Agriculture TalkBot Using AI

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*Abstract***:** *Artificial Intelligence and Machine Learning are driving IT industry to new landscape. This system "The TalkBot" overcomes this problem and provides farmers the better opportunity to obtain the desired information and to scale up with upcoming market trends and technologies in a user friendly manner. TalkBot is actually a chatbot, which is a virtual conversational assistant, through which the users can communicate with the bot as if they are conversing with humans. The focus is on developing the bot in a more intellectual way, that it can even recognize not so well grammatically defined sentences, misspelled words, incomplete phrases, etc.,. This can help people to converse easily with the bot, since this system uses the Natural Language Processing 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 understandable, the responses are generated using classification algorithms and produce non textual responses so that it can be easily perceived by the users. Bot also has an ability to provide voice oriented responses using text to speech techniques..*

*Index Terms***:** *Classification algorithms, Knowledge Base, Machine Learning, Natural Language Processing, TalkBot.*

I. INTRODUCTION

Agriculture is the major provider of employment to people in many parts of the world. Many people depend on agriculture for their livelihood. Most countries depend on agriculture for their GDP growth. The technology in the field of agriculture is developing day-by-day. Also, a large number of software is being simultaneously developed, to educate the farmers with this technological information. Most of them provide static information about farming, they require large number of searching steps to get the accurate information and they don't provide an interactive way of querying and response.

This system overcomes the above mentioned drawbacks by providing a user interface, where farmers or any other users can interact effectively to get the desired responses with less number of steps. This system "TalkBot" is a chatbot, which is a virtual assistant that enable users to get their queries clarified in a user friendly manner. The input is obtained from the user, the textual query will undergo pre-processing steps in order to find the category of the query it belong to, and provide the corresponding response. If the query is based on prediction, then the future predictions on the requested agricultural products will be represented in the graphical format and displayed to the user.
The system would educate the new age farmers regarding

agriculture information using interactive querying technique. Speech synthesis helps the users with learning disabilties, literacy difficulties, to use the system efficiently. It also helps the farmers to plan their future activities by predicting the future cost of agriculture products.

II. NATURAL LANGUAGE PROCESSING

The main objective of Natural Language Processing technique is to interpret human natural language input. This enables the system to understand the user input even if they are not grammatically correct or incomplete sentences. Also, this increases the efficiency of the classification algorithm. The steps involved in the NLP are*:*

- Tokenization
- Noise Removal
- Lexicon Normalization
- Bag Of Words or Vector Space model

Tokenization is the process of splitting the input sentences into a list of words. Input query will be converted into tokens. This will be helpful in further processing stages. Noise removal deals with removing the stop words (noise) that are not relevant to the context. Stop words like "is, the, was, are, be, will, etc." are removed, so that they do not account for the probability of the classification. Lexicon normalization is the process of converting the multiple representations of input to their single representation. Stemming is one of the methods of this technique, where the suffixes of a word are stripped off. The words which are extracted from the above process are converted to a feature vector, in which a binary value is used as a weight, to represent each feature(1 if the feature is present, 0 if the feature not present).prepare it in two-column format, including figures and tables.

III. LITERATURE SURVEY

A. An Intelligent Web-Based Voice Chatbot [1][3]

This paper presents the design and development of an intelligent voice recognition chat bot. The paper presents a technology demonstrator to verify a proposed framework required to support such a bot (a web service). While a black box approach is used, by controlling the communication structure, to and from the web-service, the web-service allows all types of clients to communicate to the server from any platform. The service provided is accessible through a generated interface which allows for seamless

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XML processing; whereby the extensibility improves the lifespan of such a service. By introducing an artificial brain, the web-based bot generates customized user responses, aligned to the desired character. Questions asked to the bot, which is not understood is further processed using a third-party expert system (an online intelligent research assistant), and the response is archived, improving the artificial brain capabilities for future generation of responses.

