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DEPARTMENT OF INFORMATION TECHNOLOGY

BONAFIDE CERTIFICATE

This is to certify that this Project Report is the bonafide work of **Dhaneshwar V(39120022)** who carried out the Project Phase-1 entitled **"VOICE-BOT FOR SMART AGRICULTURE"** under my supervision from June 2022 to November 2022.

8/11/22

Internal Guide

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Submitted for Viva voce Examination held on 8/11/2022

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DECLARATION

I, **Dhaneshwar V(Reg.No- 39120022)** hereby declare that the Project Phase-1 Report entitled **"VOICE-BOT FOR SMART AGRICULUTRE"** done by me under the guidance of **Dr. A. Sivasangari, M.E.,Ph.D** is submitted in partial fulfillment of the requirements for the award of Bachelor of Engineering degree in **Information Technology**.

DATE: 08/11/2022

PLACE:Chennai

SIGNATURE OF THE CANDIDATE

VOICE-BOT FOR SMART AGRICULTURE

Submitted in partial fulfillment of the
requirements for the award of
Bachelor of Engineering degree in Information technology

By

JAGADEES M (Reg.No – 39120042)
DHANESHWAR V (Reg.No – 39120022)

DEPARTMENT OF INFORMATION TECHNOLOGY

SCHOOL OF COMPUTING

SATHYABAMA

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MAY - 2023

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DEPARTMENT OF INFORMATION TECHNOLOGY

BONAFIDE CERTIFICATE

This is to certify that this Project Report is the bonafide work of **Jagdees M (Reg.No 39120022)** who carried out the Project Phase-2 entitled **"VOICE-BOT FOR SMART AGRICULTURE"** under my supervision from January 2023 to May 2023.

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I, **JAGADEES M (Reg.No – 39120042)** hereby declare that the Project Phase-2 Report entitled **"VOICE-BOT FOR SMART AGRICULUTRE"** done by me under the guidance of **Dr. A. Sivasangari, M.E.,Ph.D** is submitted in partial fulfillment of the requirements for the award of Bachelor of Engineering degree in **Information Technology**.

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ABSTRACT

Farmers are facing lot of issues even in the era of Digital disruptions. Conversational AI Voice bots powered by natural language processing have the potential to always assist farmers regarding all the intricacies involved in farming which positively impact the economy. All Businesses are adopting latest technology solutions to reduce costs significantly, to increase revenues and to automate time-consuming manual tasks and focus on growth. In this paper we are applying a similar approach for agriculture on which more than 70% of the rural Indian population is dependent. Conversational AI internally uses Natural Language Processing which is a subdivision of Artificial Intelligence (AI) that powers computers to understand, comprehend and process human languages. In addition, Farmers are also affected by climate change, economic issues, environmental issues that affect whether like Soil quality, water quality, climate, and terrain etc. Despite all these issues farmer community is striving hard to supply food to the growing world population. To provide timely help to all the farmers on the various aspects related to farming and market conditions, we have developed FarmersFriend – A Conversational AI Voice Bot for smart agriculture. This bot can also get integrated into Smart Agriculture System based on IoT (SASI) that has been devised by us already.To respond the farmer's queries in the multi-language, we have created an agricultural multi linguistic voice bot using Google translator,pysttsx3 and Google search engines. Also, we have the suggestion bot to give a versatile suggestion to the answer of farmer's query related to weather, crop, fertilizer, soil etc. Using this mobile application, farmers will progress towards better farming practices and increase the agricultural production.

Keywords- Suggestion Bot, Voice Bot, Agriculture, fertilizer choice, crops, weather.

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CHAPTER 1

INTRODUCTION

Farming involves cultivation in the land, this is one of the factors that determines the development of a country. Many developed countries are adopting modern techniques in farming during cultivation, advanced techniques to control weeds and pests, fertilizers because of the advancements in the technology and increased innovation & research. However, Farmers in our country are a step behind in adopting to latest technology. Spreading awareness of all the technological advancements is very essential.

The stream Conversational AI is related to the creation of speech-based assistants, messaging apps and chat bots to improve communication and to create tailored customer experience by systematizing the communication data flow. It is a collection of technologies that work together to enable computers to to understand and simulate conversations. A chat bot application is a computer program that is intended to simulate human like conversation via input text and audio messages. Operational costs can be reduced only when the related tasks can be performed most efficiently with less time and with little or no manual intervention. Using this automation techniques, the organizations can automate business in many areas like health, travel, news, weather, entertainment and e-commerce. Google and Facebook are focusing on developing Bots which helps organization to automate tasks. SAP introduced a Bot frame called Recast.

AI which helps organizations to develop the Bots for their organizational tasks. Considering the current situation everywhere, it's very difficult for farmers to reach agriculture universities or agriculture offices to get information related to farming as there are many risk factors come along due to COVID pandemic. We are considering agriculture as a domain as there is an IoT system we have set up which will generate lot of data with the help of many sensors used in the system. This data from the database can be explored, in the process, retrieving exact data

in conversational style

Since the data that is generated isof high volume, retrieving appropriate answer for each question is tedious. Many answers will look similar this makes the process even complex.The system is interactive and allows farmers to ask questions, seek guidance, and receive immediate feedback. This helps farmers make informed decisions and enhances their ability to manage their farms efficiently.Our software incorporates the latest technological advancements in agriculture and provides comprehensive information.

On various aspects of farming, including crop selection, soil management, pest control, and irrigation techniques. With this software, farmers can access information anytime, anywhere, and from any device, making it easier for them to manage their farms effectively.In summary, our system offers an interactive and user-friendly approach to agricultural education. It provides farmers with easy access to relevant information, allowing them to improve their farming practices and increase their crop yields. or other users may successfully engage to obtain the appropriate replies in fewer steps. Several efforts were launched with these new improvements in mind, and the Kisan Call Center (KCC) was one such programme launched by the government of India.

The government made data from interactions with farmers publicly available for study and analysis, dubbed the KCC dataset. The data collects many details that characterise the farmer's inquiry, including the contents of the question, the resolution supplied, the state, district, and the time when the query was raised / answered.One potential solution to the KCC's current issues with network problems, connection difficulties, and a shortage of skilled customer service representatives is to develop a chat-bot that utilizes natural language processing (NLP) to analyze a massive dataset of past inquiries. By training the chat-bot on this dataset, it can detect semantic similarities between past inquiries and provide resolutions to current inquiries. To ensure widespread accessibility, we propose building the chat-bot on WhatsApp, which is a popular communication platform. We will use Dialogflow as the tool to construct the voice-bot and implement the NLP model for effective customer service.The solution will be built on an existing means of

communication - an app that is popular among the public - and will react to inquiries using an NLP pertained model. We will use Dialogflow as the tool for constructing the Voice-bot to assist us do this.

To obtain exact response to the farmers queries, we are leveraging Natural Language Processing (NLP) in the form of conversational AI.Our study will help farmers retrieve many details regarding their crops like moisture level, humidity, temperature, raw materials, soil condition and fertilizers.Noting techniques for these types of questions should focus on Natural Language Processing (NLP), Natural Language Understanding (NLU), image arrangement, voice recognition, text-to-voice, voice-to-message, and so on.

The use of a voice interface in conjunction with a replying process is an intriguing aspect of this technique. There aren't many voice-based noting strategies that are good models for voice-based replying strategy, such as Google Assistant, Google's Alexa, Apple's Siri, Microsoft's Cortana, and IBM's Watson. This machine, dubbed "Agriculture Bot," is a chat bot, or virtual assistant, that allows users to get answers to their questions in a user-friendly manner.

After receiving the user's feedback, the textual query will go through Preprocessing steps to determine which category of query it belongs to and provide the appropriate answer.If the question is based on prediction, the consumer can see future forecasts for the requested agricultural products depicted in a graphical format. Using an interactive querying technique, the system will teach new generation farmers about agriculture knowledge. Speech synthesis aids people with learning disabilities and literacy issues in effectively using the device. It also aids farmers in planning their future activities by forecasting the cost of agricultural products in the future.

CHAPTER 2

LITERATURE SURVEY

In present a voice based intelligent web chat bot which involves the designing and implementation of an intelligent text-based bot based on natural language processing. They showcase the technology that can be used to build the bot. They use a service framework, using which the external web services can be consumed and the same set up is used to communicate with all the external clients. This extensibility feature enhances the lifetime of the bot as it uses the needed services in the form of API. The bot that is present here is stateful which maintains the state of the previous commands. In this bot also there is use of web services and the bot works like an artificial person. This bot can run in phones, computers and it can be easily accessed from internet. The conversations that are built using NLP are extremely intelligent and useful. In, A college enquiry bot is presented by the authors. This bot is having text as well text to speech response. This Bot is also a stateful boot which maintains the previous state between subsequent interactions. This bot has a integration to some of the artificial intelligence algorithms which helps users to get appropriate responses. There is also a mechanism to handle or monitor the invalid responses in this bot. Inand there is smart responding bot which is depends on optical character recognition and over generating transformation logic and ranking mechanism. Here there is mechanism to convert documents into knowledge. This Knowledge enables the chat bot answer the questions posed by the users. The electronic documents submitted help the bot simulate the responses of the bot. This bot can take the input documents in varied formats like PDF and digital photos.

The text from these documents is extracted using OCR technique and later it generates responses using transformation and ranking mechanism. The bot conducts a thorough assessment of existing research on voice in human-computer interaction, including subjects such as speech detection, natural language processing, and voice user interfaces. The authors highlight the limitations and constraints of voice-based engagement and provide solutions to overcome them.The research examines the psychological and social aspects that impact human responses to voice-based interaction. The authors address the significance of voice signals including pitch, tone, and inflection in transmitting meaning and emotion during human-computer interaction.The study's

findings suggest that voice-based engagement might boost a user's sense of social presence and lead to a more favourable user experience. The authors argue that voice has the potential to transform the way we communicate. The article examines the creation of a chat-bot that mimics a historically significant character with a focus on design and development. The authors conduct an overview of current chat-bots and their applications, including how they reproduce prominent personalities and important historical figures. They also study the application of natural language processing techniques and user modelling in designing chat-bots.

The authors emphasise the value of context in conversation simulation and discuss techniques for creating a chat-bot that can accurately replicate an historical figure. In summary, the article offers important guidance and information for creating chat-bots that can captivate users with historical dialogues. The Eurocon 2009 paper, "An intelligent web-based voice chat bot," presents the creation of a sophisticated chatbot designed to engage in conversation through natural language processing technology and speech recognition. Able to perform varied tasks, from providing information to simple transactions, the bot uses synthesized speech as its output. In contrast, the recent "International Journal of Research in Engineering, Science, and Management" article by P. Kaviya et al. examines the use of chatbot technology within customer services across different sectors, including retail, healthcare, and banking. Challenges of developing chatbots include creating platforms that can understand and respond to natural language input accurately.

The literature reveals the immense capacity these chatbots possess in streamlining communications between entities and users. However, challenges remain, such as ensuring natural-language competency for the systematic management of complex tasks. An extensive review of the advancements made in natural language processing (NLP) research, highlighting the most important breakthroughs in the field. The authors emphasize the importance of NLP in various areas, including education, healthcare, social media, and business.The study covers a wide range of NLP topics, including sentiment analysis, machine translation, question-answering systems, and dialogue systems. The authors provide an in-depth analysis of each topic, discussing the challenges and opportunities associated with them.

The paper also discusses the evolution of NLP research over time, from rule-based

systems to statistical and machine learning-based approaches. The authors highlight the latest trends in NLP research, such as deep learning and neural networks, and their potential to revolutionize the field.In conclusion, the paper provides a comprehensive overview of the state-of-the-art in NLP research, highlighting the most important breakthroughs in the field. The study's findings have practical implications for the development of NLP applications in various domains, emphasizing the potential of NLP to transform the way we interact with technology and each other. The report conducts a thorough evaluation of available flood forecasting models and methodologies, including classic statistical models and machine learning approaches. The authors point out the shortcomings of these approaches while emphasising the potential benefits of employing LSTM neural networks.

