

Enhancing Customer Service Using Chatbot Application Through Artificial Intelligence

¹ A. Shereef naina Mohamed, ² M.prabu, ³ S. Sai Tarun, ⁴ A Vijay.

¹Student, ²Assitant professor, ³Student, ⁴Student.

¹ Department of Computer Science and Engineering,

¹ SRM Institute of Science And Technology, Chennai, Tamilnadu,India.

Abstract : In every service based or product based company customer services is considered to be an important sector to maintain customer relationship. This sector also consumes a lot of resources from the company both labor wise and money wise. In this sector the usage of resources are high due to the demand in the sector, A good company is defined how good is their customer service, Today most of the companies lack a good customer interaction, Hence to ease this process of customer services in this paper we propose to use A.I chatbot in the customer service sector. The result will be faster and more optimal customer service solutions.

IndexTerms - Customer service, Artificial Intelligence, Chatbots, Resource Management, Service Enhancement.

I. INTRODUCTION

A chatterbot is a computer program which conducts a conversation via auditory or textual methods. Such programs are often created to convincingly simulate how a human would behave as a conversational partner, thereby passing the Turing test. Chatbots are mainly used upon dialog systems for various practical purposes including customer services or information acquisition. There are main types of chatbots available, one whose functions are based on a set of rules and other is the more advanced version which uses artificial intelligence. The former one tends to be limited and their smartness depends upon the complexity of the program. The more complex the program is, the more is the smartness of the chatbot. The one that uses artificial intelligence, understands language, and continuously gets smarter as it learns from the conversation with the people. A chatbot can also perform some basic functions exp calculations, setting-up reminders, alarms etc. A popular example is ALICE Bot (Artificial Linguistic Internet Computer Entity), that uses AIML (Artificial Intelligence Mark-Up Language) pattern matching technique. Turing Test is one of the most popular measures of intelligence of systems. This test was proposed by British mathematician Alan Turing in his paper titled "Computing Machinery and Intelligence" published in Mind. According to this test, when a panel of human beings are conversing with an unknown entity believes that entity is human while it was a computer, then the computer is said to have passed the Turing test.

II. RELATED WORKS

In this we discuss about two main chatbot systems available with their applications. We begin by discussing the ELIZA chatbot system and ALICE. **EASE OF USE**

A. ELIZA

The German computer scientist, Joseph Weizenbaum developed the program ELIZA, which seemed to be able to fool users into believing that they were conversing with a real human. It is considered as the first chatterbot. It behaves like the therapist by rephrasing the statements of user and posing them back as questions. It is a natural language processing computer program created at the MIT Artificial Intelligence Laboratory. It was created to demonstrate the superficiality of communication between man and machine. Eliza simulated conversation by using a 'pattern matching' and substitution method that gave users an illusion of understanding on the part of the program, but had no built-in framework for contextualizing events. Directives on how to interact were provided by 'scripts', written originally in MAD-Slip, which allowed ELIZA to process user inputs and engage discourse following the rules and directions of the script. The most famous script, simulated a Rogerian psychotherapist and used rules, dictated in the script, to respond with non-directional questions to user inputs. As such, ELIZA was the first chatterbot, but was also regarded as one of the first programs capable of passing the Turing Test.

ELIZA's creator, Weizenbaum regarded the program as a method to show the superficiality of communication between man and machine, but was surprised by the number of individuals attributed human-like feelings to the computer program.

The study comprised of non-financial companies listed at KSE-100 Index and 30 actively traded companies are selected on the bases of market capitalization. And 2015 is taken as base year for KSE-100 index.

B. ALICE

ALICE is an award winning open source natural language artificial intelligence chat robot which uses AIML(Artificial Intelligence Mark-Up Language) to form responses to queries. It is inspired by ELIZA open source chatbot developed by Dr. Wallace, which is based upon natural language understanding and pattern matching. It has won Loebner prize three times. It generates responses to the user query by applying some pattern matching rules. However, it is unable to pass the Turing test, even the casual user will often expose its flaws in short conversations. The architecture of chatbot consists of two clearly separated parts namely- “chatbot engine” and “language” which gives us the opportunity to implement a chatbot in a newly developed knowledge model. Language model is stored in AIML files. The primary design feature of AIML is minim and from all the chat robot languages, AIML is perhaps the simplest. As discussed, the basic unit of knowledge in AIML is category. Each category consists of an input or question, an output and an optional context. The question is called the pattern. The answer or response is the template. The types of optional context are called “that” and “topic”. The pattern matching is very simple while working with AIML as it consists only, spaces and wildcard symbols _ and *.

III. WHY ALICE IS BETTER

- ALICE used a simple pattern matching algorithm and a pattern template to represent input or output.
- The recursive techniques used in ALICE is considered as the main point of the system. It is used for simplifying thinput.
- In ALICE there is the capability to combine two answers in the case of splitting happened within Normal process.
- The most important in ALICE is its pattern matching algorithms, which is easy and depend on depth first search.
- It also has srai tags, which can be used for reducing pattern and templates.

