

An Analysis of an Intelligent Chatbot Using Natural Language Processing

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ABSTRACT: *Natural language processing (NLP) is a subject of languages, computer programming, and artificial intelligence concerned with computer-human language interactions, specifically how to train computers to process and evaluate huge volumes of natural language data. The objective is to create a computer that can "understand" the contents of papers, including the contextual subtleties of the language contained within them. The system can then extract information and insights from the papers, as well as classify and arrange the documents themselves. Chatbots are becoming more popular as computer communication applications. Some programs react intelligently as if they were humans. This sort of application is known as a Chatbot. This study provides a high-level review of cloud-based chatbot technology, as well as chatbot programming and the programming issues that exist in the modern and future chatbot eras. The development and deployment of a Chatbot system are also the focus of this investigation. The author would also examine other use cases and design strategies for Chatbots.*

KEYWORDS: *Artificial Intelligence (AI), Chatbot, Database, Natural Language Processing (NLP).*

1. INTRODUCTION

An area of Artificial Intelligence (AI) known as natural language processing (NLP) focuses on teaching computers to read, comprehend, and infer meaning from human language. To accomplish goals like automated summarization, translation, named entity identification, connection extraction, sentiment analysis, voice recognition, and subject segmentation, NLP is used by programmers to systematically organize and structure information. For computers to mimic human speech, natural language processing (NLP) analyzes a text. Real-world applications like automated text summarization, sentiment analysis, topic extraction, named entity identification, parts of speech tagging, relationship extraction, stemming, and more are made possible by this kind of human-computer interaction. Common applications of NLP include automated question answering, machine translation, and text mining [1].

Chatbots are software applications that simulate human conversation via the use of preprogrammed responses. They communicate by employing natural language. A chatbot is conversational computer software that can mimic human speech or writing. As a practical matter, chatbots are employed in conversational interfaces for tasks like customer support and data collection. Some chatbots use complex natural language processing algorithms, but the majority merely search for keywords in the input and choose a response from a textual database that contains the most relevant keywords or a pattern of words that is most comparable to the input [2].

The objective is to provide a place where students can go to have their questions answered and further their education. Natural Language Processing (a machine learning concept) is something

we want to include since it may serve as both a teacher and a brilliant companion to pupils. This fantastic tool of ours will serve as a companion for students, someone they can talk to whenever they want, ask anything they like, and engage in lively conversation with, just like we do with our friends. Companies already exist to clear up students' questions online, but the same set of questions is always available to them, leading to boredom; our breakthrough, dubbed "The Personal Tutor," will generate questions at random and evaluate the student based on the series of questions it had asked [3].

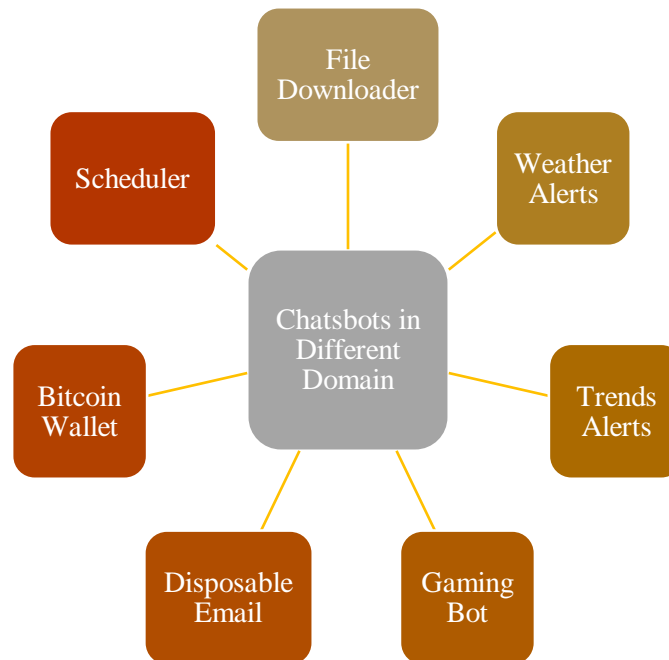


Figure 1: Displays the Chatbot There are several sorts of Chatbots that are employed in various sectors.