The article provides a unique use of an LSTM neural network for flood forecasting, taking use of the network's capacity to handle time-series data and long-term dependencies. The authors describe the LSTM network design as well as the data pretreatment processes in depth.The study's findings show that the LSTM neural network surpasses standard statistical models in terms of flood predicting accuracy. The authors highlight the potential of LSTM neural networks as a viable tool for flood prediction and catastrophe response. It thorough assessment of existing research on voice in human-computer interaction, including subjects such as speech detection, natural language processing, and voice user interfaces.

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2.1 INFERENCES FROM LITREATURE SURVEY

Crop / Monitoring site It is the farm - An extremely large field or land reservedfor agriculture that specialists in produces, usually based on a plantation house. Cotton, coffee, tea, cocoa, sugar cane, opium, sisal, oil seeds, oil palms, fruits, rubber trees, and forest trees are among the crops grown. It is from here using the sensors the data about the whole agriculture ecosystem is captured using SASI.

SASI IOT System SASI it is a Smart Agriculture System based on IoT is a Smart Agriculture solution which is developed using sensors to carefully monitor the crop field. In the experimental setup multiple sensors are used to monitor soil minerals, light, humidity, temperature, soil moisture, etc. It makes the farmer community or agriculture community reduce the complexity of many events that are achieved manually.

Storage is a cloud database is a database that normally exists on a network for cloud computing, and access to the database is given as a service. Scalability and high database availability are taken care of by database services. The underlying software-stack is made accessible to the user by database services. The data captured by the sensors in SASI is fed to a cloud-based database. The data is later consumed by the Farmers Friend Bot in real time via API or REST / SOAP based services.

Farmers Friend It is the Conversational AI voice Bot that is being developed to share the details to the farmer in a very seamless, flexible and conversational manner. The bot not only gives the details about the crop / field but also what is advised for the crop based on the season or environmental conditions. This Bot will be available to the farmer community through many channels like telegram, messenger, Microsoft same, Facebook and telegram etc. which can be accessed from their handheld devices.

CHAPTER 3

REQUIREMENT ANALYSIS

3.1 FEASIBILITY STUDIES/RISK ANALYSIS OF THE PROJECT

Query PreProcessing is the user queries are tokenism into words using the bag of words technique, and then the stop words (like is, the) are removed using the NLTK Corpus. The stemming process is performed to convert the words to their root words. For example cultivation, cultivated, cultivate all stem into cultivate which is the root word

Chat Bot Development and Training is the datasets file containing hundreds of agricultural queries and their corresponding responses are imported. The datasets is then processed and converted into vectored format. The Bot is trained, by building a neural network and the error values are optimized. The trained data is saved in a data structure for future usage.

3.1.1 Precise and Localized Answers

Specificity and localization were identified as keys to the information needs of farmers. With the help of agri-experts, the researchers carefully tailored the system responses to local conditions. Participants appreciated such information contents:

Trust is another key design requirement. In general, participants trusted the responses Stories — Stories define the sample interaction between the user and chatbot in terms of intent and action taken by the bot. Like in the example above bot got the intent of booking the table and entities like place and time but still, there is an entity missing — no of people and that would make the next action from the bot.

Actions — Actions are basically the operations performed by the bot either asking for some more details to get all the entities or integrating with some APIs or querying the database to get/save some information.

This model is based on the LSTM model which is the improvised version of Recurrent Neural Networks , which is of more convenient way to make the conversation flow

provided Six participants even asked the facilitator to write down the recommended medicines, seeds variety, and/or fertilizer with their quantities for them to refer later.

We used the high-level programming language Python for creating the model in reading the data, feeding it to RASA model and getting the output once it processed. Intent — Intent is nothing but what the user is aiming for. For example — if the user says “Reserve a table at Cliff House tonight” the intent can be classified as to book the table.

Entity is to extract the useful information from the user input. From the example above “Reserve a table at Cliff House tonight” the entities extracted would be place and time. Place — Cliff House and Time — tonight.

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Actions are basically the operations performed by the bot either asking for some more details to get all the entities or integrating with some APIs or querying the database to get/save some information.

3.1.2 Proposed System

A farmer assistant bot is built using Naive Bayes algorithm that analyzes user’s queries and understand user’s message. This System is a web application which provides answer to the query of the farmer. Farmer just have to query through the bot which is used for chatting and voice. Farmer can chat using any format there is no specific format the user has to follow. The System uses built in Naive Bayes to answer the query. The answers are appropriate what the user queries. The User can query any farmer related activities through the system. The user does not have to personally go to the office for enquiry. The System analyzes the question and then answers to the user. The system answers to the query as if it is answered by the person. With the help of Naive Bayes, the system answers the query asked by the farmer. The system replies

using an effective Graphical user interface which implies that as if a real person is talking to the user.

The user can query about the farmer related activities through online with the help of this web application. A talk bot, which is a virtual conversational assistant. Farmers can interact with the bot in a very simple manner. The focus is on developing the bot in a more intellectual way, that it can even understand not so well grammatically defined sentences. Bot uses the Natural Language Processing technique to parse the user queries. This bot is both retrieval and generative based. It can retrieve responses if the query is already defined in the database or it will fetch responses from the query in bot. To make the responses more understandable, the responses go through some analytical process, so that analytical responses could be generated. Bot also have an ability to understand user speech and can generate speech based outputs for user queries.

3.2 SOFTWARE REQUIREMENTS SPECIFICATION DOCUMENT

3.2.1. Server Side Requirements

Operating System :	Windows/ Mac/ Linux
IDE/ Workbench :	Vs code
User Interface :	Chakra,HTML, CSS
Client- side scripting :	JavaScript, React.js
API :	Alan AI

3.2.2. Client Side Requirements

Operating System :	Any Operating System
Browser :	Any Browser (IE, Opera, Chrome, Mozilla, etc)

CHAPTER 4

DESCRIPTION OF PROPOSED SYSTEM

In the proposed system Fig 4.1 we develop an mobile app with two section voice bots and suggestion bot. In voice bots farmer can ask his query with the mic of his phone. this voice input is converted to text and the system will repeatthe voice input again for confirmation of input and this text searched in web and web text will be converted to voice .the query of the farmer will be addressed by our voice bot. we also build the suggestion bots in order to give suggestion of crop to be cultivate and fertilizer which could be used for good yield. Farmers and agree-experts posed similar questions to the ones found bythe researchers.

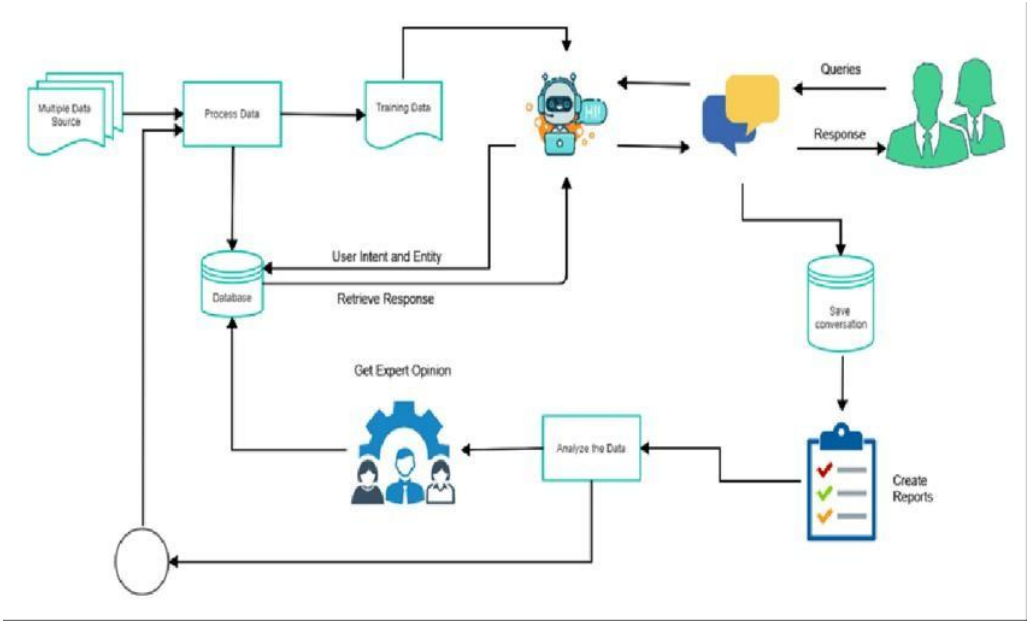

Fig 4.1 Proposed System Architecture

A proposed system for a voice bot could include the following components:

Voice recognition and transcription is the component of the system would allow the voice bot to recognize and transcribe user speech. This could be achieved using machine learning-based speech recognition models and natural language processing (NLP) techniques.

The dialog management component of the system would be responsible for managing the conversation flow between the user and the voice bot. This could involve using a decision tree or machine learning algorithms to determine the appropriate response based on the user's input.

The NLU component of the system would enable the voice bot to understand the user's intent and context behind their speech. This could involve using techniques such as sentiment analysis and entity recognition to better understand the user's input.

The NLG component of the system would be responsible for generating responses that are natural-sounding and contextually appropriate. This could involve using pre-defined templates or generating responses on-the-fly using machine learning algorithms.

To enhance the capabilities of the voice bot, it could be integrated with external systems such as weather APIs, agriculture databases, and market data sources. This would allow the voice bot to provide more comprehensive and accurate information to the user.

Once the voice bot is developed, it would need to be deployed and hosted on a platform such as Amazon Alexa or Google Assistant. This could involve building a custom skill or action that integrates with the platform's APIs.After deployment, the voice bot would need to be continuously monitored and optimized to improve its performance and user experience. This could involve analyzing user feedback, usage data, and error logs to identify areas for improvement and make necessary updates to the system

4.1 SELECTED METHODOLOGY OR PROCESS MODEL

We've been collecting data for government data website with all information of India's states for the past years . Chat bot are divided into two ways voice bot and suggestion bot.

Planning is the stage that involves defining the objectives of the voice bot, identifying the target audience, and outlining the functionalities and features of the voice bot. The planning stage also includes developing a roadmap for the development, testing, and deployment of the voice bot.

Design In this stage, the conversation flow, voice user interface (VUI), and user experience (UX) of the voice bot are designed. This includes creating a persona for the voice bot, mapping out the possible user intents and corresponding responses, and designing the voice bot's interaction with the user.

Development This stage involves the actual development of the voice bot. The development process includes building the back-end architecture of the bot, integrating with various APIs and data sources, and developing the voice bot's speech recognition and speech synthesis functionalities.

Testing In this stage, the voice bot is tested for functionality, accuracy, and user experience. The testing process includes unit testing, integration testing, and user acceptance testing (UAT).

Deployment Once the voice bot passes the testing phase, it is deployed to the target platform or device. This may include deploying the bot to a voice assistant like Amazon Alexa or Google Assistant, or embedding it within a mobile app or website.

Maintenance The maintenance stage involves ongoing monitoring, updates, and optimization of the voice bot. This includes fixing any bugs or errors that arise, updating the bot with new features or functionalities, and optimizing the bot's performance based on user feedback and usage data.

