



# Demographics Data Update System using Conversational ChatBot

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Yashika Goyal<sup>1</sup>, Mohd. Aftab<sup>1</sup>, Sakshi Verma<sup>1</sup>, Raj<sup>1</sup>, Anurag<sup>1</sup>, Shivang Tomar<sup>1</sup>, Hari Mohan Rai<sup>2\*</sup>,  
Shailesh Kumar Singh<sup>3</sup>

<sup>1</sup>Department of Computer Science Engineering, Dronacharya group of Institutions, Greater Noida

<sup>2</sup>Department of Electronics & Communication Engineering, Dronacharya group of institutions, Greater Noida

<sup>3</sup>Department of Mechanical Engineering, Dronacharya group of institutions, Greater Noida

[yashika.16190@gnindia.dronacharya.info](mailto:yashika.16190@gnindia.dronacharya.info), [harimohan.rai@gnindia.dronacharya.info](mailto:harimohan.rai@gnindia.dronacharya.info)\*

## ABSTRACT

This study proposes a solution to the issue of updating demographic data, which makes use of a conversational Chatbot in conjunction with a machine learning approach. We all know that the literacy rate in India is rather low, therefore this is mostly beneficial for India. Because not everyone is able to utilize contemporary techniques such as texting, our team is offering an upgrade to the Indian government portal UIDAI by adding a conversational Chatbot to it. As far as we are aware, the UIDAI platform does not have any options for either conversational chatbots or speech recognition. Therefore, the primary objective of our concept is to modernize the chatbots by using AI (artificial intelligence). A user's demographic information in AADHAR, such as their cellphone number, address, and email address, may be updated from the user's location of choice. Voice recognition, machine translation, machine learning on Internet of Things devices, and various payment mechanisms will all be able to be used by our conversational chatbot. We have recommended making the conversational chatbot bilingual so that it may assist individuals from different regions in freely updating their AADHAR from the comfort of their own homes. The user begins the login process by providing their email address, which is a more secure method. The user may get assistance and access to all of the relevant information online thanks to the solution. It brings about the modernization and autonomy of India.

**Keywords:** ChatBot, Artificial Intelligence, Conversational ChatBot, Machine Learning, Demographic Update

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## 1. Introduction

Conversational agents interact with humans through speech, text, or other inputs and outputs on mobile, web-based, or audio-based platforms by utilizing artificial intelligence (AI) techniques such as machine learning (a statistical method of training models with data so that they can make predictions based on a variety of features) and natural language processing. These techniques allow the agents to make accurate predictions based on a wide

range of characteristics (NLP; the ability to recognize and analyze verbal and written language). Natural language processing, often known as NLP, is a way for a computer program or chatbot to educate itself using the data it receives as input. The ability of a computer program or chatbot to acquire new knowledge as a result of the inputs it is given is referred to as machine learning. The term "natural language processing" (NLP) refers to any interaction that takes place between computers and human language. Many agents make advantage of



natural language processing (NLP) so that users may communicate with them in the same way as they would with a person[1]. After then, the agent may do an analysis on the data and respond in a way that is conversational. In order to realize the full potential of artificial intelligence on a global scale, a chatbot or conversation system has to be able to carry out the following three tasks:

- Ensure that the experience of the consumer is consistent across
- Respond with information that is useful.
- Be sure to keep the conversation's context in mind.
- Develop the capacity to pass for a human at any given moment.

The first usage of conversational agents in health care was in 1966 when ELIZA, a virtual psychotherapist that could deliver programmed answers to text-based user input, was introduced. This was the beginning of the use of conversational agents in health care. Since that time, machine learning has seen tremendous advancements, which has made it possible to develop ever-more potent AI agents. A few examples of conversational agents that make use of machine learning include chatbots, embodied conversational agents (ECAs), and virtual patients. It's possible that you may get in touch with them through phone, cell phone, computer, or any number of other digital channels. It has been easier for conversational agents to take in and grasp various kinds of information, and they've also become better at analyzing movements like gestures, facial expressions, and eye movement. In the modern world, the purpose of machine learning is twofold: first, it seeks to classify data by using previously established models; second, it seeks to use previously established models in order to forecast the occurrence of future events. In the field of machine learning, learning approaches are often categorized into three basic categories. These groupings are used for the purpose of training machines based on machine learning.

