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Cloud Based ChatBot for Bin Collection

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Abstract—The Waste management is necessary in today's world because, with the growing population, waste generated by the human is also increasing. Million Tons of waste is being produced by the people all over the world every day. If waste is not properly disposed of, it may lead to huge health issues and it may have adverse effects on our environment also. The cloud-based bin collection chatbot heralds the beginning of a new way of interacting with citizens. Machine learning is revolutionizing the structure of many organizations, as it allows us to provide service without the need to increase our employees. One of the main applications of machine learning are, of course, chatbots. This tool allows you to interact with customers and improve the overall user experience and all this in a fully automated way. Its main advantages are conversation as a platform allows 24/7-hour, natural language communication through a channel, Management of multiple clients at a same time, etc. It is an artificial intelligence algorithm that analyses the citizen's queries/messages and answer them. There is no format for the user to follow while asking any question in the Chatbot. The users can put up domain related any query. This system replies to the user with graphical user interface which implies that as if a real person is talking to the user. If the user finds his answer to be invalid, he may select the invalid answer option button which will notify the admin. Admin can view invalid through portal via login. System allows admin to delete the invalid answer or to add a specific answer of that equivalent question.

Index Terms—Bin Collection, ChatBot, Artificial Intelligence, Machine Learning, Enquiry, AIML Response

1 INTRODUCTION

Due to the rapid rise of the internet and digitization, in all over the world are initiating steps to involve IT in different sectors. This is the concept of e-services to ensure that the administration service becomes faster and easier. It also helps saves huge costs.

The major drawback of the existing system is quality of customer service they provide. In every service model, customers have to wait for a longer time to get a response from the customer service representative. Especially in case of live chat, human cannot talk to multiple customers at a same time. Even the responses may not be relevant as they copy paste pre-written answers. Also, the slow response and the long- time wait for the service agent is the biggest headache in this field of online services. As a solution to this problem, we propose a chatbot which automatically gives immediate responses to the users based on the data set of Frequently Answered Questions (FAQs), using AI (Artificial Intelligence) technology. Template based questions like greetings and general questions will be answered using AI and other service-related questions use cloud-based dataset to give responses.

The purpose of the system will simply take the query of the user and will give response according to the query. The system will match the user query with knowledge base and see for the appropriate response. The system can also reply to the general queries of the user.

2 LITERATURE REVIEW

2.1 Implementation of a Chatbot System using AI and NLP [1]

For using software applications, user interfaces that can be used includes command line, graphical user interface (GUI), menu driven, form-based, natural language, etc. The mainstream user interfaces include GUI and web-based, but occasionally the need for an alternative user interface arises. A chatbot based conversational user interface fits into this space. The chatbot is a class of bots that have existed in the chat platforms. The user can interact with them via graphical interfaces or widgets, and the trend is in this direction. They generally provide a stateful service i.e. the application saves data of each session. On a college's website, one often doesn't know where to search for some kind of information. It becomes difficult to extract information for a person who is not a student or employee there. The solution to these comes up with a college inquiry chat bot, a fast, standard and informative widget to enhance college website's user experience and provide effective information to the user. Chat bots are an intelligent system being developed using artificial intelligence (AI) and natural language processing (NLP) algorithms. It has an effective user interface and answers the queries related to examination cell, admission, academics, user attendance and grade point average, placement cell and other miscellaneous activities.

2.2An E-business Chatbot using AIML and LSA [2]

The e-business has completely changed the way of selling products. E-commerce is one of the e-business models which mostly do business over the internet. The major drawback of this field is quality of customer service they provide. In every e-business model, customers have to wait for a long time to get response from the customer service representative. Especially in case of live chat, they talk to multiple customers at a time. The responses may not be relevant as they copy paste pre-written answers. Also, the slow response and the long-time wait for the service agent is the biggest headache in this field of online services. As a solution to this problem, we propose a chatbot which automatically gives immediate responses to the users based on the data set of Frequently Answered Questions (FAQs), using Artificial Intelligence Markup Language (AIML) and Latent Semantic Analysis (LSA). Template based questions like greetings and general questions will be answered using AIML and other service-related questions use LSA to give responses.

2.3 A comparison between Alice and Elizabeth chatbot system [3]

This study examines two chatter bots' systems called ALICE and Elizabeth, which are adapted from ELIZA program. Joseph Weizenbaum implemented ELIZA in 1966 and it was originally designed to emulate a psychotherapist. This report also introduces the analysis of ALICE and Elizabeth focusing in the knowledge representation and pattern matching algorithms for each one of them. The report then illustrates the main differences between them and concludes that it will be easier to build machine learning for ALICE because of its simple pattern matching techniques than building one for Elizabeth since it depends on rules.

