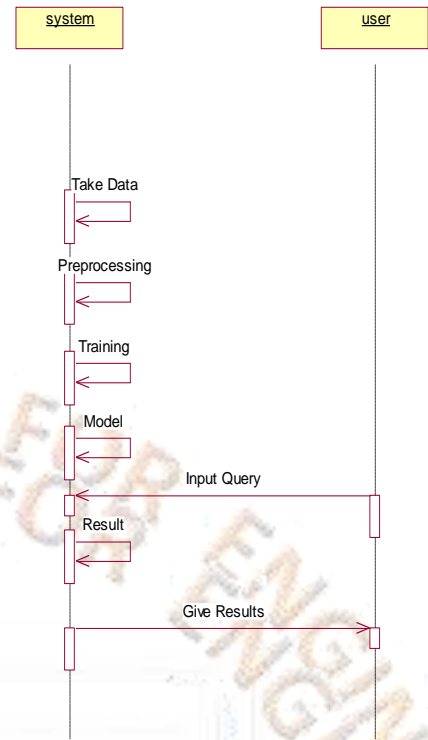
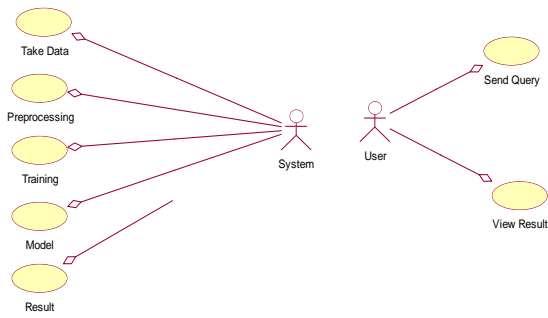
## GOALS:

The following are the main objectives of the UML design:

1. Give users access to an expressive, ready-to-use visual modeling language so they can create and share valuable models.
2. To expand the fundamental ideas, offer tools for specialization and extendibility.
3. Be unaffected by specific development processes or programming languages.
4. Offer an official foundation for comprehending the modeling language.
5. Promote the market expansion for OO tools.
6. Encourage the use of higher level development ideas like components, frameworks, partnerships, and patterns.
7. Combine the finest techniques.

## USE CASE DIAGRAM:

A use case diagram in the Unified Modeling Language (UML) is a type of behavioral diagram defined by and created from a Use-case analysis. Its purpose is to present a graphical overview of the functionality provided by a system in terms of actors, their goals (represented as use cases), and any dependencies between those use cases. The main purpose of a use case diagram is to show what system functions are performed for which actor. Roles of the actors in the system can be depicted.



**CLASS DIAGRAM:**

In software engineering, a class diagram in the Unified Modeling Language (UML) is a type of static structure diagram that describes the structure of a system by showing the system's classes, their attributes, operations (or methods), and the relationships among the classes. It explains which class contains information.



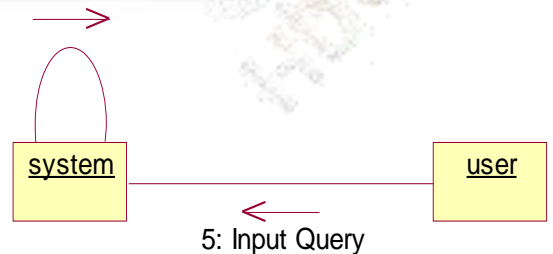
**COLLABORATION DIAGRAM:**

In collaboration diagram the method call sequence is indicated by some numbering technique as shown below. The number indicates how the methods are called one after another. We have taken the same order management system to describe the collaboration diagram. The method calls are similar to that of a sequence diagram. But the difference is that the sequence diagram does not describe the object organization whereas the collaboration diagram shows the object organization.

**SEQUENCE DIAGRAM:**

A sequence diagram in Unified Modeling Language (UML) is a kind of interaction diagram that shows how processes operate with one another and in what order. It is a construct of a Message Sequence Chart. Sequence diagrams are sometimes called event diagrams, event scenarios, and timing diagrams.