### 1.1. Supervised learning

During the supervised learning process, a "teacher" will give the computer with example inputs and desired outputs in order to "teach" the computer a general rule that maps inputs to outputs. This will let the computer to learn how to map inputs to outputs on its own. It makes use of the labelled dataset, in which the learner is already familiar with the various classifications of the data. Because it produced reliable and verified results thanks to the labelled dataset, the semi-supervised learning technique is the one that is most often employed in the machine learning classification.

### 1.2. Unsupervised learning

The trained model is not provided with any labels and is instead trusted to discover structure on its own within the data it has been given. Finding hidden patterns in data may be an end in and of itself when using unsupervised learning, but it can also be a means to an end (feature learning). In this kind of learning, the datasets are not labelled; rather, the machine is required to learn the dataset based on the parameters it contains. The clustering approach is one of the greatest examples of unsupervised learning. In this method, the dataset is divided into groups of clusters based on the parameters, and then the methodology is used.

### 1.3. Reinforcement learning

The training method known as reinforcement learning is used in machine learning, and it works by rewarding favourable actions and punishing undesirable behaviours. An agent that utilizes reinforcement learning is able to see and grasp its environment, carry out actions, and learn via trial and error. In this kind of learning, the model learns from its own experiences, which means that if the result is accurate, it is rewarded, and if it is inaccurate, there will be a penalty. Because of this, the Reinforcement Learning algorithm includes a Feedback System that acquires knowledge from the Training Agents and the Environmental Agents.

Machine learning has many different applications, some of which include: agriculture, speech recognition, natural language processing,



telecommunication, recommender systems, and time-series forecasting, Natural language comprehension, Search engines, and many others.

## 2. Literature Review

The field of conversational chatbots has seen a significant amount of development in recent years. A large number of researchers have already developed conversational chatbots for a wide range of applications. In addition, during the course of the last several decades, the idea of a chatbot has been used in a variety of fields,

including education, health care, social media, and sales and marketing. Numerous academics working in a wide variety of domains [2]–[8] have investigated, implemented and analysed the conversational chatbots. The results of some of the literature reviews that were carried out on the topic of conversational chatbots for a variety of purposes are shown in Table 1. The dataset that was used, the model or approach that was used, and the conclusion or accuracy of the chatbot were the three pillars around which the literature review was built.

Literature	Dataset	Method Used	Conclusion
[9]	Campus Dataset [10], VLE Dataset[10]	K-means clustering technique.	It pioneered the notion of conversational chatbots. It promotes self-directed learning and piques students' interest in certain subjects. It improves the enjoyment of studying.
[11]	Conversational database [11]	AI, NLP	Chatbots are employed in a variety of settings, including sales and customer support, as well as mobile phone conversations.
[12]	Data from video lectures	First-order logic predicates	<ul style="list-style-type: none"> <li>The proposed chatbot may function as an intelligent tutor for higher education.</li> <li>It can convert the audio from the video lesson into another language.</li> </ul>
[2]	Total of 31,862 conversations with more than 5 user turns	LSTM language model (Dynamic Speaker Model)	<ul style="list-style-type: none"> <li>The Chabot model is capable of interacting or conversing.</li> <li>The Dynamic Speaker Model has an accuracy of 69.5%.</li> </ul>
[4]	Large dataset with 1,017 dialogues.	Hybrid RCNN with different feature	Hybrid RCNN provides 74.8% accuracy.
[5]	Multi-Woz [6] dataset contains 8,438 multi-turn dialogues.	Transferable Dialogue State Generator (TRADE)	On the MultiWOZ (restaurant) dataset, the TRADE model of Conversational ChatBot achieves 89.7% accuracy.