4.11 DATA ANALYSIS

Data Analysis is the first step for analysis and replying of output to the farmer. In TamilNadu, irrigation is a critical input for food security. It is the application of water to the soil for the purpose of growth. Various study is been done and tabulated for analysis and suggestion for bot based on crops ,production, productivity, agro climate ,area with soil type following parameters we will give suggestion for crop and fertilizers

Crop	Area, (10^3 ha)	Production, (10^3 MT)	Av. yield, (q/ha)
Wheat	379	878	23.2
Rice	290	550	19.0
Maize	28	43	15.0
Ragi	128	171	13.3
Small millet	76	92	12.1
Sugarcane	107	6498	609
Potato	24	424	17.5
Mango	39	135.3	3.47
Apple	33	135.9	4.12
Citrus	27.4	134.5	4.91
Walnut	19.5	21.7	1.11
Pear	14.9	108.6	7.29
Peas	11.2	86.9	7.76
Tomato	8.8	97.1	11.03
Cabbage	5.6	38.1	7.33

Table 4.1 Crop Production And Productivity

Growing plants are the things that the grower is interested in because they serve as integrator of all growth factors. As a result, a close examination of the growing plant will aid in the identification of a particular nutrient stress. we will tabulate what are the essential plant nutrients .

4.12 BOT PROCESS FLOW

As presented in the process flow diagram, the farmer who wants to know more details about his crop should get connected to the Farmers Friend Bot first. Farmers Friend can be accessed from various channels like Facebook messenger, twitter, telegram, Microsoft Skype, Microsoft Teams or using by going to website where this Bot will available in a web channel. After obtaining access, one needs to start the Farmers Friend conversation during which the bot keeps asking multiple questions that are

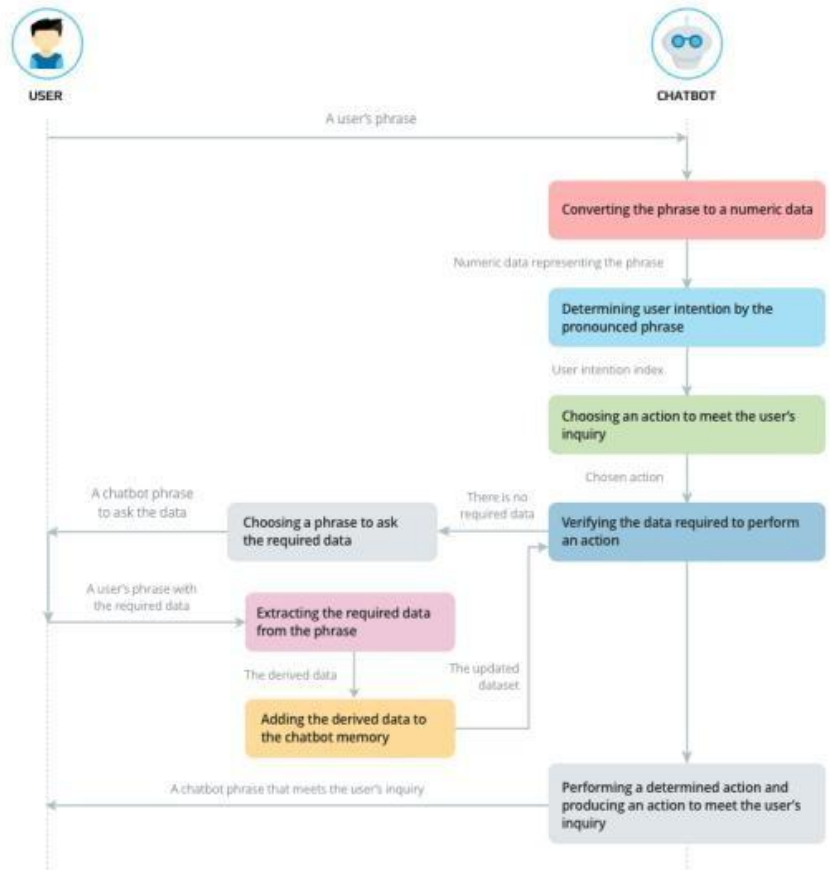

Fig 4.2 BOT PROCESS FLOW

Finally after analyzing the answers given by farmer, the Farmers Friend advice on various aspects related to the crop / field to the farmer. In addition, the Farmers Friend also suggests the appropriate action the farmer need to take based on the field condition i.e if the farmer has to increase or decrease the water level for the crop, the fertilizers that he has to apply based on the soil condition or any action that he has to take in the context of weeds or pests. Alongside helping the farmer assess the crop / field condition basis the data captured by sensors in SASI App the Bot also gives useful information to the farmer on various measures that he / she can take to improve the fertility of the soil which will further improve the yield. Thus, helping farmer obtain higher margin or profits from the yield. Also, based on the requirement or when in doubt about the cropAI Voice Bot's condition, farmer take up this help from Farmers Friend any number of times.

4.13 Models

Farmers Friend conversational uses machine learning and Natural Language Processing for multiple tasks like intent building, expression handling, automated intent formation and named entity modeling and extraction. Which means, the intent-based model is made to trigger on all the input messages, entities can be used at various places to trigger the skills. In the current section, we provide an overview to the task model we have created, intents that are built, and entities used.

Our dialog based conversational system makes use of frame-based system that has slot filling mechanism, which is measured by a system based on finite-state automation. In every step, the Farmers Friend app opens up the user to enter the next answer, but enables entering a new response, rewriting a formerly filled value, or entering multiple responses at once. We have used Natural Language Processing for the working of this, extracting the required information from SASI application based on Natural Language Processing engine. Figure 3 represents one of the parts of the finite state machine, executed when a farmer interacts with Farmers Friend. Figure 4 indicates a one of the conversations flows between the farmer and the devised bot, represented with the existing state transitions and invocations to the internal ML models.

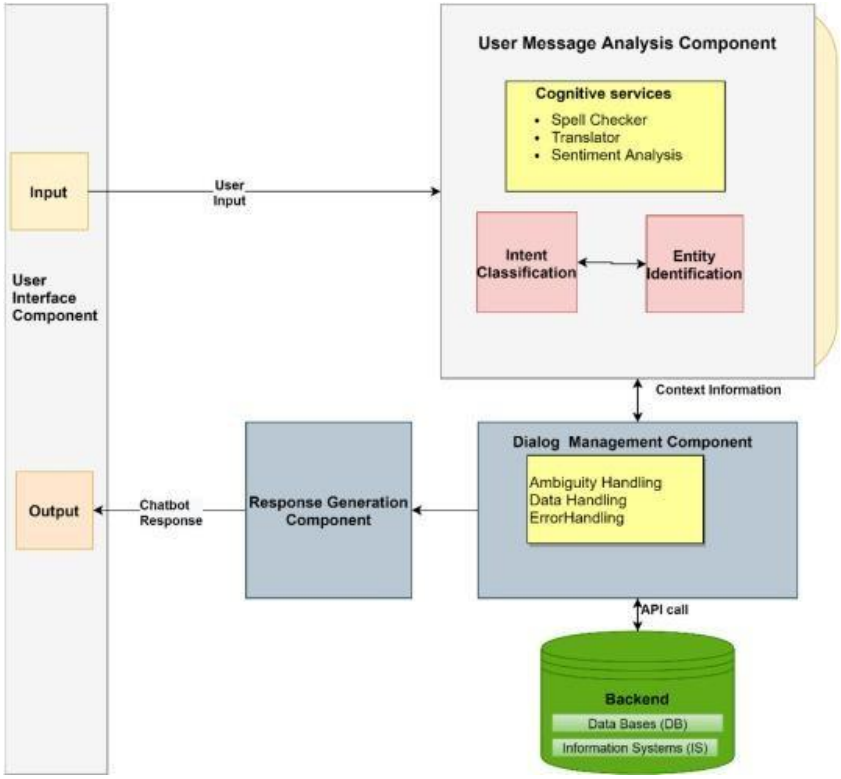

Fig 4.3 General chat-bot Architecture

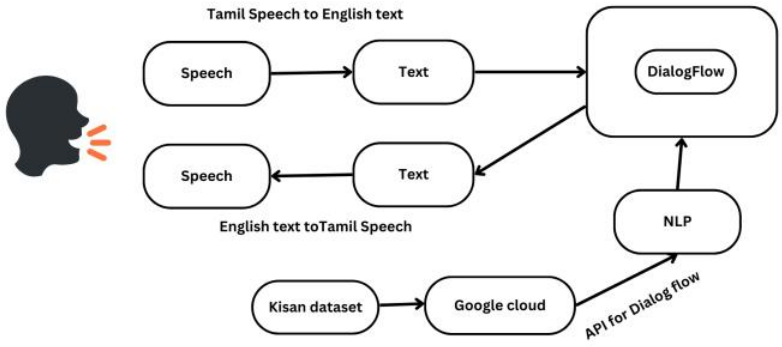

Fig 4.4 Block Diagram

4.14 DialogFlow

Dialogflow is a service offered by Google and is hosted on the Google Cloud Platform. It is a user-friendly solution that integrates Google technologies like Google Cloud Speech-to-Text and machine learning capabilities. It is primarily utilized to create actions for various Google Assistant devices.To put it differently, Dialogflow is an NLP (Natural Language Processing) platform used to build applications that provide personalized conversations and experiences for customers in multiple languages and across different platforms. By utilizing Google-powered tools, product developers can create text-based and voice-based interfaces to address customer inquiries in various languages. For instance, numerous businesses employ Dialogflow to develop chatbots that respond to user input.

Define the voice bot's functionality and user interactions Before building the voice bot, it's important to define the bot's functionality and how it will interact with users. This includes identifying the bot's core features, how users will interact with the bot using voice commands, and the types of responses the bot will provide.

Create a Dialogflow agent In Dialogflow, create a new agent and configure the agent's settings, such as the default language and time zone.Using Dialogflow's visual interface, design the conversation flow for the voice bot. This involves creating intents to handle user requests and defining the responses the bot should provide for each intent. Dialogflow also provides tools to handle more complex conversation flows, such as context and slot filling.

Dialogflow supports several speech recognition services, including Google Speech-to-Text and other third-party services. Integrate the speech recognition service with Dialogflow to enable the bot to understand user voice commands.Dialogflow also supports several speech synthesis services, including Google Text-to-Speech and other third-party services. Integrate the speech synthesis service with Dialogflow to enable the bot to generate natural-sounding spoken responses.
Test the voice bot to ensure it functions correctly and responds appropriately to user commands. Once testing is complete, deploy the bot to your desired platform or device.

4.15 Google Cloud Platform

Google Cloud provides client libraries that simplify the process of building and managing resources. These client libraries offer APIs for two main purposes: app APIs, which provide users with access to services, and admin APIs, which enable the management of those services. The app APIs are optimised for languages that are supported, such as Node.js. Additionally, Google Cloud provides storage and data management capabilities that can be integrated with Dialogflow.

4.16 Agro data

The proposed solution involves automatically collecting data from farmers through their queries and using it to train the dataset. This results in a fully automated system where queries are answered based on the question and knowledge base, eliminating the need for human intervention. Farmers can interact with the conversation bot seamlessly, and the bot is designed to understand even poorly constructed statements. This is achieved through the use of Natural Language Processing to parse user request. Weather data: Weather conditions have a significant impact on crop growth and yield. By incorporating weather data into a voice bot, farmers and agriculture professionals can receive real-time updates on temperature, rainfall, humidity, and other weather-related variables that can affect crop growth.

Soil quality is a critical factor in crop productivity. Incorporating soil data into a voice bot can help farmers and agriculture professionals make informed decisions about soil management practices such as fertilization, irrigation, and soil amendment.Information about crop varieties, planting schedules, and harvesting timelines can help farmers optimize their crop yields. A voice bot could provide crop-specific information such as ideal planting and harvesting dates, recommended fertilization schedules, and pest and disease management strategies.

Agriculture professionals need to stay up-to-date on market trends and commodity prices to make informed business decisions. By integrating market data into a voice bot, farmers and agribusinesses can receive real-time updates on commodity prices, supply and demand trends, and other market indicators.