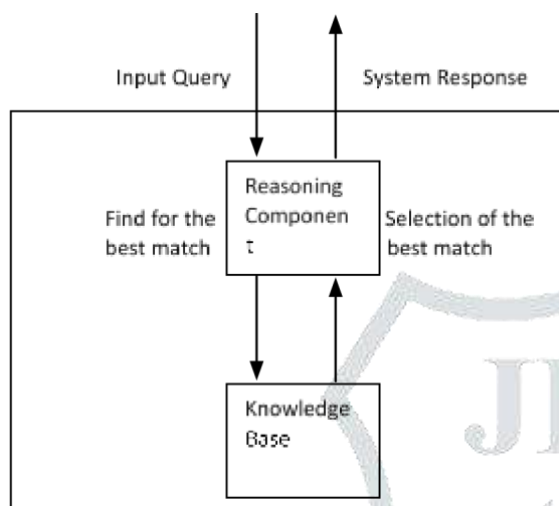
Each AIML file start with <aiml> tag that represents the AIML version being used, and it contains the AIML elements which consists of data objects called AIML objects. These object is made up of units called topics and categories. The topic is an optional top level element, has a attribute and a set of categories related to that topic. Each category contains a pattern which represents the input and a template implies FAQ bot response.

Exmp from AdmissionInfo.aiml

```
< aiml version="1.0" >
< topic name= " admission info" >
  <category>
<pattern>
What is the admission requirements for University graduate programs </pattern>
<template>
Minimum CET Score should be above cut off.
Minimum percentage requirement in 10th and 12th.
</template>
</category>
..
..
</topic>
</aiml>
```

The knowledge base will be fed as set of prior information about university related questions using AIML. In the response generation module, the pattern matching algorithm uses DFS to match an query and it continues till a match is found. The interpreter processes the template that belongs to that particular category and generates this output. System prompts the user to ask if her has another query.

IV.ARCHITECTURE



A. The research paper done by Md. Shahriare Satu¹, Tajim Md. Niamat Ullah Akhund², Mohammad Abu talks in detail about a model of e-commerce site that is interactive to its users with different services to build a reliable intelligent chatbot (assistant) which will responsible regular customer service. From this we were able to learn that Complex Interface – Chatbots are often seen to be complicated and require a lot of time to understand user's requirement.

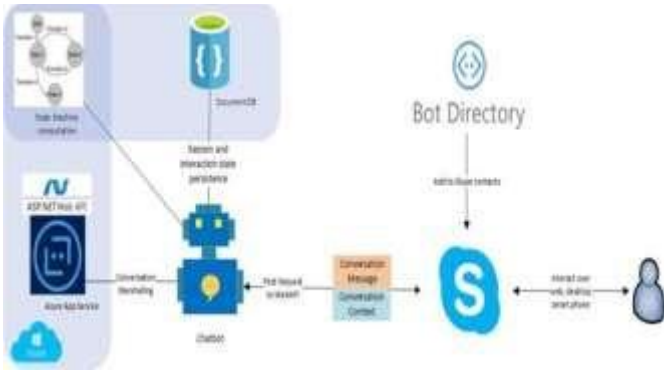
B. Luka Bradeško, Dunja Mladenčić were the first people to create a working application and from their paper we were able to understand that Due to fixed programs, chatbots can be stuck if a unsaved query is presented in front of them. Which means the chatbot isn't flexible or responsive to different queries .

C. The Research Paper done by Sameera A. Abdul-Kader

Dr. John Woods talks about Chatbot Design Techniques in Speech Conversation Systems. This paper shows us that Chatbots are installed with the motive to speed-up the response and improve customer interaction.

From all of the above research papers we have learnt that we needed a versatile Chatbot Application that can tackle and customer query without fail. Thus we decided to use Chatbots enhanced by Artificial intelligence.

The Architecture focuses on providing customer services through Chatbots systems which are powered by artificial intelligence algorithms. This entire system is achieved through cloud computing and we rely on the software Azure by Microsoft to perform this task. For simplicity reasons in this article, it is assumed that user will type in text and the bot would respond back with an appropriate message in the form of text. (So, we will not be concerned with the aspects like the ASR, speech recognition, speech to text, text to speech). The chatbot learns and understands the customer query based on the training model provided unlike normal chatbots.



