**REVIEW PAPER ON IMPROVED AGRICULTURAL ASSISTANCE TO FARMERS**

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**Abstract**

**Agriculture is considered to play a critical role in the economy that faces increasing pressures across various aspects as climatic changes, soil erosion, lack of awareness at the consumers' end, changing tastes in food, and concerns about how it is produced. The demands on the standards of agricultural products keep increasing exponentially but there is human unavailability faced in rural agricultural areas. Farmers working with plants, pests, and diseases continue to pose their challenges. Information about the conditions of the crop is certainly useful to do the necessary actions for plants to maintain their quality. The proposed paper aims at predicting and giving solutions for agriculture-related problems. The main objective is to help the farmers by keeping them up to date with all the advancements and happenings in the society that in turn assist them in providing better agricultural practices. The farmers can get benefited by knowing the available technological innovations and making use of them for improved production and yield.**

**Keywords: Agriculture, Chatbot, Artificial Intelligence, Natural Language Processing, Machine Learning, Region-based Convolutional neural network (R-CNN), K’s Nearest Algorithm, Decision Tree**

1. INTRODUCTION

Most consumers consider going to supermarkets for buying goods, that is risky because of the chemical-infused food items being sold. People are very well aware of the ill effects of the fertilizers and pesticides that are being used while farming. Some diseases like cancer, obesity, and birth defects have been identified to be caused due to the consumption of food grown using pesticides and other chemicals. As an alternative, organic food is being widely accepted. The organic food market in India is growing at a slow but steady pace. This organic food is usually affordable only to the upper class of the society while the middle and lower classes suffer from having inorganic and conventional food. The main objective is to guarantee a fair price to the agricultural community by developing chatbots as an interactive system between farmers and consumers that can be used for effective trade. [2]

Also, with IoT playing a crucial role in smart agriculture, the concept of infection recognition using object recognition image processing strategy can help out the farmers greatly without making them learn much about the technology and also helps them to sort out the issues concerning crops. (Refer fig.1.1.) Image processing strategies are integrated into smart agriculture techniques to help the farmers use the latest innovations of technology, to resolve the issues of crops like diseases to their crops which may be due to bugs or due to climatic conditions or may be due to soil consistency.[5]

SMART AGRICULTURE

HANDLES CLIMATIC CHANGE

COMBINES MULTIPLE GOALS AND CONTROL TRADE-OFFS

MAINTAINS ECOSYSTEM SERVICES

Fig.1.1. Key characteristics of smart agriculture

1. LITERATURE SURVEY

[1] AGROVOC is the multilingual thesaurus managed and published by the Food and Agriculture Organization of the United Nations (FAO). It is an online open data set whose content is available in more than 40 languages. More than 39,000 concepts identified by a uniform resource identifier (URI) and 800,000 terms are related through a hierarchical system and aligned to knowledge organization systems.

1. The purpose was to connect the consumers with the farmers with all inputs provided to them. First, a chatbot system was proposed for performing the role of the mediator between farmers and consumers. The system was built and it enables consumers to get organic food at a very economic price which is both an advantage for consumers and also provides a huge profit for the farming community.

[3] The purpose of this research is to help farmers utilize E-commerce so that, the income will be increased. The method used in the research is descriptive method by reading from various existing journals. The results show the role of Market-false E-commerce in agricultural

transactions is helpful, ranging from marketing products through media such as websites, social media, and advertisements. The role of the E-commerce Marketplace in transactions greatly provides benefits such as facilitating transactions, knowing the availability of goods, and ease of accessing the site.

[4]The research work implemented a multilingual translation system for enhancing agricultural e-extension services delivery that ensures real time agricultural information is provided to farmers irrespective of their geographical location and language. The implemented system translates the agricultural information from a source language (English) into four(4) other native languages (Arabic, Hausa, Ibo and Yoruba) depending on which the native farmer reads and understand.

[5] The proposed work focus on integrating the machine learning strategies to provide the exclusive information to the farmer by helping them with the information about the infections occurred to their crops. The experimentation in the proposed work is carried out on the maize crop as it contains the various classifications of diseases which might be due to climatic conditions, fungal infections etc. The process simplifies the task of knowing the details about the infections occurred by simply uploading the image of the infection, which is fed to the image processing strategy using Machine Learning for identifying the rots.

1. 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. A multilingual chat bot that includes a voiceover and an entity extraction for the query of the farmer has been implemented. 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.

[7] The entire work was primarily based on objective of providing farmers with a handy and portable virtual interactive farming assistant that can communicate with farmers. The app was designed to be extremely farmer specific. Agribot, not only helps farmers get best crop recommendations but it also helps them better nurture their crops, store their crops so as to increase shelf life of crops, as well as help them find best rates as which they can trade their crops in nearby markets.