2.4 ALICE Chatbot: Trials and Outputs [4]

A chatbot is a conversational agent that interacts with users using natural language. Multi chatbots are available to serve in different domains. However, the knowledge base of chatbots is hand coded in its brain. This paper presents an overview of ALICE chatbot, its AIML format, and our experiments to generate different prototypes of ALICE automatically based on a corpus approach. A description of developed software which converts readable text (corpus) into AIML format is presented alongside with describing the different corpora we used. Our trials revealed the possibility of generating useful prototypes without the need for sophisticated natural language processing or complex machine learning techniques. These prototypes were used as tools to practice different languages, to visualize corpus, and to provide answers for questions.

2.5 Natural Language Processing [5]

Natural Language Processing (NLP) is the study of letting computers understand human languages [3]. Without NLP, human language sentences are just a series of meaningless symbols to computers. Computers do not recognize the words and don't understand the grammars. NLP can be regard as a "translator", who will translate human languages to computer understandable information. Traditionally, users need to follow well- defined procedures accurately, in order to interact with computers. For example, in Linux systems, all commands must be precise. A single replace of one character or even a space can have significant difference. However, the emergence of NLP is changing the way of interacting. Apple Siri and Microsoft Cortana have made it possible to give command in everyday languages and is changing the way of interacting.

Literature	Pros	Cons
Chatbots: Are they really useful?	Significance of Chatbot.	Machine like response.
Natural Language rocessing Journal for Computational Linguistics and Language	Benefits of Natural language processing in any AIML bot. Detailed overview of Natural language processing mechanism.	Technical and obsolete problem in NLP mechanism.
Towards Natural language negotiation for open learner model	Use of technology to enhance the response.	Limited Information Problems inintegration.
Intelligent Tutorial System. Whitepaper for Army's Science of learning workshop	Detailed description of Python and AIML.	Only for Chatbot based on AIML.
AIChatbot with AIML	Effective way of installation.	Slow of loading.

3 PROPOSED SYSTEM

This System is an Android application which answers the queries asked by the user. The System uses Microsoft LUIS Technology to understand user's query and give the appropriate response suitable to it. In the case if the response found invalid, user can choose it as invalid. Administrator can verify these invalid answers from the backend. Administrator can retrain the model or modify the answer based on user's response. The user can ask any domain related query through this mobile app. Users do not need to call to customer care or go to the office for simple frequently asked queries. The LUIS model understands the user query and identifies the intent of it. Based on identified intent, fetch the answer from the db. With the assistance of this AI model, system replies to the user with graphical user interface which implies that as if a real person is talking to the

user. Users do not need to follow any fixed format while asking the questions.

The proposed system will simply take the query of the user and gives the response according to it. The system understands the intent of user's query, matches the intent with knowledge base and give the appropriate response. The algorithm of the complete system can be understood by the following flowchart.

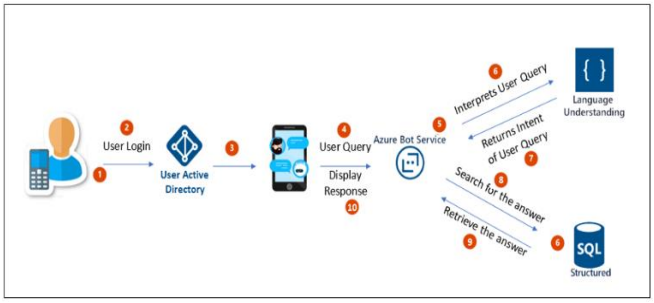


Fig -3.1: Process Flow of Proposed System

1. User starts the Chatbot application to get the information regarding bin collection.
2. Validate the user's identity by User Active Directory.
3. Navigate to user's chat screen to communicate with bot.
4. User starts conversation with bot.
   - User can ask the bot what type of queries are supported.
   - The user can ask valid queries regarding bin collection domain.
5. The bot submits the query to Azure Bot Service (LUIS model).
6. LUIS interprets user goals (intents) and distils valuable information from sentences (entities), for a high quality, nuanced language model.
7. Based on the training, LUIS returns the relevant intent and entities from the user query.
8. Search for the answer into the database based on intent and entities.
9. Returns the respective answers from DB.
10. Display the answer on user's screen.

4 OBJECTIVES OF THE SYSTEM

- Reduce management effort.
- Provide necessary information to users quickly.
- Help users to get rid of a traditional way of communication through phone calls and emails.
- 24x7 availability.
- Decrease dedicated workload and time for responses.
- Manage multiple users at a same time.
- Efficient and quick response.

5 IMPLEMENTATION

5.1 LUIS MODEL

Language Understanding (LUIS) is a cloud-based API service that applies custom machine-learning intelligence to a user's conversational, natural language text to predict overall meaning, and pull out relevant, detailed information.

