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Paper Authors

DR. P.V.RAMARAJU, G. NAGA RAJU, R.S. ANIL KUMAR, CH.VEERABABU, V. RISHI TEJA AND B.SITARAM

Dept of ECE, Sri Sai Institute of Engineering and technology, Bhimavaram , AP, India.



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Implementation of Chatbot using Artificial Intelligence and Natural Language Processing

Dr. P.V.Ramaraju¹, G. Naga Raju², R.S. Anil kumar³, Ch.Veerababu⁴, V. Rishi Teja⁵ and B.Sitaram⁶

¹Head of Department, ²Asst. Professor, Department of Electronics and Communication Engineering, S.R.K.R Engineering College, Bhimavaram, Andhra Pradesh, INDIA

^{3,4,5,6} B. Tech. Students, Department of Electronics and Communication Engineering, S.R.K.R Engineering College, Bhimavaram, Andhra Pradesh, INDIA

¹anilrayaprolu007@gmail.com.

ABSTRACT: The Artificial intelligence Chatbot is predominant these days and getting speed as an application of computer communication. Sometimes chatbot reacts astutely like the human. The main aim of chatbot is to make an interaction between both human and machine. The machine has been installed learning to perceive the sentences and settling on a choice itself as the reaction to answer a request. The response depends upon the matching the input sentence from the user. The knowledge of Chatbot is put away in the database. It uses Amazon AWS and AVS services as a database. The sentences that we request are processed from the database and provide corresponding output response. The database has been employed as knowledge storage. The interface is standalone which has been built using the programming language such as python and node.js. It also uses natural language processing (NLP).

INTRODUCTION

Chatbots are computer programs that interact with users using natural languages. The need of conversational agents has turned out to be intense with the widespread use of personal machines with the wish to communicate. The desire of their developers to provide natural language interfaces has been increasing. With the improvement of data-mining and machine-learning technique in present days, there is more demand for the chatbots.

The creation and analysis of software and machines are called Artificial Intelligence, or simply AI. It can be implemented in each and every work in today's life. Intelligent machines can do a huge number of tasks – from labour work to complex operations. Present trends in this field are human brain simulation, natural-language processing and neural networking etc. One of the examples of an AI system is a “chatbot”. A chatbot is a computer program which responds like an intelligent entity. The



conversation may be through text or voice. Any chatbot program understands one or more human languages by Natural Language Processing. Due to this, the system interprets human language input using information fed to it. A chatbot can also perform some useful functions like calculations, setting-up reminders or alarms etc. one of the most popular example of chatbot is the ALICE Bot (Artificial Linguistic Internet Computer Entity), which utilizes AIML pattern matching techniques.

In present days computers play an important role in our society. Computers give us information; they can entertain us and help us in lots of ways. At present, there is a vast development of the information technology and communication been complex in implementing of artificially intelligent systems.

AI Chatbot recognizes the user input as well as by using matching process; it accesses the information to provide a predefined response. For example, if the user is providing the chatbot with a sentence like "Who developed you?" The chatbot is most likely to response something like "Developed by the students of Electronics and Communication Engineering". If the requested sentence is not matched with the database provided it simply give the response like "I can't get that one" or "Sorry I don't know that". The application of an AIChatbot can be seen in various fields at present days.

This chatbot uses natural language processing (NLP) for interaction with the human. It mainly uses the database which is provided by the Amazon. They are Amazon web services and Amazon AVS. In Amazon web service we use lambda function for programming the results. These two services act as a cloud for data to be stored and to provide the responses according to the request processed by the user.

Amazon AVS is used to provide the intents, entities and sample utterances and custom slots (if any required). In the above two sections, the programming of the database will take place by using either python or node.js which is nothing but JavaScript.

In order to respond to the human, the wake word is very essential to the AI chatbot. Without the wake word, the chatbot remains in idle state and there is no response from chatbot. This wake word is used in order to avoid the false triggering the bot. Here we named the chatbot name as *snow boy* which is the universal model.

II. METHODOLOGY

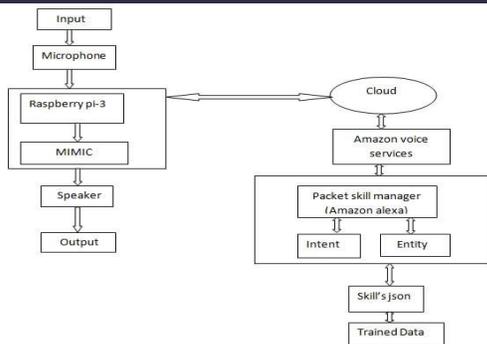


Figure 1: Idea approach diagram

The following are the key aspects of the designing and working of the AI chatbot and the figure 1 represents the idea approach diagram the way in which the communication will take place with the database and provides output.