1. METHODOLOGY

An interactive chatbot, which communicates with users through social media messaging applications and connects the consumers directly to the farmers without the interruption of middlemen collects details of the farmer, the crop cultivated along with land and maintains the records in a database. When a consumer requests a particular crop at a particular price, the chatbot automatically displays the farmer's details. Thus, the consumer may contact the farmer, provide him with inputs, pay the farmer and get fresh and organic food. (Refer fig.1.2.) The system was developed using the Raspberry Pi 3 model using Python 2.7.9, R language, Javascript, and PostgreSQL. It is possible to implement the system in Slack using open-source software called HUBOT. [2]

CHATBOT

1. Getting details of farmers, total land area, and crop that is cultivated.
2. Receiving a request from users and recommending farmers accordingly, providing them with the contact number of the farmers.

3. Maintaining the farmer’s profile and keeping track of service

Fig.1.2. Working of E-agriculture chatbot

For disease prediction using Machine Learning, Rot Identification and disease predictor are the two basic steps to be followed. The idea of including Convolutional Neural Network (CNN) is to train the images of various types of diseases in the crop such as infections and other possible rots. It includes main layers namely the Max-pooling layer, where sampling is performed by reducing the size of feature maps to achieve the spatial mapping for faster and better performance, and a soft-max layer, that is used to perform classification for data set availability. (Refer fig. 1. 3.) After the rot identification phase, a set of questionnaires is generated with the basic symptoms of the identified rot, consisting of true or false/ yes or no logic using the IF-THEN principle., if the set of answers is determined as true, then the information about the symptom is presented to the farmer. [5]

METHODOLOGY

ROT IDENTIFICATION

DISEASE PREDICTOR

R-CNN

CNN

MAX POOL LAYER

SOFT POOL LAYER

Fig 1.3. Methodology in the identification of crop diseases

Data mining and analytics assist and guide the farmers with various farming techniques and practices. To make this easily approachable to the farmers, a chatbot is proposed in which the Natural Language Processing technique is used. The input to the chatbot is the farmer’s queries in an audio format, that facilitates user-friendly interaction. If any of the queries is not been answered then, it is redirected to helpline centers. The responses are generated based on various machine learning algorithms modeled around data set. [7]

A mobile application that assists the farmers in two ways, the voice bot and the suggestion bot is also been developed to respond the farmer's queries in the multi-language. For this, agricultural multi linguistic voice bot using Google translator,pysttsx3 and Google search engines have been used. Also, the suggestion bot gives a versatile suggestion to the query related to weather, crop, fertilizer, soil etc. Data Analysis is the first step for analyzing and replying to the farmer. The farmer will give voice input that is fed into a voice text synthesizer using a google translator. Crop suggestion is done based on the location,weather and soil type. The farmer will give the location of cultivation as the input. Using the requests and on module the algorithm requests the data from the website and process the data with the help of on module. The requests module permits sending HTTP demands utilizing Python. [6]

Identification of rots and diseases in crops obeys four processes of which Validation is the process of verifying the test image obtained from the farmer. (Refer fig.1.4.) If similar annotations are found, then the corresponding class of infections is selected in the next phase. Otherwise, no information is provided. Query Processing deals with presenting the set of questions related to the symptoms identified on the crop, and applying IF-THEN/Decision Rules on them. In the next stage, detailed information about the infection obtained and reasons for occurrence and preventive measures is provided. The final stage of Presentation gives information about the infection that occurred and the reasons for such infections and necessary preventive measures are displayed to the farmer. [5]

ACQUISITION

VALIDATION

ARCHITECTURE

QUERY PROCESSING

PRESENTATION

Fig 1.4. Stages in Architecture

In voice bots, the farmer can ask his query using the mic in his phone. This audio input is converted to text and the system will repeat the voice input again for confirmation of input and this text will be searched in web and web text will be converted to voice .The query of the farmer will be addressed by our voice bot. There is also a suggestion bot is also embedded to suggest about what crops can be used in a particular type of soil and what fertilizer can be used to increase the crop yield. [6]

1. RESULTS AND DISCUSSION

The various advancements discussed above serve as the support system for an innovative and productive farming. The crisis of diseases, scarcity and other problems could now be overcome with the application of these technologies. This definitely promises a better agriculture with a proper yield and effective trade. Furthermore, this also encourages the next generation to take up agriculture as their profession, providing them a good pay and profit. Agriculture will grow massively as a profession and several stakeholders and companies might pitch in for further innovations in technologies.

1. CONCLUSION AND FUTURE ENHANCEMENT

The direct marketing using chatbots can further be improved by including live monitoring of the status of the crop and live tracking of the transport of the crops from the farmer to the consumer. This helps the consumer to build unbreakable trust by keeping track of the status of completion and also monitoring the progressive work going on.[2]

The methodology of Faster R-CNN can be extended by employing the RGB configuration to predict the object more accurately for the color of the surface of a plant and leaf color and integrate SMS and call gateway APIs, text to voice translation systems which would help in a more precise way to the farmer by supporting illiterate farmers providing the precautions and preventive measures in the form of voice commands using IOT operations.[5]

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