A client application for LUIS is any conversational application that communicates with a user in natural language to complete a task. Examples of client applications include social media apps, chat bots, and speech-enabled desktop applications.

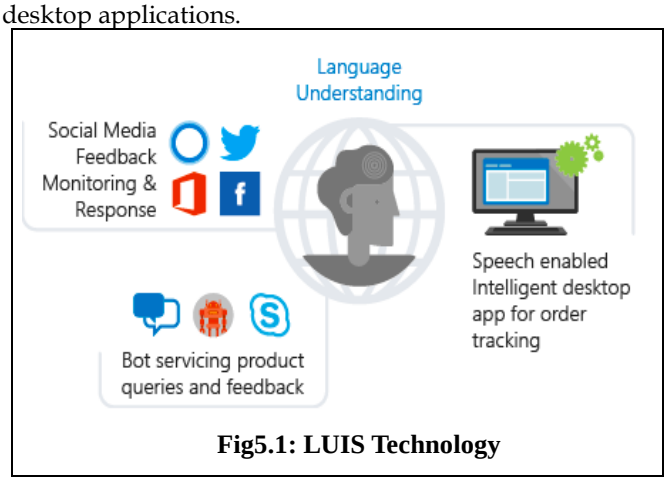
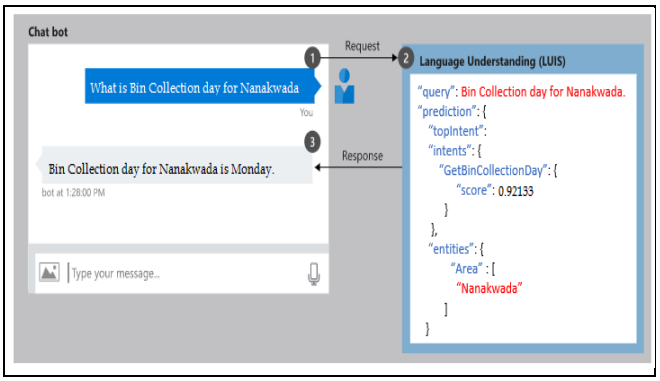


Fig5.1: LUIS Technology

Once the LUIS app is published, a client application sends utterances (text) to the LUIS natural language processing endpoint API and receives the results as JSON responses. A common client application for LUIS is a chat bot.



The LUIS app provides intelligence so the client application can make smart choices. LUIS does not provide those choices. Below table shows the steps which are performed while any request processed through LUIS model.

Step	Action
1	The client application sends the user utterance (text in their own words), "What is Bin Collection Day for Nanakwada?" to the LUIS endpoint as an HTTP request.
2	LUIS enables you to craft your custom language models to add intelligence to your application. Machine learned language models take the user's unstructured input text and returns a JSON-formatted response, with a top intent, HRContact. The minimum JSON endpoint response contains the query utterance, and the top scoring intent. It can also extract data such as the Contact Type entity.
3	The client application uses the JSON response to make decisions about how to fulfill the user's requests. These decisions can include knowledge base decision tree in the application code and calls to other services.

5.2 DEVELOPMENT LIFECYCLE

A Language Understanding (LUIS) app learns and performs most efficiently with iteration. Here's a typical iteration cycle:

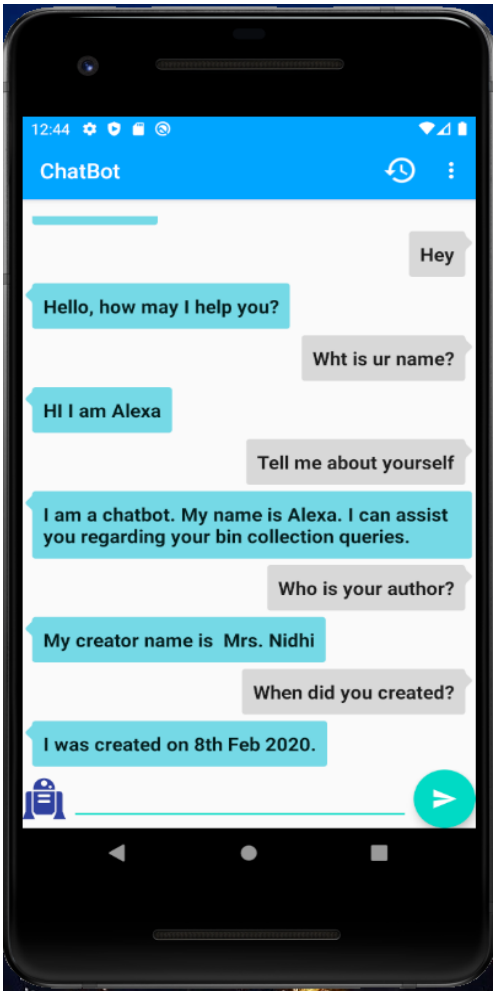
Fig 5.2 LUIS Model Development Lifecycle