Input:

The input is given as voice commands this is in the form of audio signal. The input voice command is given along with the wake word this wake word command is very essential to make the chatbot into an active state. This audio signal is passed through the microphone for further processing.

Microphone:

The audio signal that is nothing but voice signal is recognized by the microphone. Here we use 4-Array noise cancellation microphone in order to reduce the effects caused by the environment.

Raspberry pi-3:

It acts as an interface between the cloud and the user. Whenever a wake command is

activated by the user and request the service it passes through it. The Raspberry pi stores the voice of the user until the sentence that the user request is completed after that it passed through the cloud for further processing. The data that is requested by the user is passed to Amazon Avs and amazon avs for pattern matching. If the requested data is found in the database there is a response to the user by giving the correct acknowledgment to the user which he requested.

Selection of operating system

Here NOOBS is used as the operating system in raspberry pi which is Linux operating system.

Amazon AWS services

The sentences that are requested by the user is processed here. Amazon AWS consists of lambda function where the user has to write the programs using java and python. It consists of different library files to process the request. For example, if the user requests the chatbot for the time by using the wake word command and after that the sentence ("Snowboy, what is the time now?"). This command firstly passes to AVS function for performing match processing. If the pattern is matched the AVS calls the corresponding function that is present in the AWS and provides the response.

Amazon AVS services



In the Amazon AVS, Intents, Entities, Sample utterances, Slot types are different sections for building the skills.

Intents:

A intent represents the purpose of a user's input. You define a intent for each type of user request you want your application to support. There are different types of intents that are already given as inbuilt intents in Amazon AVS some of them are given below. These intents help in performing the action such as start, stop pause etc.

Examples:

AMAZON.CancelIntent, AMAZON.HelpIntent, AMAZON.LoopOffIntent, AMAZON.NextIntent, AMAZON.PauseIntent, AMAZON.PreviousIntent, AMAZON.StopIntent

An intent is the user's intention. For example, if a user types "show me today's business news", the user's intent is to retrieve a list of business headlines. Intents are given a name, often a verb and a noun, such as "show News".

Entities:

An entity represents a term or object in the user's input that provides clarification or specific context for a particular intent. If intents represent verbs (something a user wants to do), entities represent nouns (such as the object of, or

the context for, an action). Entities make it possible for a single intent to represent multiple specific actions. An entity defines a class of objects, with specific values representing possible objects in that class.

An *entity* modifies intent. For example, if a user types "show me today's business news", the entities are "today's" and "business". Entities are given a name, such as "date Time" and "news Type". Entities are sometimes referred to as *slots*.

Sample utterances:

Utterance: Anything the user says. For example, if a user types "show me today's business news", the entire sentence is the utterance. These utterances are the sentences that are requested by the user if the same utterance is present in the AVS function there is the response from AVS. The match processing will take place in the AVS by comparing the requested sentence and sample utterance if there is a match found then further processing of the request will take place else there is no response from the function and it returns a response that there is no sentence found. The response is "I don't know that one".

Under these sample utterances section, various forms of the same sentences can be written as per the user point of view.

Example: To ask for the time the user might say

Snowboy, what is the time, Snowboy, what's the time now, Snowboy, Tell me the time, Snowboy, What is the time right now.

In this way, the user might request the sentences. These sentences are nothing but the utterances. We should provide all the utterances in the utterances section already provided in the AVS for processing the requests.

Slot types

There are some built-in slot types that are already available to the user these are called as built-in slot types. These built-in slot types are provided itself by the Amazon that is repeatedly used by the user. For example date, time, number etc. some of the built-in slot types are shown below

AMAZON.DATE, AMAZON.TIME,

AMAZON.DURATION, AMAZON.NUMBER

The user can also create own custom slots types as per the requirement. For example, if the user writes a program for horoscopes there are 12 signs are present these signs should be provided in the custom slot type section.

Natural language processing (NLP)

This natural language processing plays an important role in artificial intelligence chatbot. NLP examines an utterance and extracts the intent and entities. NLP involves breaking down sentences and other parts of the language,

into components. It processes the semantics of the content to identify things like the entities and intents of the user.

Output

The sentence that is requested by the user get processed and acknowledgements are provided in the form of response. This response is provided by the loudspeaker this is in the form of audio signal. In this way, the chatbot interacts with the human. By writing the more number of skills the chatbot will be more and more intelligent. This will completely depend upon the developer who is writing skills to the bot. For programming these skills it uses JSON.

III. RESULTS

We developed the AI chatbot using a microphone, Linux operating system raspberrypi3, speaker and Amazon voice services and Amazon web services and observed the outputs for the various input commands. The output that we obtained is in the form of the audio signal so that the output is shown by using the block diagram.