4.17 Chat bot Definitions

The AI-based chat bot was chosen based on the proximity to the experience of dialogue with a human being it can bring. This is so, due to the understanding that is given by the NLP and ML algorithms, which enables it to draw the same meaning from a dialogue, even when expressed in different ways. The chat bot knowledge areas were categorized into two groups: technical knowledge (Resources) and extra knowledge (Others). The technical knowledge area is in charge of the search of information from the WSN in the database through API. The extra knowledge area was created to make chat bot behavior more human-like. This area consists of dialogue such as greetings, options menu and help sections, making the chat bot more social. Figure 2 lists the functionalities in each knowledge area.

4.18 Artificial Intelligence

Web 3.0, or semantic web, that potentiated the organization and systematization of online content, making the searches more assertive, now undergoes a new transformation towards Web 4.0, which, although it does not yet have a clear definition, is being treated as a web where humans and machines interact in symbiosis. Scholars point towards a large dynamic operating system, working in parallel with the human mind, implying a massive web composed of highly intelligent interactions, and it is only possible with the use of Artificial Intelligence (AI). In this perspective, AI is derived from human intelligence itself and from human nature, aiming at bringing intelligence and knowledge to a virtual brain, trying to not only understand the world, but to construct intelligent applications in order to expand the reach of innovations in the Information Technology market (Russel; Norvig, 2010). Poole and Mackworth (2017) state that among the central objectives of AI research are: to analyze natural and artificial agents; to formulateand test hypotheses about what is necessary for the creation of intelligent agents.

o design, study and conduct experiments with computational systems to perform tasks that require intelligence AI is a great ally of the conversational agents because using it in chat bots expands their capacity for understanding and response. One common application in chat bots involves the use of Natural Language Interaction (NLI) and consequently Natural Language Processing (NLP), which is designed to

simulate a

human conversation. The advantage of using it relies on the ability to use structured phrases (with verbs, nouns, adjectives, etc.) to provide a response more sensitive to the intents of the question (Higashinaka et al., 2014).

4.19 Natural Language Processing

Natural Language Processing (NLP) is a theory-motivated range of computational techniques for the automatic analysis and representation of human language (Cambria; White, 2014). According to Lehnert and Ringle (2014), research on NLP should not be mistaken by speech recognition but is concerned with the symbolic manipulations of meaning and interface that are needed once words are recognized. In fact, a speech recognition algorithm needs to be paired to a language processing program in order to implement actual verbal dialogues with computers. The authors Cambria and White (2014) state that NLP research is in a paradigm shift, they are no longer based on techniques of recognition and understanding of loose words. But now begin to explore semantic techniques more consistently, which the authors call a jump from syntactic curve to the semantics curve, and ultimately will arrive at the pragmatics curve, where computational programs will be able to investigate and build entire narratives. Natural Language Processing (NLP) is a critical component of voice bots, which are automated systems that can understand and respond to voice commands. NLP allows the voice bot to understand natural language, which is often complex and can include idioms, colloquialisms, and cultural references. The NLP process involves several steps, including speech recognition, natural language understanding, and natural language generation. Speech recognition involves converting the spoken word into text, while natural language understanding involves analyzing the text to identify the intent and meaning behind the words. Natural language generation involves producing a response that is both accurate and natural-sounding. This is where machine learning algorithms come into play, as they can be trained on large datasets of human language to learn how to generate responses that sound natural and appropriate.Overall, NLP is essential to the success of voice bots, as it allows them to provide users with a more natural and intuitive way to interact with technology.

4.20 Voice to Text Converter

In order for the chat bot to interact with the user via voice, a voice recognition engine (also known as a speech recognizer) is utilized to convert the audio stream into text transcription. This enables the chat bot to understand and respond to the user's spoken input. The chat bot will utilize a voice recognition API to process the user's voice input. The computer will receive structured voice input, which will be sent to the speech recognizer. There are several voice recognition APIs available, including Google Voice Recognition API. The output of the recognizer will be a text string or a JSON object containing the text output. Voice to text conversion is a critical component of many voice bots, as it allows the system to recognize and understand the user's spoken commands.

The process of converting voice to text involves several steps, including acoustic modeling, language modeling, and speech recognition. Acoustic modeling involves analyzing the audio signal to identify the unique characteristics of the speaker's voice, such as pitch, tone, and cadence. Language modeling involves analyzing the text to identify the meaning of the words and their relationships to each other. Speech recognition involves using these two models to translate the spoken words into text, which can then be processed by the voice bot.There are several techniques and tools that can be used to implement voice to text conversion in voice bots, including deep learning models like convolutional neural networks (CNNs) and recurrent neural networks (RNNs). These models can be trained on large datasets of speech data to learn how to recognize and transcribe speech accurately.Overall, the ability to convert voice to text is essential for any voice bot that aims to provide a seamless and intuitive user experience.

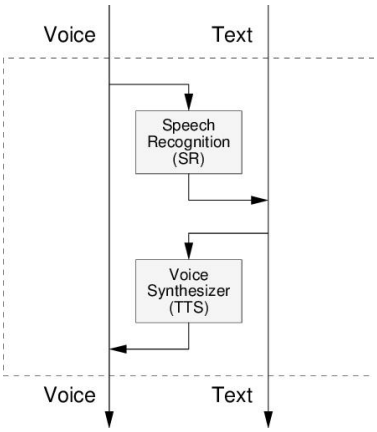

Fig 4.5: Architecture of voice/text converter

4.2 ARCHITECTURE / OVERALL DESIGN OF PROPOSED SYSTEM

We propose a chat bot specialized only for farmers and their rights. This conversational bot communicates with farmers and solves their problems by giving out the preferred solution. Also, all the government given subsidies, facilities and rights will be informed to them through this bot. The main attractive feature of the bot is that this system will actually get the input from the user like land area, soil type, rainfall condition etc., and uses the prediction algorithm to predict the crops that can be sown by them to get the better yield and also deal with anything other than the crop suggestion, for example if the user wants to get information about the future price of any crop and also any farming equipment they require will also be able to choose from. The focus is on developing the bot in a more intellectual way, that it can even acknowledge not so well grammatically defined sentences, misspelled or incorrect words, and incomplete phrases. This can help the farmer to communicate easily with the bot, since this system uses the Natural Language Processing (NLP) technique to parse the user queries, identify the key words, match them with Knowledge Base and respond with the accurate results. To make the responses more comprehensible, the responses are generated using classification algorithms and produce non textual responses so that it can be easily perceived by the users.

The user inputs the query in the user interface in the form of text. The user interface receives the user queries and then forwards it to Agro bot. In this chat bot, the textual query undergoes a pre-processing stage. Pre-processing Steps include Ionization where the query sentence is tokenized into words, then the stop words are removed, and then the words are stemmed to their root words. If the query is classification based, it would undergo classification using the neural network classifier, which uses the knowledge base to retrieve the relevant responses. This mainly based with the use of NLP and the main features used are: Tokenization, Noise Removal, Lexicon Normalization, Bag of Words or Vector Space model. Hence, this system will help farmers to query about the agriculture, get the response in text and also helps in predicting the future data of price, so that they can plan their activities. The future enhancement can be done by giving the response in their regional language itself and prediction can be extended to rainfall, productivity, etc.

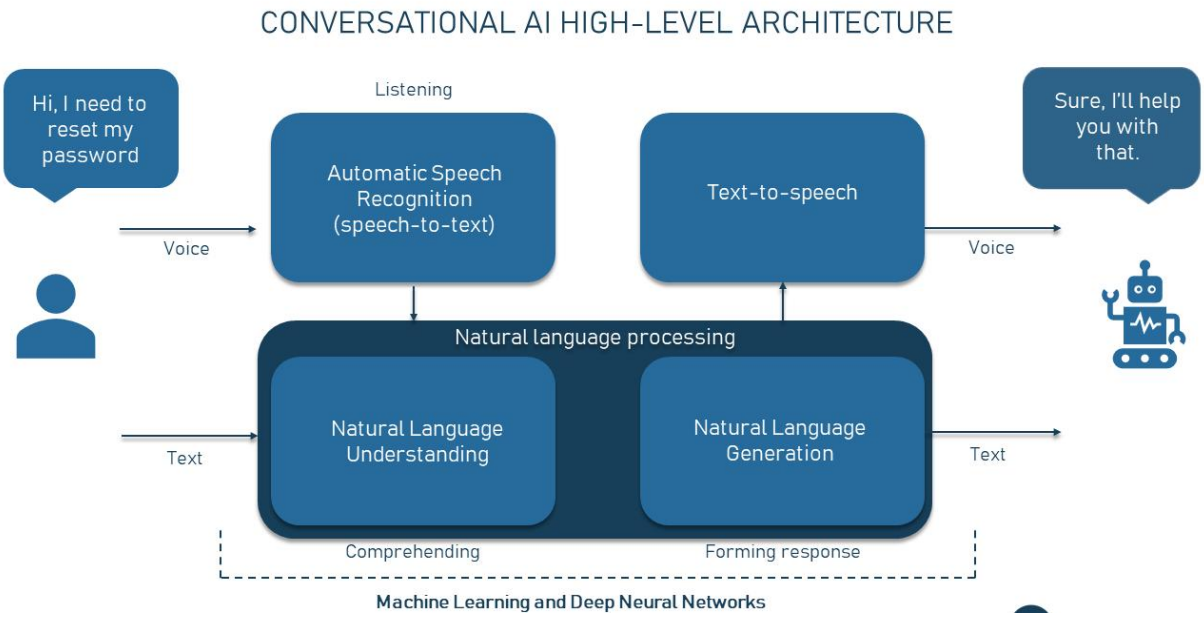

Fig 4.6 Conversational AI Archirtecture

Conversational AI is the area of artificial intelligence that deals with questions on how to let people interact with software services through chat- or voice-enabled conversational interfaces and make this interaction natural. In general, it is a set of technologies that work together to help chatbots and voice assistants process human language, understand intents, and formulate appropriate, timely responses in a human-like manner. The primary goal of a conversational AI voice bot is to provide a natural and engaging user experience by allowing users to converse with the bot in a similar way they would with a human. Conversational AI voice bots can be used in a wide range of applications such as customer service, healthcare, education, finance, and agriculture.

One of the key advantages of conversational AI voice bots is their ability to handle complex and varied user requests. By using NLU and machine learning algorithms, the voice bot can understand the intent behind the user's speech and provide a relevant response, even if the user's speech is not grammatically correct or uses slang and colloquialisms. Another advantage of conversational AI voice bots is their scalability. Once developed, the voice bot can be deployed to multiple platforms and devices, allowing users to access it through a wide range of channels such as mobile apps, smart speakers, and messaging platforms.

4.3 DESCRIPTION OF SOFTWARE FOR IMPLEMENTATION AND TESTING PLAN OF THE PROPOSED MODEL/SYSTEM

Farmer's assist voice Bot system will help farmer communities by answering queries related to agriculture. Via this app, the farmer will be able to access the agricultural information as well as localized information including weather forecasts, best crop for plantation and fertilizer. We have implemented the multilingual chat bot that includes a voice over and an entity extraction for the query of the farmer. This system will allow farmers of different regions who speak different languages to ask questions at any time. The voice bot will respond to the queries of the farmer in their regional language and also suggest the crop,fertilizer based on weather and soil which allow the modern farming technology to reach a larger number of farmers. As the future work, we have planned to identify the diseases in crops and their remedies. Further, we can also suggest the best plant and the harvest time based on the market price, climate and soil.

4.31 Query PreProcessing

The user queries are tokenism into words using the bag of words technique, and then the stop words (like is, the) are removed using the NLTK Corpus. The stemming process is performed to convert the words to their root words. For example cultivation, cultivated, cultivate all stem into cultivate which is the root word

4.32 Chat Bot Development and Training

The datasets file containing hundreds of agricultural queries and their corresponding responses are imported. The datasets is then processed and converted into vectored format. The Bot is trained, by building a neural network and the error values are optimized. The trained data is saved in a data structure for future usage.