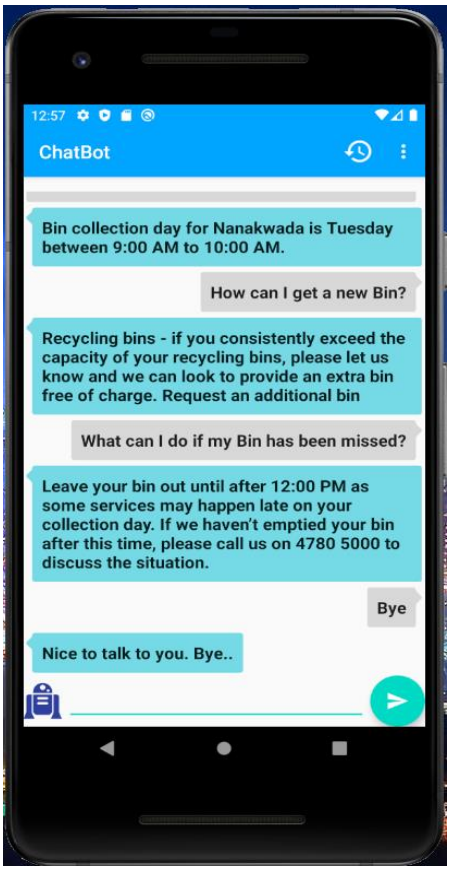
- Create new version
- Edit the LUIS app schema. This includes:
  - Intents with example utterances
  - Entities
  - Features
  - Train, test, and publish
- Test at the prediction endpoint for active learning
  Gather data from endpoint queries

6 DATA AND RESULTS

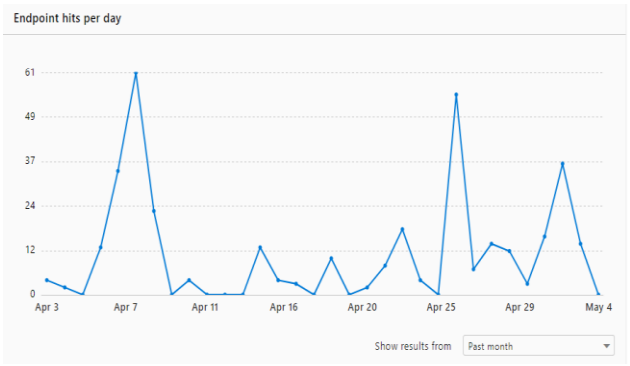
We have created an application with the help of Microsoft cognitive service which is open source and uses artificialintelligence to interact with user and provide the desiredinformation. This LUIS model is an open source SDK that enable developers to model and build sophisticated conversation using their favorite programming language.
API is integrated with Microsoft Azure cloud used to deliver the query of the userto the server. We have used LUIS model as a pre-trainedartificial intelligence module so that we could use it's pretrainedneural networks to answer the user's query withefficiency and accuracy. We also used PhpMyAdmin database to store the intent answers. Thisapplication would be available on theplaystore, for this purpose we have created an android app to provide UI to the user. This app isbuilt using Android Studio 3.7 with Python and database part isdone with help of PhpMyAdmin. We published a LUIS model, once initial level training finished, to use it in production. LUIS model calls through API using an android app. Even after published the model, we can also retrain it or modify it based on our requirements.

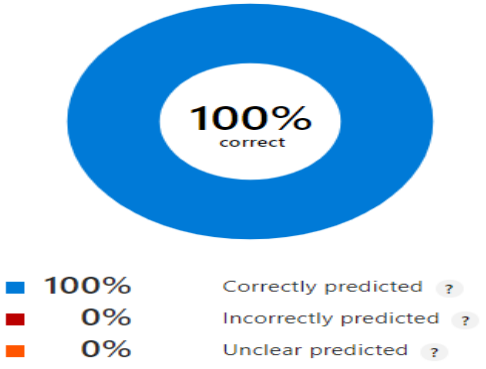
6.1 Test Cases





6.2Training Evaluation





7 CONCLUSION

The main objective of this project is for smart citizen services. To develop an AI model that will be used to identify answers related to user submitted queries. Need to develop a cloud-based database where related data will be stored. We can access this database from anywhere and anytime. Also need to develop a web interface to integrate this algorithm. The web interface developed will have two parts, one for simple users and one for the administrator.

Current version of chatbot can understand the query in textual, also answer for queries in the textual form, but we can implement it for textual as well as in voice form of user input and output.

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