## 3. Proposed Methodology

The AI in our device operates based on a conversational model. Converting a rule-based chatbot into a conversational multilingual chatbot is made easier with the assistance of this conversational AI. Conversational refers to a speech system, and multilingual refers to speaking many languages; thus, our gadget is a voice-based chatbot that can communicate in multiple languages. Two different parts will

determine how we go about developing a sophisticated chatbot. The initial part of this project is a messaging platform that is driven by chatbots that follow predefined rules [11]. Using a text-based question and answer format, the messaging platform of a chatbot may assist in answering any questions or concerns raised by a consumer. Our gadget also has a conversational platform that is powered by AI that understands natural language conversations. It is capable of recognizing many languages and comprises of a



speech recognition system. Users are encouraged to explain their questions in a variety of languages by using their voices. It not only answers the questions that the user has, but it also helps to improve the experience that the user has and gives the user power over the conversational chatbot that they are accessing. Converting a rule-based chatbot into a conversational multilingual chatbot requires a few phases, which are used together to form a conversational chatbot.

### 3.1. Working

The dashboard of the proposed conversational chatbot is accessed by the user [1]. The first option, to ask questions through text, is provided by the channel; the second choice, to ask questions by voice, is provided by the channel as well. The user issues the questions by using their voice, and the speech recognition method works in the background to process them. Voice recognition establishes a connection with an Application Programming Interface (API), which offers the user the option to ask questions in more than one hundred languages. The API functions via the use of Google Translate. It also includes the regional language, which is carried over into the machine translation. A word-for-word comprehension of questions may be achieved with the use of machine translation. After the IoT device has finished processing the query in its entirety, the inquiry is sent to the device. The Internet of Things both improves the experience and makes better use of the time.

#### 3.1.1. User queries

After accessing the UIDAI website, the user will be greeted with a conversational chatbot. The user may choose to answer the questions using either a voice-activated or text-based approach. Voice recognition is the foundation of the voice-activated system. Voice recognition in our system allows the user to identify himself or ask questions by speaking into a voice box[1]. Conversational chatbots gain the capabilities of machine translation, Internet of Things devices, and Google Translate in speech recognition in order to comprehend the questions asked by users (voice system).

**Machine translation:** Machine translation helps to grasp the questions or concerns raised by a user based on the many forms of machine translation. It indicates that the rule-based machine translation (RBMT), example-based machine translation (EBMT), statistical machine translation (SMT), and natural language translation (NMT) problems are understood by the conversational chatbot (Neural network Machine translation).

**IoT Device:** An Internet of Things device, also known as IoT, improves the overall experience that a user has when interacting with a conversational chatbot. Additionally, beginning with the next interaction, an IoT device grants the user the ability to control the conversational chatbot in accordance with their preferences. This makes it possible for these real-world objects to be integrated into the digital world in a more seamless manner, which improves the effectiveness of the application and reduces the amount of work that is necessary to manage the objects[13]. With the assistance of artificial intelligence (AI), the Internet of Things (IoT) improves the economic feasibility and accuracy of a variety of tasks, and it is easily applicable in daily life via the use of conversational chatbots [14].

**Google translator:** The application programming interface (API) of a Google translator enables a conversational chatbot to function in many languages. Using neural machine translation, it supports more than 100 different languages. It makes use of cutting-edge technology, which enables it to provide dynamic and customizable features as a consequence.

### 3.2. Chatbot approach

Following the submission of questions by a user, the conversational chatbot will now operate using a rule-based chatbot in conjunction with conversational AI. At this point, the queries are sent to a system known as Natural Language Processing (NLP) [9]. [2]

After then, the bot logic will begin verifying the inquiries, which are often in the form of sentences that are provided by the user. The logic of the bot is derived from machine

learning. The employment of supervised learning, unsupervised learning, and reinforcement learning together enables one to investigate and recognize either the data that is supplied to them or the data that they have encountered (conversational chatbot experiences the data by the physical world or previous queries of the user). Machine learning can understand the questions asked by users. Once the query has been identified, the bot logic will begin to gather the user's data according to the information source [9], [14]. Documents, demographic information, and payment recourse are all included in this information source. These data sources will not only update, but will also upload new information before updating any existing data. Documents are going to be uploaded via the use of a Google drive. After the papers have been uploaded, the user's email address or phone number will be logged so that their demographic information may be updated. Documents and demographic information will be automatically checked for accuracy by the official authorisation of UIDAI [1], [11].