4.33 Response Retrieval using Machine Learning

The neural network classification is used to construct a model using the training

dataset. Using the model constructed probabilities is generated for the test datasets. The least probabilities are filtered out using the threshold value and sorted in descending order. The highest probability is looped through to obtain the corresponding response.

- Data collection: A dataset of previously seen user inputs and their corresponding responses is collected. This dataset is typically created by humans, who manually label the input and output pairs.

- Feature extraction: From the collected dataset, features are extracted from the input and output pairs. These features are used to train a machine learning model to predict the appropriate response given a new input.

- Model training: A machine learning model, such as a neural network, is trained using the extracted features. The model is trained to learn the relationships between the input features and the corresponding responses.

- Model evaluation: The trained model is evaluated on a test dataset to measure its accuracy and performance.

- Inference: When a new input is received, the trained model is used to predict the most appropriate response from the dataset.

The effectiveness of response retrieval using ML depends on the quality and size of the dataset used to train the model, as well as the accuracy and complexity of the machine learning algorithm used. With a large and high-quality dataset and a well-trained model, response retrieval using ML can be a powerful tool for creating intelligent and natural-sounding conversational agents.

4.34 AlgorithmUsed

Natural Language Processing (NLP) is a branch of Artificial Intelligence (AI) that deals with teaching machines to comprehend and interpret human language in both written and spoken form. NLP comprises two primary stages: data preprocessing and

algorithm development.During the data preprocessing phase, a range of techniques are employed, such as tokenization, stop word removal, lemmatization, stemming, and part-of-speech tagging, to clean and prepare textual data for machine analysis. These techniques enable machines to understand the meaning behind words, phrases, and sentences.After data preprocessing, an algorithm is developed to analyze and interpret the data. NLP algorithms are primarily categorized into two types: rules-based systems and machine learning-based systems. Rules-based systems use pre-designed linguistic rules to analyze text data. On the other hand, machine learning-based systems employ statistical techniques and algorithms to adjust their methods as more data is processed.To improve the accuracy and precision of NLP algorithms over time, they integrate machine learning, deep learning, and neural networks. These advanced techniques enable algorithms to learn from data, analyze it in more depth, and refine their rules for better performance.

4.35 Speech Recognition

The app which recognise the speech clearly.Artificial intelligence (AI) applications rely heavily on speech recognition. The capacity of a computer to replicate human behaviour by learning from its surroundings is referred to as AI. Voice recognition helps computers and software programmes to "understand" what people are saying, allowing them to process data more quickly and accurately. Speech recognition is an important component of voice bots that allows the system to understand spoken commands and respond appropriately. Speech recognition involves converting the user's spoken words into written text that the voice bot can then process using natural language processing (NLP) techniques.

There are two main approaches to speech recognition: traditional statistical methods and deep learning methods:

Taditional statistical methods involve breaking down the speech signal into its component parts, such as individual phonemes, and using statistical models to identify the most likely sequence of phonemes that correspond to the spoken words. This approach typically involves the use of Hidden Markov Models (HMMs) or Gaussian Mixture Models (GMMs) to model the speech signal.Deep learning methods, on the other hand, involve training neural networks to directly map the speech signal to written text. These networks are typically based on Convolutional Neural Networks (CNNs) or

Recurrent Neural Networks (RNNs) and are trained on large datasets of transcribed speech.

4.36 Speech Synthesis

The textual output generated is passed through Speech Synthesis API. Especially used Alan AI bot in the starting procedure .The API gets text input and converts it into speech and provides it as output. The output is heard through the speaker. There are several approaches to speech synthesis, including rule-based methods, concatenative methods, and generative methods.Rule-based methods involve using a set of pre-defined rules and patterns to generate speech. These rules typically take into account the phonetic and linguistic characteristics of the language being spoken, as well as the context and intonation of the text.Concatenative methods involve pre-recording individual speech sounds or words and then concatenating them together to create the desired speech. This approach can produce highly natural-sounding speech, but requires a large database of recorded speech sounds or words.There are several techniques for speech synthesis, including rule-based synthesis, concatenative synthesis, and statistical parametric synthesis. Statistical parametric synthesis is the most popular approach for modern TTS systems and is used in many commercial voice bots.Statistical parametric synthesis involves training a machine learning model on a large dataset of recorded speech samples. The model learns to predict the acoustic features of speech, such as the pitch, duration, and amplitude of each sound, based on the input text. Once trained, the model can generate high-quality synthetic speech that sounds natural and realistic.To use speech synthesis in a voice bot, the bot needs to convert the text response generated by the dialog management and natural language generation components into an audio signal that can be played back to the user.

This can be achieved using an audio synthesis library or a cloud-based TTS service.When implementing speech synthesis in a voice bot, there are several factors to consider to ensure a high-quality user experience. These include selecting a natural-sounding voice that matches the bot's persona and the user's preferences, controlling the speaking rate and intonation to convey meaning and emotion, and adding appropriate pauses and emphasis to improve clarity and comprehension.Overall, speech synthesis is a crucial component of a voice bot that allows it to provide an engaging and natural conversation experience to users. By using modern TTS techniques and carefully designing the audio output, voice bots can deliver high-quality speech that sounds almost indistinguishable from human

speech.

4.4 PROJECT MANAGEMENT PLAN

Automatic talk bot will be created. The Automatic talk bot will be able to answer user questions without any human assistance. The Talk bot provides answer to the query of the farmer. The farmer will have any query; the bot replied the corresponding queries by the way of chat and voice. If the farmer have any query about the agriculture, the bot will send the answers to them through the voice or text. The interface of the Agriculture Talbot can be displayed as Mobile Application. The output can be displayed as This system helps farmers to query about the agriculture, get the response in text as well as speech and also helps in predicting the future data of price, so that they can plan their activities. The future enhancement can be done by giving the response in their regional language. This system would enable the farmer to ask any number of questions, anytime, which will in turn help in spreading the modern farming technology faster and to a higher number of farmers. Also they will be able to get the information in Tamil and English for the State of TamilNadu to the farmers who don't know English. Further the Chat bot can be enhanced to provide customized services for farmers. AI can vary depending on the specific application and the level of technology used. However, some common outcomes can include increased efficiency in farming operations, improved decision-making for farmers, and greater yields and profits. The discussion of these results should take into consideration factors such as the cost-effectiveness of the technology, the level of user adoption, and the potential impact on the environment. Additionally, it is important to discuss any limitations or challenges encountered during the implementation process and potential solutions to these issues.

- Natural language processing (NLP): The voice bot should be able to understand and interpret natural language inputs from users.
- Dialog flow: The voice bot should be able to guide users through a conversation flow that leads to the desired outcome.
- Voice user interface (VUI): The voice bot should have a user-friendly and

intuitive voice interface that enables users to interact with it easily.

- Personalization: The voice bot should be able to personalize its responses based on the user's preferences and history.
- Multilingual support: The voice bot should be able to communicate in multiple languages to cater to a diverse user base.
- Integration with other systems: The voice bot should be able to integrate with other systems or APIs to provide users with relevant information and services.
- Authentication and security: The voice bot should have a secure authentication mechanism to ensure that only authorized users can access sensitive information.
- Analytics and reporting: The voice bot should be able to track and analyze user interactions to provide insights into user behavior and preferences.
- 24/7 availability: The voice bot should be available 24/7 to provide assistance to users at any time.
- Error handling and fallbacks: The voice bot should be able to handle errors gracefully and provide fallback options when it is unable to understand the user's input or provide the requested information.
- Context awareness: The voice bot should be able to recognize the context of a conversation and provide relevant responses based on that context.
- Voice analytics: The voice bot can collect and analyze data on user interactions and behavior to improve the bot's performance and provide insights to the developers.

4.5 Kisan Call Centre

The Kisan Call Centre (KCC) dataset contains farmer enquiries and corresponding responses provided by the KCC. The Indian government has made the entire corpus available on "data.gov.in" in CSV format from 2006 to 2020. Each month, a separate catalog is maintained for every district in each state. These URLs can be

modified as per the requirement to extract data for different districts and time periods. The KCC data is a valuable resource for researchers, policymakers, and farmers alike, as it provides insights into the issues faced by farmers and the solutions provided by the KCC.

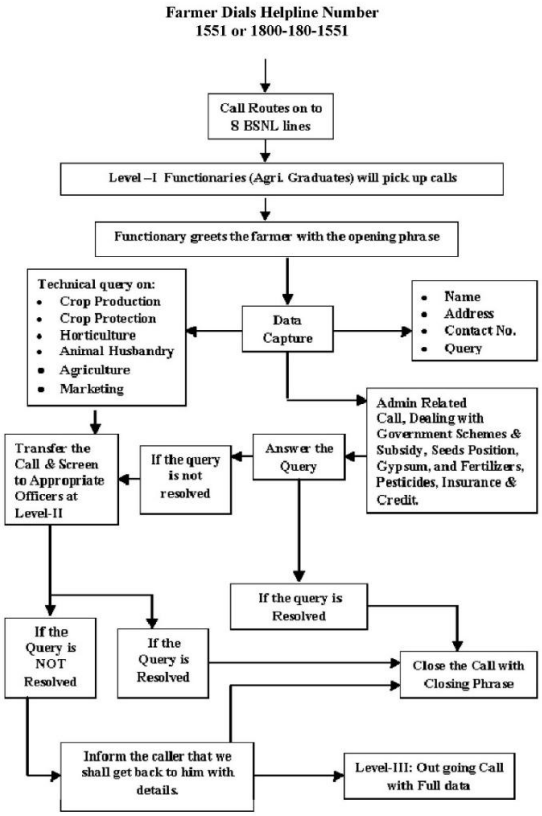

Fig 4.7 Kisan Flow Diagram

Kisan Call Centre is a government-run initiative in India that provides agricultural information and guidance to farmers across the country. It was launched in 2004 and is managed by the Ministry of Agriculture and Farmers Welfare. The Kisan Call Centre is a toll-free service available in 22 regional languages and operates from 6 a.m. to 10 p.m. throughout the year. The service is provided by trained agricultural experts who offer guidance on a wide range of issues related to farming, including crop cultivation, soil

health, pest management, livestock management, and post-harvest management.Farmers can call the Kisan Call Centre to seek advice on any agricultural issue they may be facing. The experts at the call centre provide personalized solutions and also guide farmers on accessing government schemes and programs that may be beneficial to them.The Kisan Call Centre has been a valuable resource for farmers, particularly those in remote areas, who may not have access to agricultural information and expertise. The service has helped farmers improve their crop yields, adopt better farming practices, and increase their income. It has also played a crucial role in disseminating information on government schemes and programs aimed at supporting farmers.The experts at the Kisan Call Center are trained in various disciplines related to agriculture, and they provide advice based on scientific research and practical experience. The call center also provides information on government schemes and programs related to agriculture and rural development.Overall, the Kisan Call Center has been an effective way to provide agricultural advisory services to farmers in India, particularly those in remote and rural areas who may not have easy access to such information.Kisan Call Center is primarily a platform for providing agricultural information and advisory services to farmers through a toll-free number.

While the Kisan Call Center may collect data on the nature of the queries and advice provided to farmers, it is not primarily focused on data collection.The Indian government conducts an Agriculture Census every five years to collect data on land use, cropping patterns, agricultural practices, and other relevant indicators. The Census provides a comprehensive dataset on agriculture at the national, state, and district levels. Crop Cutting Experiments (CCEs) are conducted to estimate the yield of crops in different regions. These experiments involve randomly selecting fields, measuring the area and yield of the crops, and extrapolating the results to estimate the overall yield in the region. The data collected through CCEs is used to assess crop production and plan government interventions.