A chatbot is a service account on an instant messaging platform that may carry on conversations with users to do their tasks more quickly and effectively. Because there are no programs to install, a chatbot may be deployed quickly and with little user confusion across the web and mobile platforms. The distribution and management of these packages are simple. Unlike human accounts, Chatbots do not update their online or last seen statuses, nor do they start discussions or calls with other accounts. Figure.1 displays several Chatbots employed in various industries. The purpose of the user's communication is determined by the intent categorization module. The message is parsed for structured data that is then extracted using the entity recognition module. All necessary computations unique to the user's domain are being performed by the candidate response generator at this time. The response selector just evaluates each potential answer based on a set of criteria and chooses the one it believes would perform best in the given situation [4].

2. DISCUSSION

Automation, Machine Learning (ML), Natural Language Processing (NLP), Machine Vision (MV), Expert Systems (ES), and Robotics are just a few of the numerous technologies that have

recently been integrated with AI. Artificial intelligence has also been beneficial in many other areas, such as medicine, teaching, commerce, finance, manufacturing, and the law [5]. Conversational robots, or "Chatbots," are language processing systems capable of holding natural-sounding conversations with humans. To provide an output, a Chatbot may analyze the user input using the NLP tool and then correlate the input with the purpose. Generally speaking, Chatbots may be broken down into two categories:

- *Rule-Based Conversational Robots:*

They are trained to respond to certain inquiries that are preset at the outset. Users are limited to a few input possibilities while using this kind of Chatbot.

- *Artificial Intelligence Chatbots:*

Aside from being able to remember words and their contexts, they are also trained to converse with users as if they were human. Additionally, there are a lot of logic implementations unique to Chatbots. In addition, there are three broad types to choose from deep learning Chatbots, end-to-end solutions, and sequence-to-sequence modeling [6]. Furthermore, the widespread adoption of technology is altering the delivery of services across a broad range of industries. Thus, Chatbots may be used in the academic setting as a digital assistants for learners to answer their questions and facilitate their learning [7].

The method used by Bahdanau et al. has many advantages, such as its ability to handle lengthy sentences, its use of a Bidirectional Recurrent Neural Network (BiRNN) model to improve the interpretation of each phrase by allowing it to possess the descriptions of both the ability to follow and predated words and also the provision of quantitative and qualitative outcomes in the study [8]. When compared to earlier methods, the strengths of the presented model by Li . et al. include, among others, the simplicity with which replies may be made and the absence of general responses. The two virtual agents may be encouraged to engage with one another and search the whole space of replies by using policy slopes to fine-tune pre-trained networks [9].

2.1.Design of Chatbots:

A chatbot is a robot that can have a conversation. In other words, it's a computer application that acts as a conversation simulator. Communication with the end user is of utmost importance. A Chatbot has a fairly straightforward conversational structure. User questions are answered.

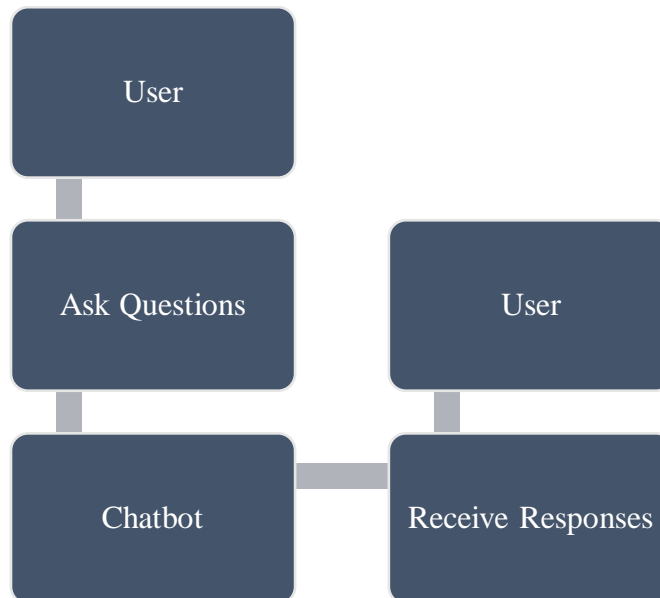


Figure 2: Displays the Figure of Use Cases for the Chatbot Design.