System for the latest demographic updates It is necessary to do an update on the user's demographic information, which includes the user's name, date of birth, gender, address, mobile number, email address, and language [1]. There are normally two different ways that we may use to update our AADHAR records at home.

### **3.2.1. User login via email**

To be able to log in using the user's email id, one must first enter the AADHAR website and, if they haven't previously done so, register themselves using the email-id registration option. Log in if you are already registered by entering the email address you used to register and your password. If the login was successful, an OTP would be sent to the email address that was registered, and entering that OTP would provide access to the ADHAR account of the individual. This would make it possible to update the information without any problems.

### **3.2.2. User login via mobile number**

In a similar manner, in order to log in using the user's cellphone number, one must first enter the AADHAR website and register oneself using the option of mobile number, provided that they have not previously done so. If you have already registered, you may log in by entering the password together with the registered cellphone number. The one-time password (OTP) will be sent to the person's registered cellphone number if the login is successful. Entering the OTP will give access to the person's AADHAR account, which will make it possible to update the information without any problems. In the event that the user forgets their password, they will be able to access their account by using the enrollment id that has been sent to either their registered cellphone number or email address [15].

## **4. Discussion**

### **4.1. DESCRIPTION**

We have proposed a design for a conversational chatbot to be implemented on the UIDAI website for the purpose of providing user benefits. This chatbot would allow users to update their demographic information from the comfort of their own homes by utilizing the voice system that the rule-based chatbots would provide. We have basically developed a multilingual conversational chatbot in order to cater to the needs of certain regional populations as well as those who are unfamiliar with the technology required to utilize the system through text messages. The first part of Chatbot is devoted to the access of users, and the second part is for the access of service providers (who holds database-CIDR database, UID database). The following is the process that should be followed in order to update a rule-based chatbot into a conversational chatbot. Figure 1 presents a flow diagram depicting the operational method of the proposed system for the updating of demographic data utilizing conversational Chatbot.