CHAPTER 5
CONCLUSION

Bots can help users to improve the efficiency by navigating users to chat bot platforms. They help to automate all the repetitive, distracting tasks that prevent teams from reaching high performance. By using Conversational AI, user can leverage solutions through easy integration. User can connect chat bot to the existing SASI and other applications and can keep the data in the cloud ecosystem. This paper provides a detailed explanation of our conversational AI and NLP system for agriculture, we have currently deployed this in the real world. We explain the machine learning model that was have adopted, and the exclusive opportunity of building a chat bot for the agriculture sector. Our success indicates that this chat bot will be a good substitute to farmers looking for help in the context of their crop, health and atmosphere. In fact, we understand that high volume innovations in task-oriented bot or perform actions bot technology will have incredible potential to expand farmer experience and drive revenue growth in new and channels that are not explored in agriculture. In conclusion, Our Farmer's Friend chat bot will reduce dependency on agriculture universities crowd and makes help available at one's fingertips. This saves the time of farmers and agriculture scientists. Easy accessibility of this application to everyone to seek help related to farming or crops makes this application vary unique. The future enhancement to this bot can include speech integration which can extend the usage of the bot to those farmers who cannot read or write.

This study aims to explore the principles of voice chatbots and their potential impact on agriculture by providing an overview of relevant concepts, products, and platforms. The benefits and limitations of voice chatbots in agriculture were examined in detail. Additionally, a sample chatbot was built to illustrate key elements of chatbot execution, including interactivity, user experience design, and reusable software architecture. The project's ultimate objective was to promote the use of voice chatbots in

agriculture and to inspire farmers to consider implementing this technology in their operations. This research can serve as a foundation for exploring additional opportunities for voice chatbots in agriculture. Bots can help users to improve the efficiency by navigating users to chatbot paltforms. They help to automate all the repetitive, distracting tasks that prevent teams from reaching high performance. By using Conversational AI, user can leverage solutions through easy integrations. User can connect chatbot to the existing SASI and other applications and can keep the data in the cloud ecosystem. This paper provides a detailed explanation of our conversational AI and NLP system for agriculture, we have currently deployed this in the real world. We explain the machine learning model that was have adopted, and the exclusive opportunity of building a chatbot for the agriculture sector.

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The output can be displayed as This system helps farmers to query about the agriculture, get the response in text as well as speech and also helps in predicting the future data of price, so that they can plan their activities. The future enhancement can be done by giving the response in their regional language.

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13. AGRICULTURE ADVANCEMENT USING ARTIFICIAL INTELLIGENCEKunal Verma1,Dinesh Pabbi2, Avnish Singh Ja