- 1: Take Data
- 2: Preprocessing
- 3: Training
- 4: Model
- 6: Result



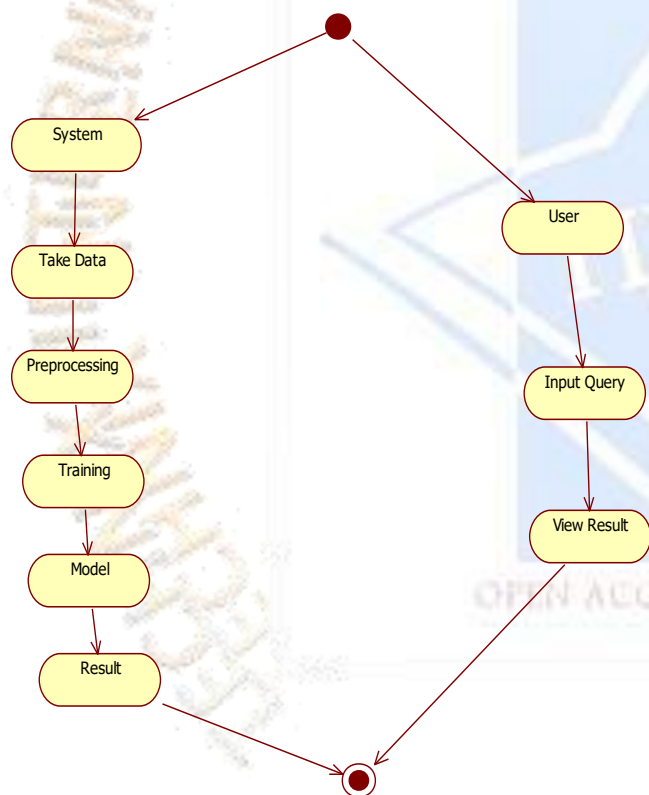
## DEPLOYMENT DIAGRAM

Deployment diagram represents the deployment view of a system. It is related to the component diagram. Because the components are deployed using the deployment diagrams. A deployment diagram consists of nodes. Nodes are nothing but physical hardware used to deploy the application.



## ACTIVITY DIAGRAM:

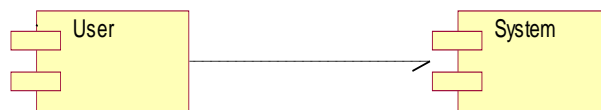
Activity diagrams are graphical representations of workflows of stepwise activities and actions with support for choice, iteration and concurrency. In the Unified Modeling Language, activity diagrams can be used to describe the business and operational step-by-step workflows of components in a system. An activity diagram shows the overall flow of control.



## COMPONENT DIAGRAM

A component diagram, also known as a UML component diagram, describes the organization and wiring of the physical components in a system. Component diagrams are often drawn to help model implementation details and double-check that every aspect of the system's

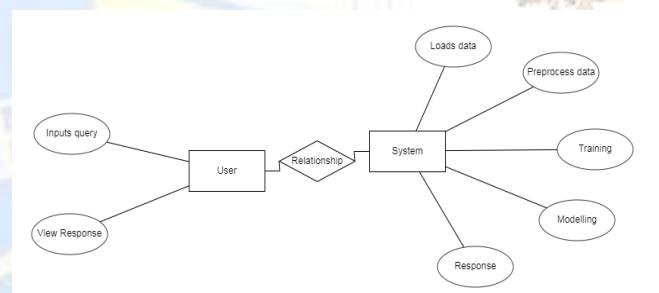
required function is covered by planned development.



## ER DIAGRAM:

An Entity-relationship model (ER model) describes the structure of a database with the help of a diagram, which is known as Entity Relationship Diagram (ER Diagram). An ER model is a design or blueprint of a database that can later be implemented as a database. The main components of E-R model are: entity set and relationship set.

An ER diagram shows the relationship among entity sets. An entity set is a group of similar entities and these entities can have attributes. In terms of DBMS, an entity is a table or attribute of a table in database, so by showing relationship among tables and their attributes, ER diagram shows the complete logical structure of a database. Let's have a look at a simple ER diagram to understand this concept.