This architecture can simply be explained in six

1. Customer submits their query
2. The intermediate communication software forwards this query to the chatbot. This software may vary from company to company, They may either use their private messenger or an already existing messenger like skype or whatsapp.
3. Chatbot tries to find out the user intent. This means that the chatbot tries to find out tries to find out the issue the customer has.
4. Chatbot understands the specifics of the user query. This includes extracting more information from the user to understand the query better.
5. Chatbot keeps track of the conversation and all the queries and messages submitted to narrow down on a viable solution for the customer. This can also be used to track data from the previous text sent by the customer. We need to keep track of the conversations happened thus far, to predict a appropriate response. This is why we have a dedicated CHATBOT Directory which are used to save conversations.
6. Chatbot gives appropriate response to the customer.

Once the chatbot is ready and is live interacting with customers, smart feedback can be implemented. During the conversation when customers ask an question, chatbot smartly give them a couple of answers by providing different options like “Did you mean a,b or c”. That way customers themselves matches the questions with actual possible intent and that information can be used to retrain the machine learning model, hence improving the chatbot’s accuracy. Despite this, there are limitations in place assuring that the model should not change based on new replies where users is not driving the bot in right direction. Chatbot will also not just rephrase what the people say in the chat but it is indeed taught to answer things that the Customer wants it to answer.

V.RESULTS AND DISCUSSION

While the benefits for the company that uses chatbots include reducing costs (your live chat support staff bill will be much lower), the winner will be your customers. Here’s how a chatbot enhances customer experiences.

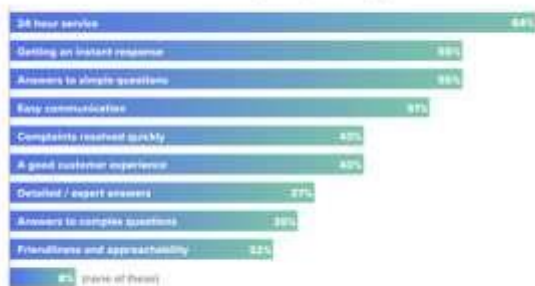
Here are the ways a chatbot can improve customer experience.

1. Seamless Live Chat

Customers can engage with a chatbot in much the same way they would in an online conversation with live customer support employees, so the learning curve for customers is to engage with chatbots is practically

Potential Benefits of Chatbots

If chatbots were available (and working effectively) for the online services that you use, which of these benefits would you expect to enjoy?

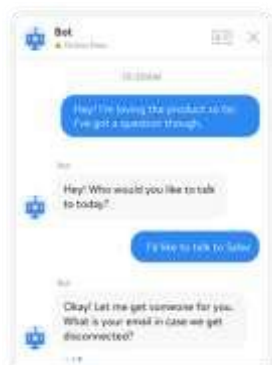


Drift Audience Inbox Proactive

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nonexistent. Since many chatbots use Artificial Intelligence, they can analyze the customer's question and deliver a response that meets the customer's needs.





These chatbots can also be seamlessly integrated into the company's website or smartphone apps, which saves the customer the time and trouble of searching the company's online resources for the answers they need. Or, customers can talk to a brand at any time without leaving their favorite messaging apps like Facebook Messenger or WhatsApp.

1. 24/7 Customer Service

The chat support staff need sleep — but a chatbot doesn't. Customers' needs often arise outside of business hours, so they need a way to seek out answers to vital questions at times when customer service staff members is unavailable. Chatbots offer customers the opportunity to get answers to their questions at any time, so they don't have to wait for an response from a voicemail or email message.

2. Endless Queries, Zero Chance of Error

Although some chatbots are designed to simulate human intelligence, other systems have been developed around the idea of letting computers do the things that they are built to do: handle dull or repetitive task, such as calculations database searches. Since the chatbots are based on artificial intelligence we don't have to worry about the customer not finding an appropriate answer.

3. Less Stress

A recent survey by chatbot developer Helpshift found that 96 percent of the 2,000+ respondents “dread contacting customer support.” The current methods of handling customer support calls, from overseas operators to automated telephone menus, have done little ease a customer's dread at reaching out to a vendor's customer service branch. The survey also found that customers would welcome the use of chatbots to satisfy specific needs. At least 80 percent of the respondents answered that they would use chatbots if they could accomplish much-needed tasks, such as resolving issues with the need to contact customer support, reduce the time needed to solve issues, reduce the time to get a customer service representative on the phone, and streamline the entire customer service process.

4. A Smoother Journey

To ease the purchasing process for the customer, the chatbot can pop up on any product page to offer additional information, video content or even a discount code. Chatbots can also help customers with the process that gathering information, such as the item they wish to purchase

VI. CONCLUSION

To summarize, we have learned about the existing systems which included ELIZA and ALICE. We found out ways in which these systems can influence the system. ELIZA helped us understand how reframing the questions will make the conversations more like human. ALICE helped us understand how we can make use of chatbots in our system, In this system, the user will be prompted to ask a query which is related to universities. The user will write his query on the platform provided. A range of university/institute related questions and their responses will be coded into the AIML and stored into the database. When the user will ask a query, this query will be matched against the various patterns present in the database and template corresponding to that pattern will be returned in form of words to the user.

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