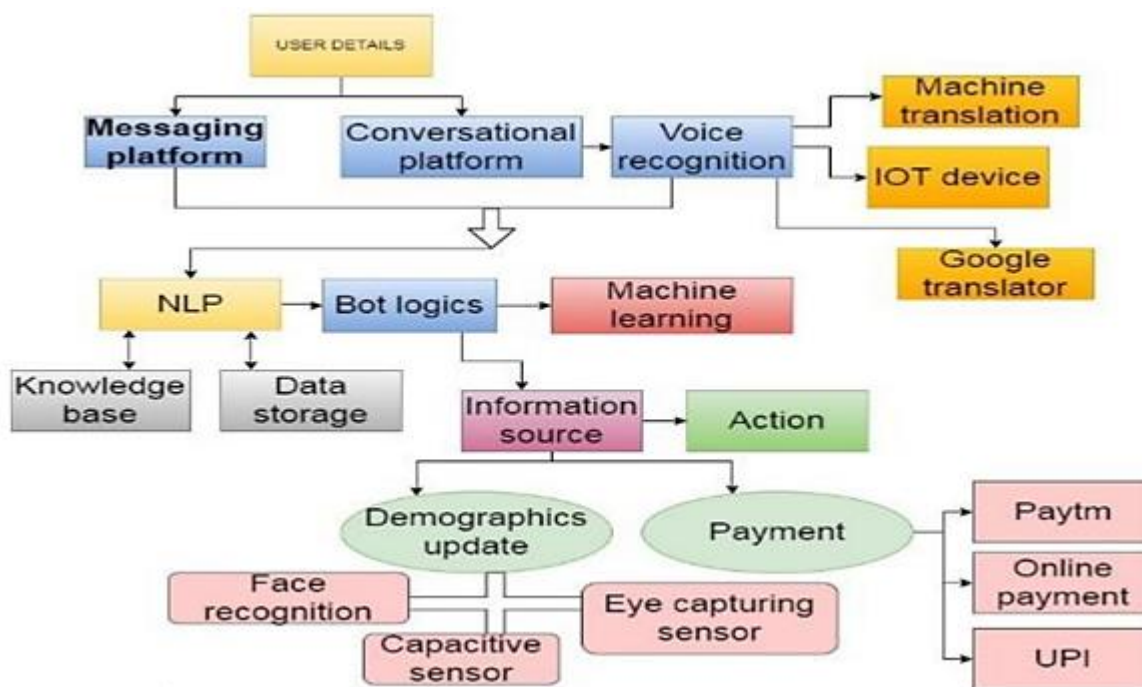


Fig.1: The flow diagram of the overall working of proposed demographic update system

#### 4.1.1. User access steps

- The user navigates their way into the website. Use the voice to ask the chatbot questions, and you may do it either in the standard language or in the local language.
- Utilizing a scanner, upload the necessary papers in accordance with the user's most recent changes.
- Make sure all of the papers you submitted are correct.
- At this point, the first crucial step is to input either your current email address or your cell phone number. Get a One-Time Password (OTP), and make sure it's confirmed.
- At this point, the user must submit the demographic information that they want to have updated in their AADHAR record.
- Once again, check that the demographic information that was submitted does not need any more modification.
- At this point, you will need to complete the banking information and either pay using UPI or submit the money using online banking.

#### 4.1.2. Service provider access steps

- Inquire about any concerns about the usage of the UIDAI.
- Please provide a list of the papers that are requested.

- Run the user's documents through the CIDR database for verification before storing them.
- Utilizing the UID database, validate the demographic information that was submitted by the user.
- The service provider and the user are the only ones who have access to any of the user's personal information.

#### 4.2. Working operation of the ChatBot

The user initiates the discussion by asking questions; the conversational chatbot then responds with one of two available options: the first is a message platform, and the second is a speech system equipped with voice recognition technology[1]. Voice recognition is made possible with the assistance of Google Translate (which gives users access to multiple language options by utilizing API), machine translation (which gives users the meaning of words by utilizing neural networks), and Internet of Things (IoT) devices (which help to improve the overall user experience and give users the ability to control their access to conversational chatbots) [13].

After then, natural language processing kicks in, making it possible for the chatbot to easily access and comprehend human language. Our chatbot is able to communicate with humans because to this feature. The logic of the bot is utilized to recognize several sources of

information, including documents (through the sensor), demographics, and payment (by online banking or UPI id). The logic of the bot is executed with the assistance of machine learning, which supplies the conversational chatbot with labeled data. The chatbot then recognizes all of the documents that have been input by the user.

In the event that the user forgets to bring their AADHAR card, they may just key in their enrollment ID, which is secure, and get their card once again. This is how our conversational chatbot operates and how it helps individuals, including those who live in distant areas. Figure 2 depicts the use case diagram for the conversational chatbot.