B. College Information Chatbot System[4][2]

Chat bots typically provide a text-based user interface, allowing the user to type commands and receive text as well as text to speech response. Chat bots are usually stateful services, remembering previous commands (and perhaps even conversation) in order to provide functionality. When chat bot technology is integrated with popular web services it can be utilized securely by an even larger audience. A CHATBOT is an artificial person, animal or other creature which holds conversations with humans. This could be a text based (typed) conversation, a spoken conversation or even a non-verbal conversation. Chat bot can run on local computers and phones, though most of the time it is accessed through the internet. Chat bot is typically perceived as engaging software entity which humans can talk to. It can be interesting, inspiring and intriguing. It appears everywhere, from old ancient HTML pages to modern advanced social networking. Websites, and from standard computers to fashionable smart mobile devices. Chat bots talk in almost every major language. Their language (Natural Language Processing, NLP) skills vary from extremely poor to very clever intelligent, helpful and funny. The same counts for their graphic design, sometimes it feels like a cartoonish character drawn by a child, and on the other hand there are photo-realistic 3D animated characters available, which are hard to distinguish from humans. And they are all referred to as "chatbots".

C. College Enquiry Chatbot [80

Chat bots typically provide a text-based user interface, allowing the user to type commands and receive text as well as text to speech response. Chat bots are usually stateful services, remembering previous commands in order to provide functionality. When chat bot technology is integrated with popular web services it can be utilized securely by an even larger audience. The college enquiry chat bot will be built using artificial algorithms that analyses user's queries and understand user's message. This System will be a web application which provides answer to the query of the student very effectively. Students just have to put their query to the bot which is used for chatting. The system will use the artificial intelligence algorithms to give appropriate answers to the user. If the answer is found invalid, then some system to declare the answer as invalid can be incorporated. These invalid answers can be deleted or modified by the admin of the system. The student will not have to go to the college for enquiring something. Student can use the chat bot to get the answers to their queries. Students can use this web based system for making enquiries at any point of time. This system may help students to stay updated with the college activities.

D. Smart Answering Chatbot based on OCR and over generating Transformation and Ranking[5][6][7][10]

With rapid development of information and communication technology, people are very diverse in education, learning style, and knowledge improvement methods. This paper presents an approach of converting documents into knowledge of Chatbot system that enables users to make more benefits of it by asking and answering questions through the use of electronic documents integrated with simulate system. It is an integrated system for enrich contents of documents from popular format such as Portable Document Format (PDF) and digital photos. The workflow of this system is started from extracts texts using Optical Character Recognition (OCR) from files, and then generates questions via over generating Transformations and Ranking algorithm, and finally let Chatbot response to the user's question when it is matched with the String pattern.

IV. PROPOSED SYSTEM

Chatbot are conversational virtual assistants which automate interactions with end users. Artificial intelligence powered chat bots, using machine learning techniques, understand natural language and interact with users in a personalized way. In early days chat bots were used mostly in retail, travel, media or insurance players. Agriculture could also leverage this emerging technology by assisting farmers with answers to their questions, providing advice and recommendations on farming related problems.

This conversational assistant uses Natural Language Processing techniques to understand the user queries in their natural language. This will make the system understand even the grammatically not well defined sentences as input queries. The user queries undergo the pre-processing stage where the query is first tokenized into words, then the stop words like a, is, the, etc., are removed so that it would not contribute to the probability of classifying the queries based on their respective classes and then the stemming process is carried out where the words are converted to their root words. The words are converted to a bag of words and then converted to a vector form so that they can be processed efficiently by the classification algorithm. The bot is then trained with the training dataset.

Based on the training set data, a neural network is constructed and error is optimized using the gradient descent algorithm. The test data set undergoes the same pre-processing stages, classification and neural network construction. The class with the highest probability is iterated to get the accurate results.

The system uses the speech synthesis Web API to provide voice based response. It also uses the prediction algorithm 'ARIMA' to predict the future cost of the agricultural products using the moving average technique, so that the farmer can plan their activities prior to harvesting.

A. System Architecture

The figure 1 is the architecture diagram of the TalkBot application. 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 the TalkBot application. In the TalkBot application, the textual query undergoes a pre-processing stage. Pre-processing steps include Tokenization 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 Naives Bayes classifier, which uses the knowledge base to retrieve the relevant responses.
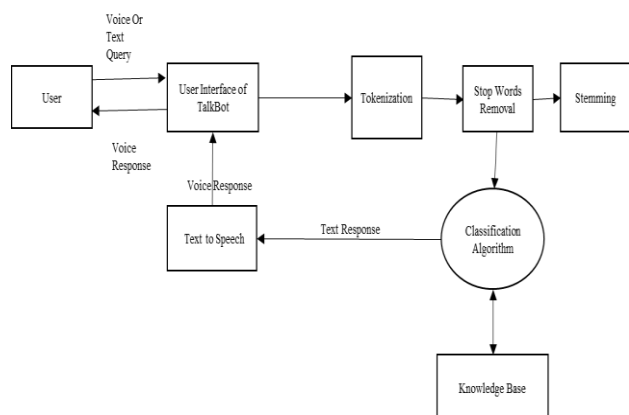