The structure of a chatbot may be illustrated using a diagram in the following way:

- *Selection of Operating System (OS):*

The programming language Java may be done with the help of the Eclipse software. Because it offers a fundamental working environment and also because the majority of java programs make use of it [10].

- *Creating a Chatbot:*

A program must be built to create a Chatbot. For programming, the Java programming language is employed. The Chatbot is designed to assist the user, facilitate conversation, and entertain the user [11].

- *Creating a Chat :*

The conversation is built according to a user-familiar structure, making it potentially straightforward to grasp. A dialogue window appears for initiating a chat. Java applets were used to make this dialogue box.

- *Pattern Matching:*

It's an AI method that's included in the coding of chatbots. The information is sent into a database, where it is compared to previous entries, and the appropriate answer is given based on the results [12].

2.2.Implementation Process of Chatbots:

A chatbot is an AI-powered program designed to carry on conversations with real people. The questions requested by the user are answered to aid them. Java is used for the actual implementation of the software. In particular, applets written in Java are used. The use of applets is prevalent due to the convenience with which a dialogue box for user-bot interaction may be developed.

- Begin by outlining the bot's intended function and the results you wish to see. Goals that are attainable and quantifiable should be taken into account. Alternatively, the bot might provide a service, such as facilitating the booking of reservations or providing access to product details.
- Create several use-case scenarios and dialogue models. The use of a visual for this step is something I usually suggest. Demonstrate the flow of discussion, considering potential roadblocks and means of re-engaging with the speaker. Involve your team in this process, as their input will help you identify blind spots and uncover unanticipated avenues of exploration. Don't forget to factor in any API calls that may be required for dialogue tailoring, or any data handoffs that must be enabled in a customer relationship management (CRM) system or customer database.
- Organize your information into a database. If your bot needs to do tasks like answering questions and recognizing language, this is essential. Botco.ai employs a straightforward approach to knowledge-based construction. Just as you would educate a new employee, you will need to teach your bot about your business and its goods (or anything else it will need to know to provide satisfactory answers to customers' inquiries). Information like links, frequently asked questions, product literature, industry data, presentations, and video transcripts may all be thrown into the knowledge base without worrying about how they are organized.

2.3.Methods and Tools for Basic Design:

- *Making a dialog box:*

Each package necessary to make the dialog box has been imported. Both the size of the dialogue box and the area for entering text are specified. The chat may continue on the screen by using the vertical scroll bar. Due to the restricted width of the dialogue box, the horizontal scroll bar is never utilized [13].

- *Creating a Database:*

Assembling a database makes use of string arrays in both dimensions. Messages are sent and received using array rows. The questions or requests are in the even rows, while the responses are in the odd ones. The array's columns are used to record the various categories of user queries and the possible replies a Chatbot might provide. When a question is not found in the array, the default replies are pulled from a single row.

The fact that the way a chatbot learns is unique to each user means that it may respond to and assist each user in various ways, making it an integral component of the educational process. With the

use of relevant data from other users, we may assess the user's performance and question pattern and anticipate the level at which the user is and how much more work he or she needs to do. The building of a client-side bot and the subsequent linking of that bot to the provider's application programming interface (API) are the two stages that comprise the process of creating a machine learning chatbot (Telegram, Viber, Twilio, etc.). When we are through with the work, we will be able to combine artificial intelligence with natural language processing (NLP) in chatbots.

3. CONCLUSION

A chatbot is a kind of computer program that is designed to replicate human communication. Its design incorporates both a language model and a computational algorithm to simulate the kind of information exchange that may take place online between a person and a machine employing natural language. The use of chatbots is becoming more popular, and research has shown that their use may boost the efficiency of a company's operations by improving customer satisfaction at a reduced cost. When compared to more complicated chatbots, creating a simple chatbot is not a particularly tough process. However, developers need to be aware of and take into consideration, concerns relating to reliability, scalability, and adaptability, as well as a high degree of purpose on human language. The chatbot ecosystem is evolving rather quickly, and with time, new capabilities are being added to the platform that is now in use. Recent developments in machine learning methods may make it possible to appropriately manage complicated discussion issues like payments. Chatbots are sometimes known as virtual assistants. It is a basic sort of tool capable of simulating human communication. Chatbots are going to explode and have the potential to completely dominate the future. Chatbots may give users a new and flexible method to interact.

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