APPENDIX

A.SCREENSHOTS

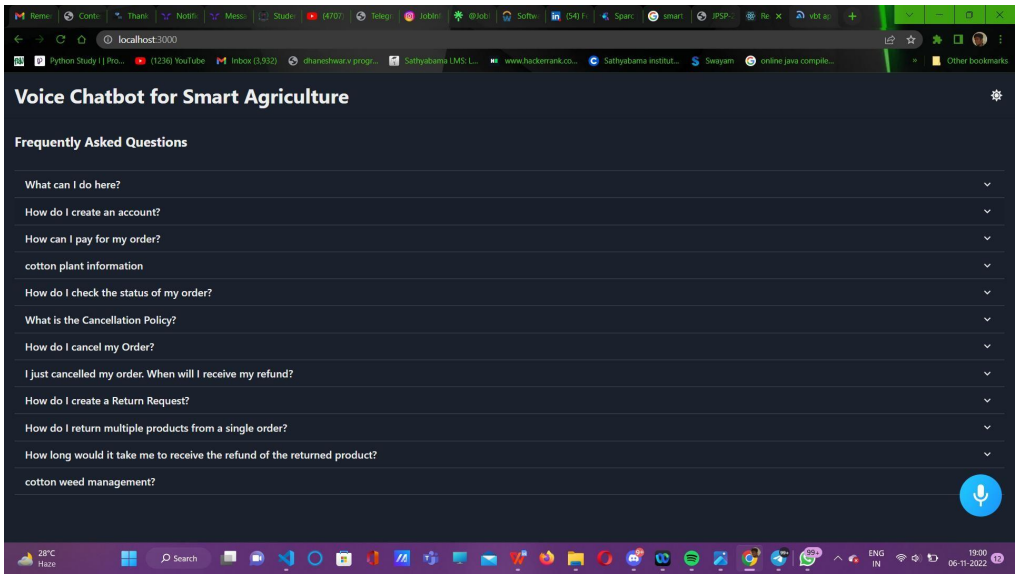

Fig A.1 Smart Agro Voicebot-React App

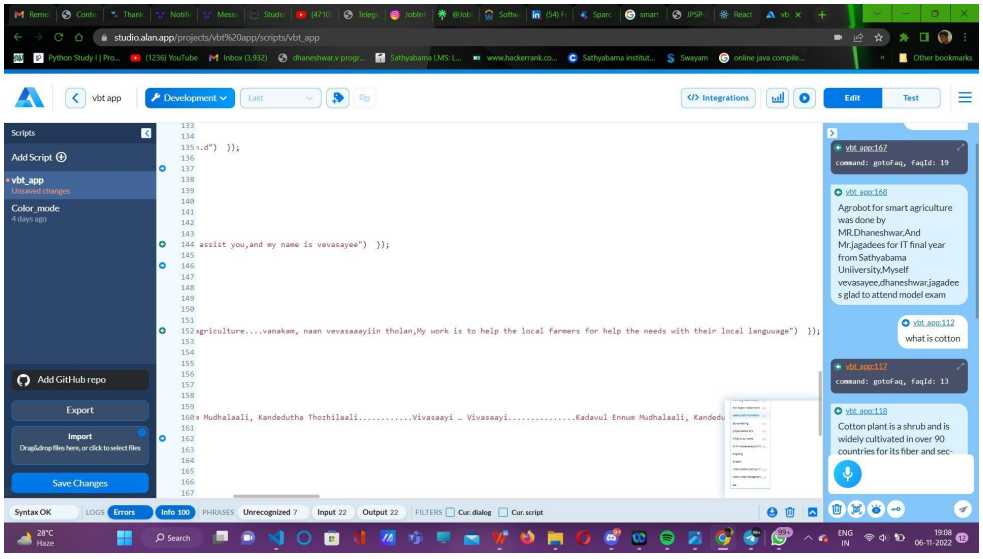

Fig A.2 Alan AI API

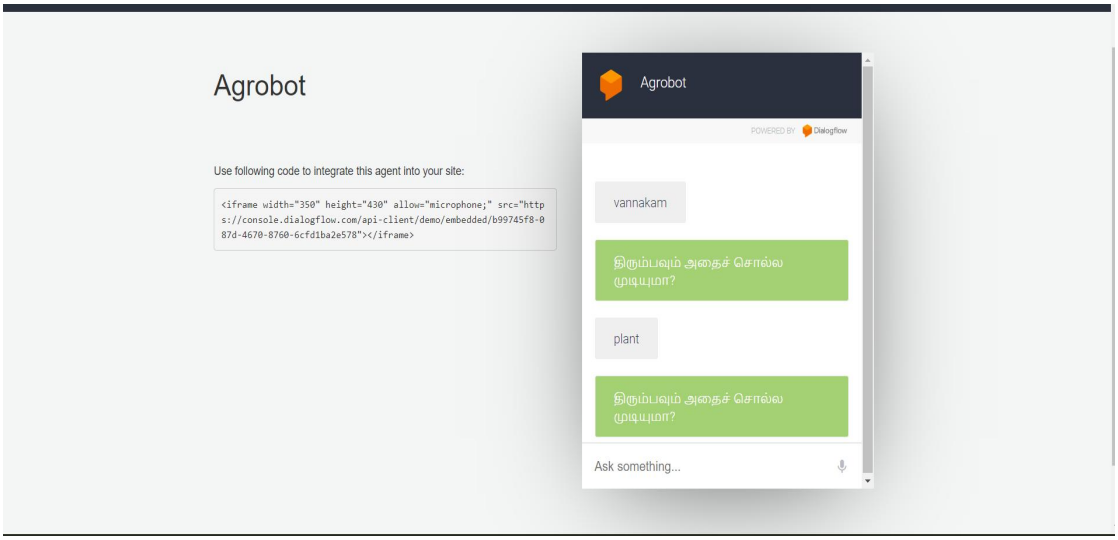

Fig A.3 Agrobot

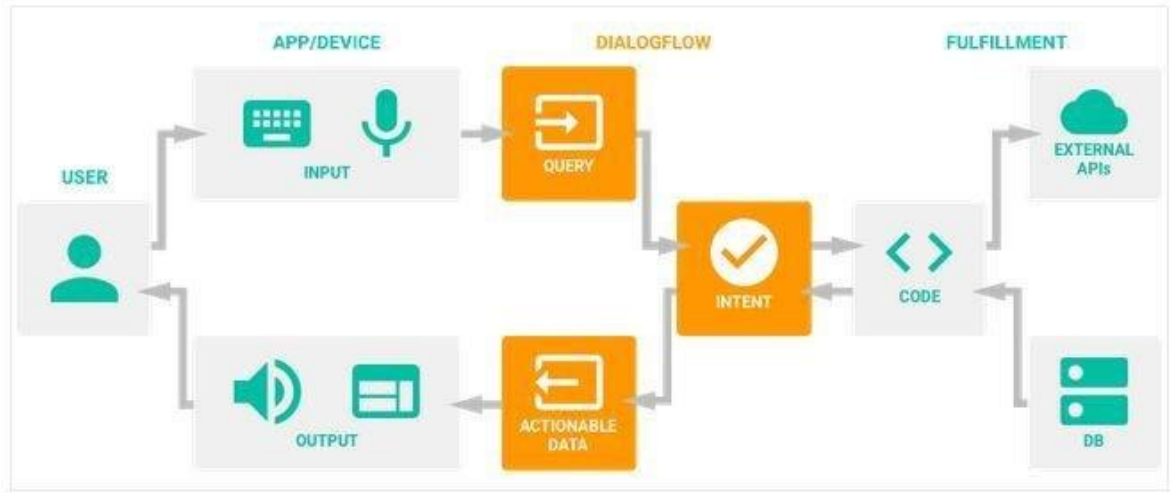

Fig A.4 DialogFlow Architecture

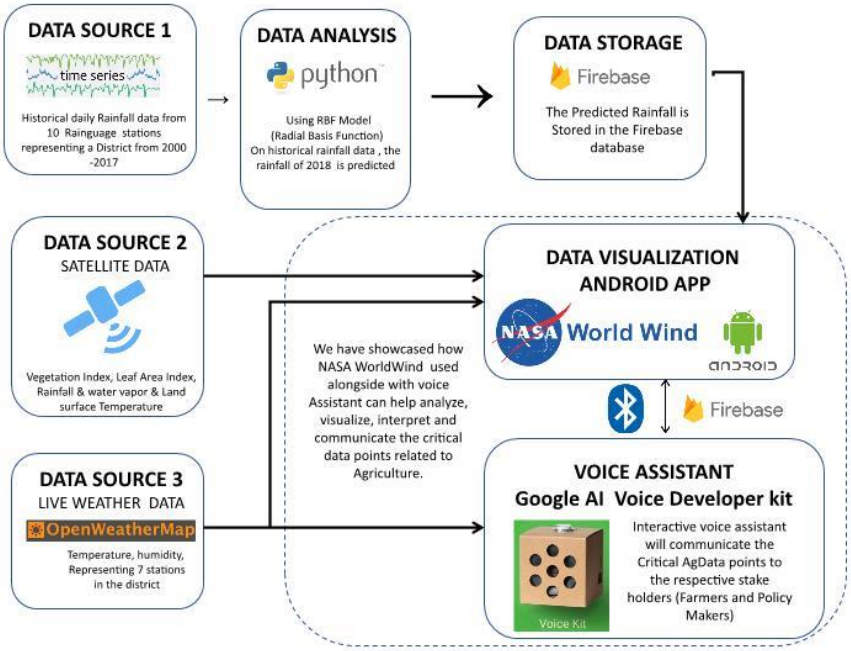

Fig A.5 Conversational AI BoT

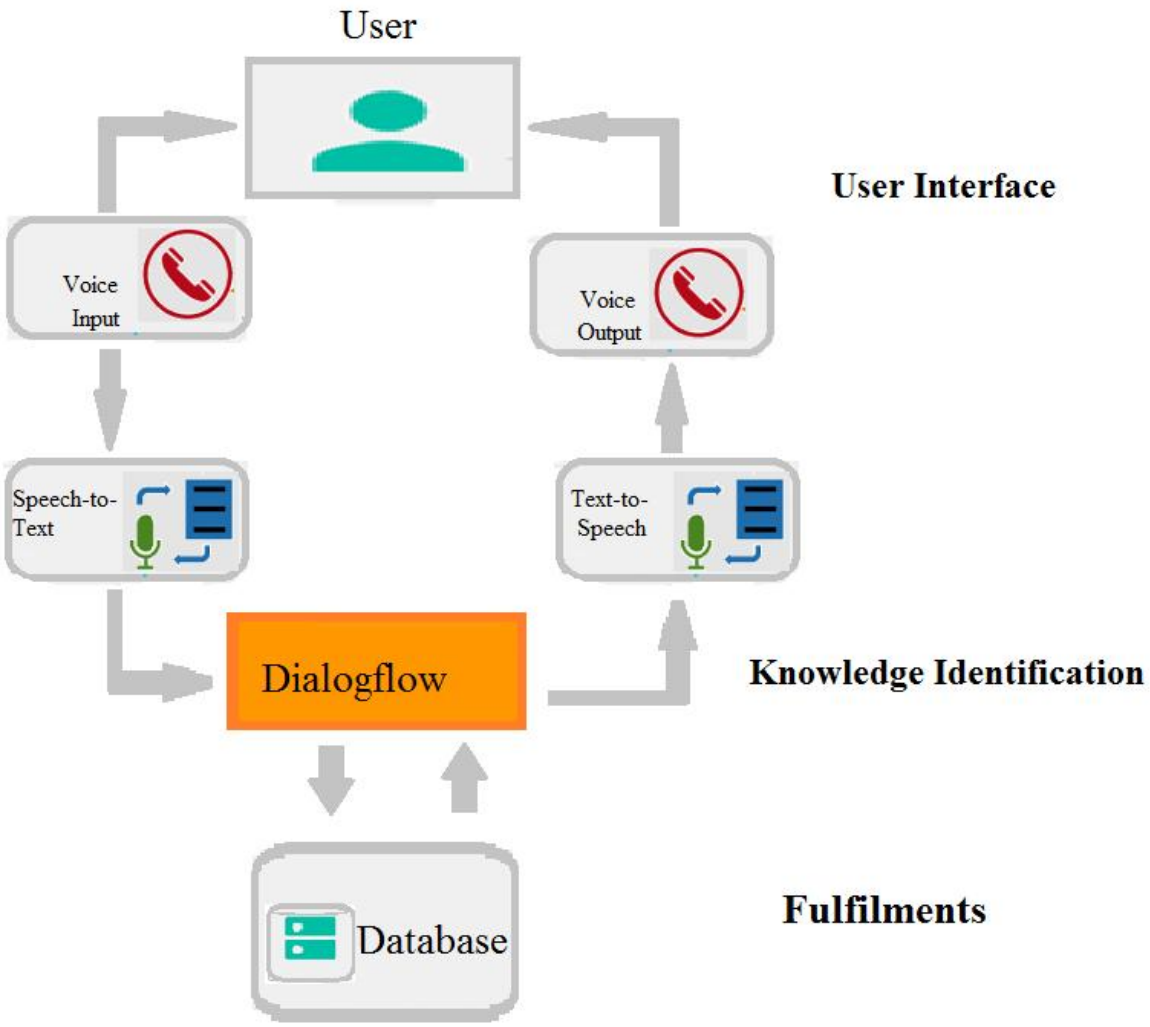

Fig A.6 DialogFlow VoiceBot Architecture

B.SOURCE CODE

B.1 Sample source code

App.js

```
import React, { useState, useEffect, useRef } from 'react';
import { ChakraProvider, theme } from '@chakra-ui/react';
import { Navbar } from './Navbar';
import { Faq } from './Faq';
import alanBtn from '@alan-ai/alan-sdk-web';
import { scroller } from 'react-scroll';

export const App = () => {
  const alanBtnInstance = useRef(null);
  const [index, setIndex] = useState(null);
  const [currentFaqId, setCurrentFaqId] = useState(null);
  const [toggleColorFlag, setToggleColorFlag] = useState(false);
```

```
  useEffect(() => {
    if (!alanBtnInstance.current)
      { alanBtnInstance.current =
      alanBtn({
        key: '7335c0776af28ea5f950f2da024cd5d82e956eca572e1d8b807a3e2338fdd0dc/stage',
        onCommand: commandData => {
          if (commandData.command === 'gotoFaq')
            { scroller.scrollTo(`accordion-button-${commandData.faqId}`,
            {
              duration: 800,
              delay: 0,
              smooth: 'easeInOutQuart',
            });
            setIndex(commandData.faqId - 1);
            setCurrentFaqId(commandData.faqId);
          } else if (commandData.command === 'toggleColorMode')
            {setToggleColorFlag(flag => !flag);
          }
        },
      });
```

```
  return (
    <ChakraProvider theme={theme}>
      <Navbar toggleColorFlag={toggleColorFlag} />
      <Faq
        index={index}
        setIndex={setIndex}
        currentFaqId={currentFaqId}
        setCurrentFaqId={setCurrentFaqId}
      />
    </ChakraProvider>
  );
};
```

APPENDEX C

RESEARCH PAPER

Voice-Bot For Smart Agriculture

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Abstract –Indian agriculture is afflicted by knowledge, and farmers are not well-versed in economics, new technology, and emerging resources. The Indian agricultural industry presently employs KCC (kisan call center). It is a merger of two industries: the information sector and the agricultural sector.However, KCC is a beneficiary of growth. In recent years, due to new and emerging digitization, call and sms became older, use of apps and internet is common, so our study is based on the datasets of KCC that we have collected and using Natural language processing (NLP) create a model and sync it with the Dialogflow of Google. Build an app which is voice bot where some people don't know to type and they can voice over using the Dialog flow API and integrate it with the Flutter app.The main element is that the farmer can connect with the Voicebot in their own language, which allows them to interact and solve problems, as well as store and clarify new and varied worries.

Keywords:KCC,NLP,Dialog Flow,Voice-bot

I. INTRODUCTION

Agriculture is a crucial sector that provides employment to a large number of people in various parts of the world. It serves as a source of livelihood for many individuals and contributes significantly to the economic growth of a country. With the advancements in agricultural technology, there is a need to educate farmers on the latest techniques and practices to improve their crop yields and quality.However, most of the existing software available for farmers provide static information on farming, which requires them to go through numerous steps to obtain reliable information. These software also lack an interactive method of inquiring and responding to the farmers' needs.To address these issues, our system offers a user-friendly interface that allows farmers to easily access relevant and up-to-date information on agriculture. The system is interactive and allows farmers to ask questions, seek guidance, and receive immediate feedback. This helps farmers make informed decisions and enhances their ability to manage their farms efficiently.Our software incorporates the latest technological advancements in agriculture and provides comprehensive information on various aspects of farming, including crop selection, soil management, pest control, and irrigation techniques. With this software, farmers can access information anytime, anywhere, and from any device, making it easier for them to manage their farms effectively.In summary, our system offers an interactive and user-friendly approach to agricultural education. It provides farmers with easy access to relevant information, allowing them to improve their farming practices and increase their crop yields. or other users may successfully engage to obtain the appropriate replies in fewer steps. Several efforts were launched with these new improvements in mind, and the Kisan Call Center (KCC) was one such programme launched by the government of India. The government made data from interactions with farmers publicly available for study and analysis, dubbed the KCC dataset. The data collects many details that characterise the farmer's inquiry, including the contents of the question, the resolution supplied, the state, district, and the time when the query was raised / answered.One potential solution to the KCC's current issues with network problems, connection difficulties, and a shortage of skilled customer service representatives is to develop a chat-bot that utilizes natural language processing (NLP) to analyze a massive dataset of past inquiries. By training the chat-bot on this dataset, it can detect semantic similarities between past inquiries and provide resolutions to current inquiries. To ensure widespread accessibility, we propose building the chat-bot on WhatsApp, which is a popular communication platform. We will use Dialogflow as the tool to construct the voice-bot and implement the NLP model for effective

customer service.The solution will be built on an existing means of communication - an app that is popular among the public - and will react to inquiries using an NLP pertained model. We will use Dialogflow as the tool for constructing the Voice-bot to assist us do this.

II. RELATED WORKS

The Kisan Call Centre (KCC) dataset contains farmer enquiries and corresponding responses provided by the KCC. The Indian government has made the entire corpus available on "data.gov.in" in CSV format from 2006 to 2020. Each month, a separate catalog is maintained for every district in each state.
These URLs can be modified as per the requirement to extract data for different districts and time periods. The KCC data is a valuable resource for researchers, policymakers, and farmers alike, as it provides insights into the issues faced by farmers and the solutions provided by the KCC.

III. LITERATURE SURVEY

[1] The paper conducts a thorough assessment of existing research on voice in human-computer interaction, including subjects such as speech detection, natural language processing, and voice user interfaces. The authors highlight the limitations and constraints of voice-based engagement and provide solutions to overcome them.The research examines the psychological and social aspects that impact human responses to voice-based interaction. The authors address the significance of voice signals including pitch, tone, and inflection in transmitting meaning and emotion during human-computer interaction.The study's findings suggest that voice-based engagement might boost a user's sense of social presence and lead to a more favourable user experience. The authors argue that voice has the potential to transform the way we communicate.

[2]This article presents the development of a chatbot technology, which utilizes different web technologies for the front-end to provide an excellent user interface. For the back-end, node.js, dialogflow, and responsivevoice.js have been used to create an intelligent chatbot that can dynamically handle various college-related queries in the local language. The Pantomath chatbot is accessible via web browsers, and the node.js runtime environment processes client-side and server-side requests. In the future, the system can be enhanced with speech recognition abilities to cater to persons with reading difficulties. Additionally, this chatbot can be adapted to function on mobile platforms and integrated into android or iOS applications.
[3]The article examines the creation of a chat-bot that mimics a historically significant character with a focus on design and development. The authors conduct an overview of current chat-bots and their applications, including how they reproduce prominent personalities and important historical figures. They also study the application of natural language processing techniques and user modelling in designing chat-bots. The authors emphasise the value of context in conversation simulation and discuss techniques for creating a chat-bot that can accurately replicate an historical figure. In summary, the article offers important guidance and information for creating chat-bots that can captivate users with historical dialogues.
[4]The EUROCON 2009 paper, "An intelligent web-based voice chat bot," presents the creation of a sophisticated chatbot designed to engage in conversation through natural language processing technology and speech recognition. Able to perform varied tasks, from providing information to simple transactions, the bot uses synthesized speech as its output. In contrast, the recent "International Journal of Research in Engineering, Science, and Management" article by P. Kaviya et al. examines the use of chatbot technology within customer services across different sectors, including retail, healthcare, and banking. Challenges of developing chatbots include creating platforms that can understand and respond to natural language input accurately. The literature reveals the immense capacity these chatbots possess in streamlining communications between entities and users. However, challenges remain, such as ensuring natural-language competency for the systematic management of complex tasks.

[5]Y. Chen, W. Wang, and Z. Liu's work "Keyword-based search and exploration on databases" highlights the necessity for keyword-based searching and exploration in databases. According to the authors, most users are unfamiliar with database structure or schema and may struggle to formulate complicated query languages. As a consequence, the authors offer a method known as "Database Keyword Search" (DBKS), which allows users to enter basic searches using a few words to retrieve reliable database results.