## DFD DIAGRAM:

A Data Flow Diagram (DFD) is a traditional way to visualize the information flows within a system. A neat and clear DFD can depict a good amount of the system requirements graphically. It can be manual, automated, or a combination of both. It shows how information enters and leaves the system, what changes the information and where information is stored. The purpose of a DFD is to show the scope and boundaries of a system as a whole. It may be used as a communications tool between a systems analyst and any person who plays a part in the system that acts as the starting point for redesigning a system.



The system will deliver the output to the user.

**2. User**

Testing

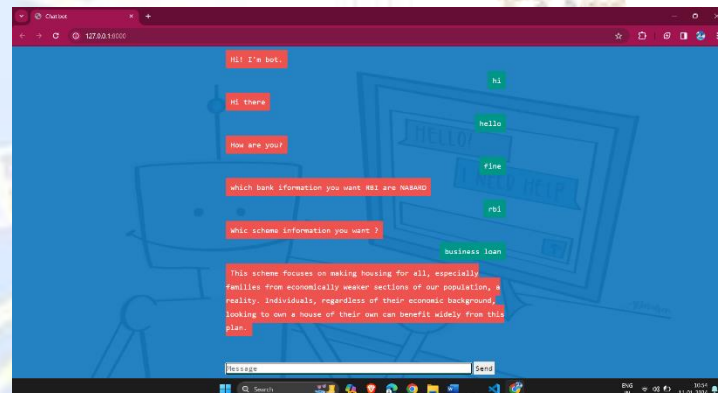
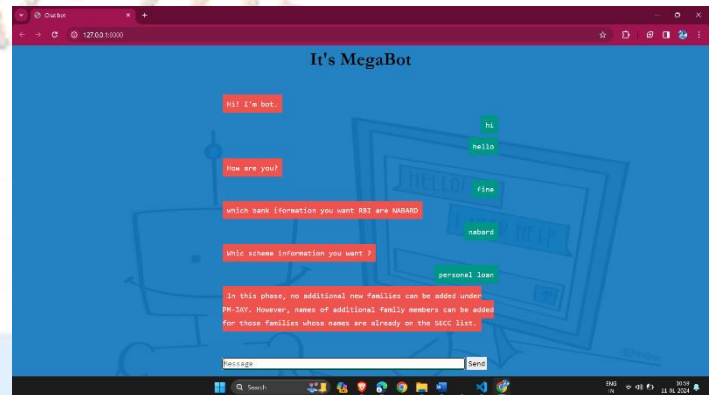
2.1 Send Query:

User will send Query to the system.

2.2 View Query Result:

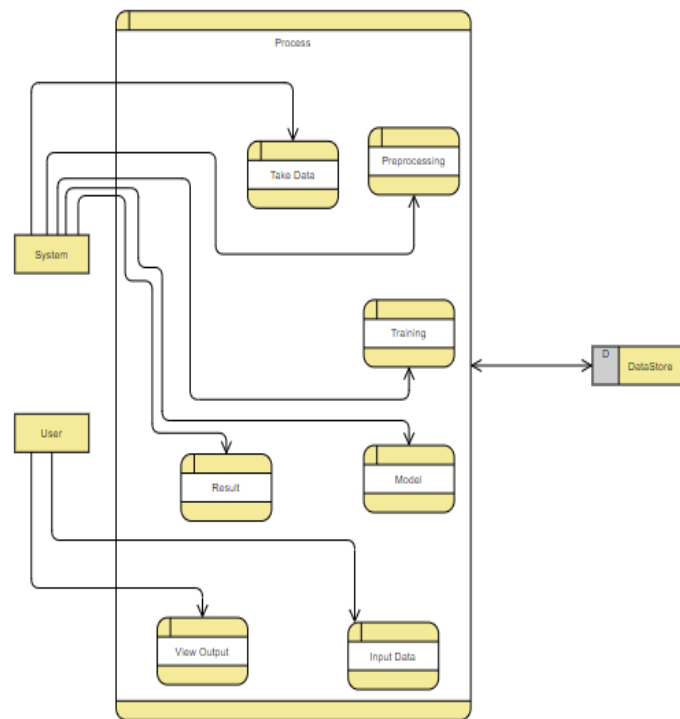
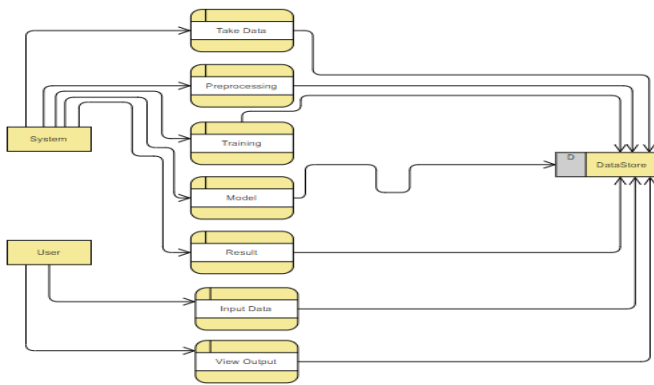
User will view his query result.