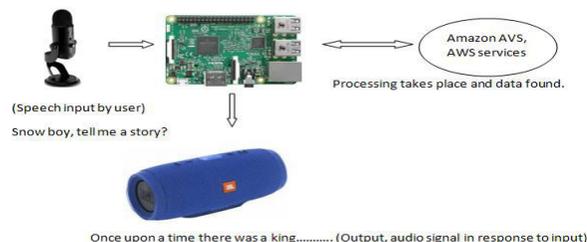


Figure 2

The figure 2 and figure 3 represents the positive acknowledgement obtained from the cloud. The data is matched with the utterances present in the database. Hence the response is that the time is 9.15am and for the figure two the response is “once upon a time there was a king” and complete story is provided as the output.

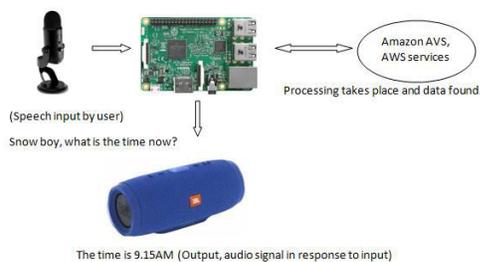


Figure 3

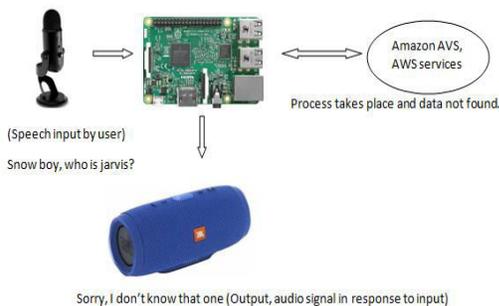


Figure 4

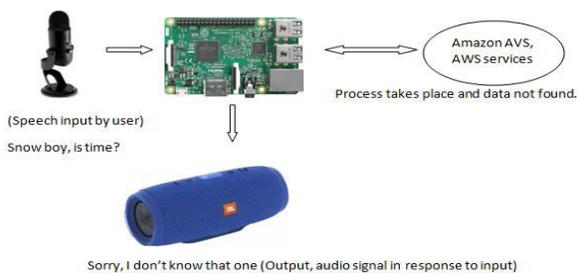


Figure 5

The figure4 and figure5 represents the negative acknowledgement obtained from the cloud. The

data is not matched with the utterances present in the cloud. Hence the response is that I don't know that one.

In this way communication between the user and the chatbot takes place and provide the outputs in response to the inquiry initiated by the user.

IV. CONCLUSIONS

A chatbot is one of the easiest ways to transport data from the user to cloud and to collect information; users can easily request their query in natural language and retrieve information according to that inquiry. In this paper, information about the design, implementation of the AI chatbot has been presented. It can be said that the development and improvement of AI chatbot design grow at an unpredictable rate due to a variety of methods and approaches used to design a chatbot. A Chatbot is an incredible device for speedy association with the user. They help us by providing entertainment, saving time and answering the questions that are hard to find. The Chatbot must be simple and conversational. The chatbot can also be used for the purpose of home security, for storytelling for kinder garden children, emergency cases, use as personal assistance. Control all your connected devices with your voice. Ask about the weather, news, information, sports scores, and more. Tell her to play music, schedule meetings, set alarms,

get recipes, and more. Far-field voice recognition that hears you from across the room.

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ABOUT AUTHORS:

Dr. P. V. Rama Raju



Presently working as a Professor and HOD of Department of Electronics and Communication Engineering,

S.R.K.R. Engineering College, AP, India.

His research interests include Biomedical-Signal Processing, Signal Processing, Image Processing, VLSI Design, Antennas and Microwave Anechoic Chambers Design. He is author of several research studies published in national and international journals and conference proceedings.



Ch. Veerababu

Presently pursuing Bachelor of engineering degree in Electronics & Communication engineering at S.R.K.R. Engineering College,



V. Rishi teja

Presently pursuing Bachelor of Engineering degree in Electronics & Communication engineering at S.R.K.R. Engineering College, AP, India



G. Naga Raju

Presently working as assistant professor in Dept. of ECE, S.R.K.R. Engineering College, Bhimavaram, AP, India. He received B.Tech degree from S.R.K.R Engineering College, Bhimavaram in 2012, and M.Tech degree in Computer electronics specialization from Govt. College of Engg., Pune University in 2004. His current research interests include Image processing, digital security systems, Signal processing, Biomedical Signal processing, and VLSI Design.



B. Sitaram

Presently pursuing Bachelor of Engineering degree in Electronics & Communication engineering at S.R.K.R. Engineering College, AP, India.

R. S. Anil Kumar



Presently pursuing Bachelor of Engineering degree in Electronics & Communication engineering at S.R.K.R Engineering College, A..P. India.