**4.2.1. Alternative**

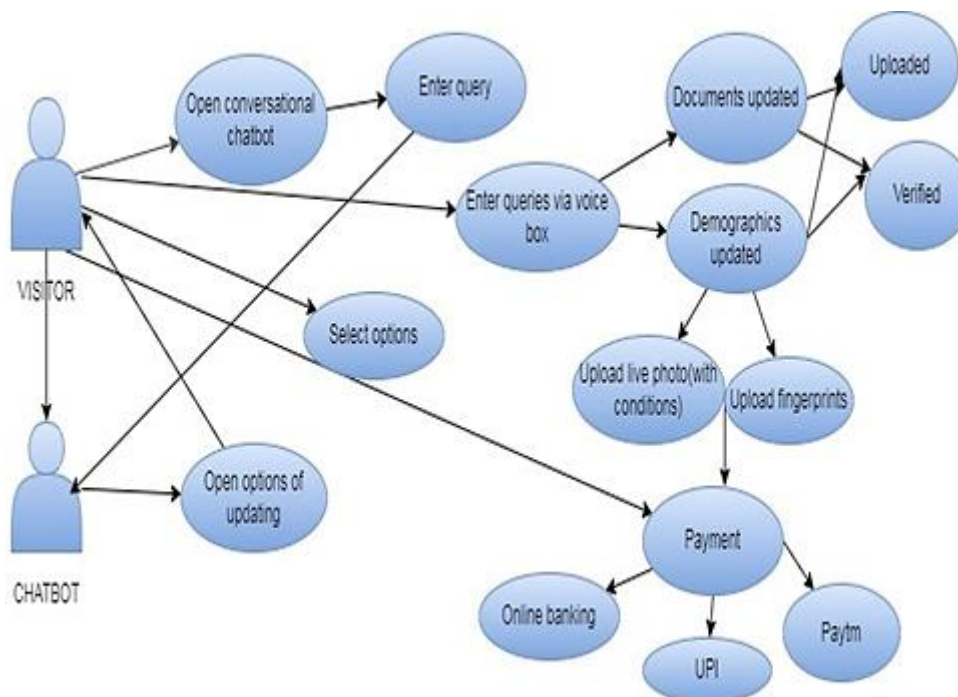


Fig.2: The use case diagram of the Conversational ChatBot

**4.3. Applications**

An artificial intelligence conversational chatbot may be put to use for a range of tasks in order to satisfy the requirements of the user. It has a stronger presence than a typical chatbot, which does not meet all of the standards. A user may utilize the AI-based conversational chatbot to whatever degree they want, but a primitive chatbot simply provides them with a restricted number of possibilities. Some famous websites, such as Amazon and Flipkart, employ chatbots for interaction because they provide an instant answer to the user, hence minimizing the amount of human labor required and the amount of time needed. It is available for use by anybody at any time and in any location for the purpose of conducting inquiries. The chatbot responds with the answer to the user's inquiry,

and in the event that it is unable to do so, it immediately makes contact with a representative of the customer care team [16]. In the future years, there will be an increase in the need for AI chatbots. This is because the technology offers several advantages to various individuals as well as enterprises. For example, on a business website, it may assist in the following areas:

- Improve both your speed and your accuracy.
- Safer methods of financial transaction
- Suggestions for improvements to the product
- Providing answers to questions pertaining to the product
- Communication with the consumer in an interactive format



- The feedback is instantaneous.
- An examination of the user's emotional state

Positive reviews helped the website or application gain more benefits, which in turn led to an increase in demand for that commercial website or any application [17]. Customer feedback to the website or application, including how the AI chatbot assisted the customer in finding a solution to their problem, led to the positive reviews. A voice recognition system is also one of the most critical components for the successful operation of a chatbot. Even someone who is illiterate or has physical impairments is able to speak and find solutions to their problems without encountering any form of difficulty. Voice recognition software for an artificial intelligence chatbot requires a comprehension of every language that may be uttered by the user, and it must also provide results in the same language. The conversational AI chatbot may also be utilized on the website for the AADHAR card, which makes it much simpler to make changes to documents than it was in the past. Implementing this will be highly advantageous in the following ways [16], [17]:

- An AI chatbot on the internet that supports many languages may be utilized by anybody in the nation, regardless of the language they speak.
- Using a technique known as natural language processing, it is able to comprehend human language and then produce the necessary output.
- Making them available to the great majority of Indians for whom English is not their native tongue so that they may read and understand them
- Making them available to the great majority of Indians for whom English was neither their native language or preferred language of communication.

## 5. CONCLUSION

In this work, we have proposed a conversational chatbot in which we have employed machine translation and machine learning. This makes it simpler to access the conversational chatbots,

and it also makes it easier to grasp human language by utilizing Google Translator. In order to comprehend the user's query and analyze the information that was entered, the two approaches that were explained above are used. We have made available a demographics update system that can be used to scan the face and lenses of a human being who is requesting for an adjustment in his or her data. This will allow the individual to make changes to their information while at home. The user will be responsible for keeping the evidence of documents up to date, and their verification will take place within a certain amount of time. It provides enough protection by using not one but two databases, namely the UIDAI database and the CIDR database. In the event that the user forgets their password, they will be able to access their account by using the enrollment id that will be sent to either their registered cellphone number or email address. This is how our conversational chatBot works, and it not only helps locals but also others in surrounding areas.

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