**RESULTS:**



**RESULTS AND DISCUSSIONS**

Results and conversations regarding the use of chatbots and digital public announcement systems for e-governance, including plans for multiple banks, would normally entail an evaluation of the systems' effects and results. An example format for results and discussion presentation is provided below:



**IMPLEMENTATION AND RESULTS**

**Modules:**

**1. System**

1.1 Take Data:

System will receive data from the user.

1.2 Preprocessing:

The system will undergo for preprocessing.

1.3 Training:

The System will get trained.

1.4 Model:

The system will work based on model.

1.5 Results:

**Outcomes:****1. User Engagement and Interaction:**

Determine how many users interacted with the chatbot and digital public announcement systems.

Examine how often and how long users interact with each other.

Analyze the many questions and concerns that users have brought up.

**2. Efficiency and Response Time:**

Evaluate how quickly the system responds to user inquiries and fixes issues.

Examine response times both before and after the chatbot was put into place.

Determine whether the system has any delays or bottlenecks.

**3. Cost Savings:**

Examine whether deploying chatbots is more affordable than using more conventional customer care techniques.

Examine any decrease in the number of human resources needed to handle standard inquiries.

Examine the cost-benefit analysis in its entirety.

**4. User Satisfaction:**

Get user input about how they felt using the digital systems.

Use surveys or feedback forms to gauge user satisfaction.

Determine what needs to be improved based on suggestions from users.

**5. Bank Integration:**

Evaluate the degree of bank integration that has been attained.

Assess the efficiency of the chatbot's interactions with various banking systems.

List any difficulties encountered during the process of integration.

**Talk about the following:****1. Better Accessibility:**

Talk about how chatbots and digital public announcement systems have made it easier for citizens to obtain banking and government information.

Discuss any difficulties in reaching a larger audience.

**2. Improved Efficiency:**

See how the chatbot system has improved the way regular chores and inquiries are handled.

Talk about any areas that could be made even more efficient.

**3. Cooperation with Banks:**

Talk about the joint initiatives to incorporate bank services into the e-governance framework.

Draw attention to any advantages shared and difficulties encountered during the partnership.

**4. Challenges and Solutions:**

Talk about any difficulties that arose throughout the implementation, such as problems with technology, difficulty with user adoption, or worries about data security.

Provide tactics or ways to get through these obstacles.

**5. Prospective Routes:**

Talk about possible upgrades and advancements for the chatbot and digital public announcement systems in the future.

Examine the possibilities of adding more services or banks to the system.

**CONCLUSION**

In the digital age, MegaBot becomes a crucial remedy that promotes financial inclusion and improves accessibility to financial programs funded by the government. MegaBot facilitates easy navigation of the complicated world of insurance and loan options for individuals, corporations, and organizations by combining data from several sources into a user-friendly virtual assistant. Its sophisticated search and natural language processing powers enable quick and easy access to important information, supporting

well-informed decision-making. This creative chatbot serves as a link between government programs and the people they are intended to assist. In the end, MegaBot serves as a lighthouse of development in the age of digital revolution, encouraging financial inclusion and rendering public programs more accessible and advantageous for a wider range of individuals and business owners.

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