After a study of existing research on keyword-based search and exploration, the authors claim that the majority of current approaches are either unsuccessful or impracticable. To solve this issue, they offer DBKS, which matches keywords with appropriate database characteristics via a database schema mapping procedure.

[6]V. Bhargava and N. Maheshwari's work "An Intelligent Voice Recognition System for Recognition System" was published in 2009. The study provides an in-depth look at the many features of voice recognition systems and the approaches used to create intelligent systems.

The article starts by explaining the fundamental concepts of speech recognition, emphasising the significance of acoustic modelling and language modelling in the creation of recognition systems. The writers then go into the several types of voice recognition systems, such as isolated word recognition, continuous speech recognition, and speaker recognition.

Following that, the authors cover the numerous methods

and approaches utilised in voice recognition systems, such as Hidden Markov Models (HMM), Dynamic Time Warping (DTW), Artificial Neural Networks (ANN), and Gaussian Mixture Models (GMM).

[7]The paper titled "Keyword-based search and exploration on databases" was presented by Y. Chen, W. Wang, and Z. Liu at the 2011 IEEE 27th International Conference on Data Engineering in Hannover.The study focuses on developing an efficient and effective approach for keyword-based search and exploration of databases. The authors state that traditional database query systems are not user-friendly, and users who lack technical expertise face difficulties in retrieving the information they need. In response, the authors propose a keyword-based search approach that enables users to search for information in databases using natural language keywords.The paper presents a comprehensive review of related work in the field of keyword-based search and exploration of databases, highlighting the strengths and weaknesses of existing approaches. The authors then introduce their approach, which uses a combination of keyword-based indexing and search techniques to retrieve relevant information from databases. They also propose a query refinement method that enables users to refine their queries to obtain more accurate results.The authors evaluate their approach using a real-world dataset, and the results demonstrate the effectiveness of their approach in retrieving relevant information from databases. They conclude that their approach can be useful for users who lack technical expertise and need to search for information in databases using natural language keywords.In summary, the paper provides a useful contribution to the field of keyword-based search and exploration of databases by proposing a novel approach that addresses the limitations of existing systems. The study's findings have practical implications for the development of more user-friendly database query systems that can be accessed by non-technical users.

[8]The paper provides a detailed overview of the AgronomoBot system architecture, which comprises a user interface, a natural language processing module, a knowledge base, and a sensor data management module. The authors emphasize the use of natural language processing, which enables users to interact with the chatbot in a conversational manner, making the process more user-friendly.The study highlights the potential benefits of AgronomoBot, including its ability to provide farmers with real-time data on soil moisture, temperature, and other relevant parameters. The chatbot can also offer personalized recommendations to farmers based on their specific needs, improving the efficiency of agricultural practices and reducing resource wastage.In summary, the paper proposes a novel approach to address the challenge of providing accurate and timely information to farmers in precision agriculture. The study's findings have practical implications for the development of smart answering chatbots that can be integrated with agricultural sensor networks to improve farming practices and reduce resource wastage.

[9] The paper provides an extensive review of the advancements made in natural language processing (NLP) research, highlighting the most important breakthroughs in the field. The authors emphasize the importance of NLP in various areas, including education, healthcare, social media, and business.The study covers a wide range of NLP topics, including sentiment analysis, machine translation, question-answering systems, and dialogue systems. The authors provide an in-depth analysis of each topic, discussing the challenges and opportunities associated with them.The paper also discusses the evolution of NLP research over time, from rule-based systems to statistical and machine learning-based approaches. The authors highlight the latest trends in NLP research, such as deep learning and neural networks, and their potential to revolutionize the field.In conclusion, the paper provides a comprehensive overview of the state-of-the-art in NLP research, highlighting the most important breakthroughs in the field. The study's findings have practical implications for the development of NLP applications in various domains, emphasizing the potential of NLP to transform the way we interact with technology and each other.

[10] The report conducts a thorough evaluation of available flood forecasting models and methodologies, including classic statistical models and machine learning approaches. The authors point out the shortcomings of these approaches while emphasising the potential benefits of employing LSTM neural networks.The article provides a unique use of an LSTM neural network for flood forecasting, taking use of the network's capacity to handle time-series data and long-term dependencies. The authors describe the LSTM network design as well as the data pretreatment processes in depth.The study's findings show that the LSTM neural network surpasses standard statistical models in terms of flood predicting accuracy. The authors highlight the potential of LSTM neural networks as a viable tool for flood prediction and catastrophe response.

IV. ALOGIRTHM USED

Natural Language Processing (NLP) is a branch of Artificial Intelligence (AI) that deals with teaching machines to comprehend and interpret human language in both written and spoken form. NLP comprises two primary stages: data preprocessing and algorithm development.During the data preprocessing phase, a range of techniques are employed, such as tokenization, stop word removal, lemmatization, stemming, and part-of-speech tagging, to clean and prepare textual data for machine analysis. These techniques enable machines to understand the meaning behind words, phrases, and sentences.After data preprocessing, an algorithm is developed to analyze and interpret the data. NLP algorithms are primarily categorized into two types: rules-based systems and machine learning-based systems. Rules-based systems use pre-designed linguistic rules to analyze text data. On the other hand, machine learning-based systems employ statistical techniques and

algorithms to adjust their methods as more data is processed.To improve the accuracy and precision of NLP algorithms over time, they integrate machine learning, deep learning, and neural networks. These advanced techniques enable algorithms to learn from data, analyze it in more depth, and refine their rules for better performance.

V. PROPOSED SYSTEM

This study presents a chat bot with a user-friendly graphical interface, designed to assist farmers with online inquiries related to farming activities. The bot has been developed to learn and understand natural language inputs, even those with unclear grammatical structure. By utilising Natural Language Processing, the bot can perform both retrieval and generation tasks. If a user's query is already in the database, the bot can retrieve the results; otherwise, it will generate a response to the query. Results are further processed through an analytical procedure to provide more informative responses. Additionally, the bot is capable of interpreting human speech and providing speech-based responses to user inquiries. The bot's learning capability allows for ongoing development to improve its understanding of natural language inputs.

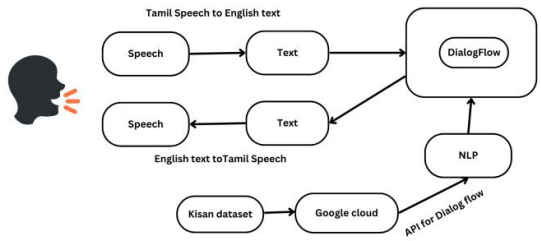

Fig 1:Block Diagram

VI. MODULE IMPLEMENTATION

A.Train Voice Bot:
Training in the Questions and Answers in Dialogflow with the old datas from the Kisan data set.

B.Speech Recognition:
The app which recognise the speech clearly.Artificial intelligence (AI) applications rely heavily on speech recognition. The capacity of a computer to replicate human behaviour by learning from its surroundings is referred to as AI. Voice recognition helps computers and software programmes to "understand" what people are saying, allowing them to process data more quickly and accurately.

C.Voice to Text Converter:
In order for the chat bot to interact with the user via voice, a voice recognition engine (also known as a speech recognizer) is utilized to convert the audio stream into text transcription. This enables the chat bot to understand and respond to the user's spoken input. The chat bot will utilize a voice recognition API to process the user's voice input. The computer will receive structured voice input, which will be sent to the speech recognizer. There are several voice recognition APIs available, including Google Voice Recognition API. The output of the recognizer will be a text string or a JSON object containing the text output.

D.DialogFlow:
Dialogflow is a service offered by Google and is hosted on the Google Cloud Platform. It is a user-friendly solution that integrates Google technologies like Google Cloud Speech-to-Text and machine learning capabilities. It is primarily utilized to create actions for various Google Assistant devices.To put it differently, Dialogflow is an NLP (Natural Language Processing) platform used to build applications that provide personalized conversations and experiences for customers in multiple languages and across different platforms. By utilizing Google-powered tools, product developers can create text-based and voice-based interfaces to address customer inquiries in various languages. For instance, numerous businesses employ Dialogflow to develop chatbots that respond to user input.

E.Google Cloud Platform:
Google Cloud provides client libraries that simplify the process of building and managing resources. These client libraries offer APIs for two main purposes: app APIs, which provide users with access to services, and admin APIs, which enable the management of those services. The app APIs are optimised for languages that are supported, such as Node.js. Additionally, Google Cloud provides storage and data management capabilities that can be integrated with Dialogflow.

F.Text to Speech:
Communication is crucial for making a bot seem human. Since machines only understand binary code, they require programming to be able to speak. Text-to-Speech (TTS) technology is one way to enable a computer to speak. The TTS API, such as Google TTS, takes in a text response from the bot API. The TTS API then processes the text and generates an audio file with an appropriate response to the user's input.

G.Agro data:
The proposed solution involves automatically collecting data from farmers through their queries and using it to train the dataset. This results in a fully automated system where queries are answered based on the question and knowledge base, eliminating the need for human intervention. Farmers can interact with the conversation bot seamlessly, and the bot is designed to understand even poorly constructed statements. This is achieved through the use of Natural Language Processing to parse user request.

VII. EXPERIMENTAL RESULT ANDDISCUSSION

AI can vary depending on the specific application and the level of technology used. However, some common

outcomes can include increased efficiency in farming operations, improved decision-making for farmers, and greater yields and profits. The discussion of these results should take into consideration factors such as the cost-effectiveness of the technology, the level of user adoption, and the potential impact on the environment. Additionally, it is important to discuss any limitations or challenges encountered during the implementation process and potential solutions to these issues.

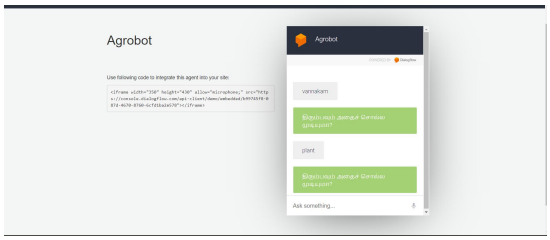

Fig 2: Live Demo of Voice Bot

VIII. Conclusion:

This study aims to explore the principles of voice chatbots and their potential impact on agriculture by providing an overview of relevant concepts, products, and platforms. The benefits and limitations of voice chatbots in agriculture were examined in detail. Additionally, a sample chatbot was built to illustrate key elements of chatbot execution, including interactivity, user experience design, and reusable software architecture. The project's ultimate objective was to promote the use of voice chatbots in agriculture and to inspire farmers to consider implementing this technology in their operations. This research can serve as a foundation for exploring additional opportunities for voice chatbots in agriculture.

IX. Future works:

According to Gartner, by 2020, voice chatbots will dominate 85% of all customer care interactions and become nearly indistinguishable from human beings.In the future, Natural Language Processing (NLP) is expected to advance significantly, enabling machines to handle more complex requests and generate more accurate results. Voice chatbots will be capable of performing multilingual translations, not only understanding mixed languages like 'HINGLISH' with Natural Language Understanding (NLU) but also responding with sophisticated Natural Language Generation (NLG). With advancements in NLP, machines will be able to comprehend the nuances and complexities of human language with greater accuracy and context. This will enable chatbots to provide more personalized and relevant responses to user queries. In addition, voice chatbots will become even more intuitive and responsive, allowing for a more natural and conversational interaction with users.The development of empathetic voice chatbots will be the most significant breakthrough in future voice chatbots. Conversational user interfaces that eliminate endless navigation and provide a seamless user experience from the start, based on listening and learning, will outperform top-down products.Furthermore, NLP will facilitate seamless communication across different languages, allowing chatbots to translate between multiple languages and dialects in real-time. This will be particularly useful in multilingual environments, where language barriers can be a hindrance to effective communication.

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