Fig 1: Overall System Architecture Diagram for Talkbot

B. Query PreProcessing

The user queries are tokenized 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
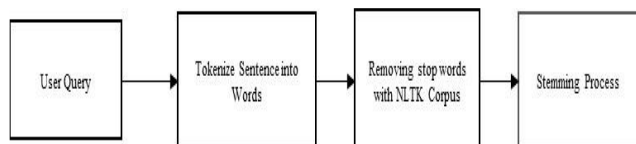

Fig 2: Query PreProcessing

C. ChatBot Development and Training

The dataset file containing hundreds of agricultural queries and their corresponding responses are imported. The dataset 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**.**
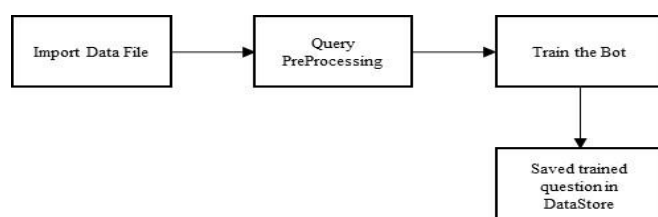

Fig3: Chatbot Training

D. 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 dataset. 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.
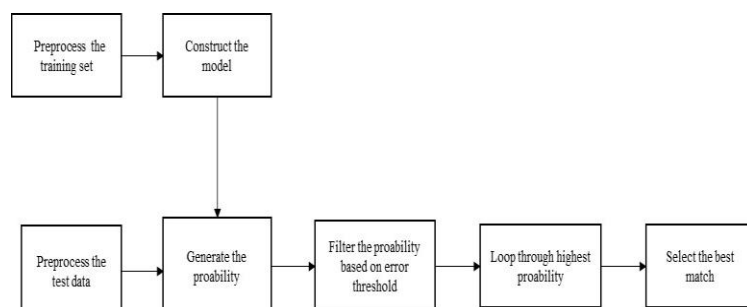

Fig 4: Response Retrieval

E. Speech Synthesis

The textual output generated is passed through Speech Synthesis API. The API gets text input and converts it into speech and provides it as output. The output is heard through the speaker.
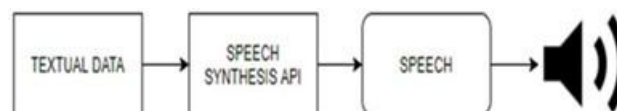

Fig 5: Speech Synthesis

V. RESULTS AND DISCUSSIONS

Automatic talkbot will be created. The Automatic talkbot will be able to answer user questions without any human assistance. The Talkbot 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 Talkbot can be displayed as Mobile Application. The output can be displayed as

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Fig.6. TalkBot Conversations

Table 1: Comparison of various Talk Bots

Bot Name	Features	Programming Languages/Apps/Integration	Languages	Clients/Fields	Channels
IBM Watson Conversation Service	Built on a neural network(one billion Wikipedia words)	Node SDK, Java SDK, Python SDK, iOs SDK, Unity SDK	English, Japanese	Healthcare, Finance, Retail	Speech, Image, Text
AgentBot	Understands natural language. Memory to maintain coherence during long conversations	Use our REST API to integrate with your CRM and other platforms	English, Spanish	Telecommunic-ations and Online Services	Voice or messenger channel
AgriBot	Understands users query and response to that query	Python SDK	English	Agriculture,Farmers	Voice, Text
Digital Genius	AI predicts case meta-data and suggests the right answer to agents. AI learns from every agent interaction.	Human + AI customer service is installed as a layer into your existing customer service software	English	Customer Services	Email, Social Media, Mobile Messaging, Live Chat
Wit.ai	Natural Language Process	Node.js client, Python client, Ruby client	English, Latin	Used by over 65,000 developers to build applications and devices that you can talk or text to.	Voice, text

VI. CONCLUSION

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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