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Computerized System for Farmers to Increase Profit and Growth

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***Abstract*— Nowadays, major problems faced by farmers are low profit on their products (crops) and lack of guidance on fertilizers and climate issues. So, we are here with a solution to deal with their issues by creating an Application and E-commerce platform. Our application contains a Chatbot which will helpful to farmers in solving some queries like--which land and which climate suits to a particular crop and which crop gives more profit in particular area --etc. E-commerce platform is based on F2C (Farmers to Customers) model which means farmers can sell their crops directly to the customers or retailers without interference of third parties. Also, E-commerce platform have data visualization tool.**

Keywords-- Chatbot; F2C; ANN; Data Visualization;

I. INTRODUCTION

In India, agriculture plays an important role in the economic development by contributing about 16% to the overall GDP and accounting for employment of approximately 52% of the Indian population[1]. According to the Farmers' portal[1], rapid growth in agriculture is essential not only for self-reliance but also to earn valuable foreign exchange. However, most farmers can not sell their crops to other areas. Also they do not have access to authentic information about the latest farming practices and trends. So people involved in the occupation of farming are comparatively slow adopters of latest technology. Traditionally, APMC agents and merchants buys their crops and sells with commissions or at lower prices. So, farmers do not get actual price with profit. Also, farmers are often unable to obtain agricultural information which can help them in taking better decisions related to the crops that they cultivate. This leads to reduced crop yield, increased wastage of valuable labor, and market inefficiency. These reasons add up to severely impact a farmer's earnings, time and opportunities to increase the crop yield. In recent years, the use of Information Technology (IT) in agriculture extension has grown. According to TRAI[13], there were 647 million urban mobile subscribers while 519 million rural subscribers as of Aug 2018 and The Economic Times predicted that by 2020, 50% of internet users will be from the rural sector. This data shows that mobile connectivity is seeing an Exponential growth aiding to the promotion of agricultural information by IT services. The Government faces difficulties in spreading vital information related to farming. In such a scenario, usage of mobile devices to sell their crops directly to customers or retailers with maximum profits and spread agriculture related information appears to be a promising solution.

II. LITERATURE SURVEY

A. Natural Language Processing (NLP)

Looking at agriculture as a specific domain ADANS (Agriculture Domain for question answering system) uses NLP and semantic web technologies to provide answers for asked questions[4]. The task is done in steps where pre-processing of the natural language takes place. Here POS tagging, removal of stop words is carried out. In the next step triples are formed. Ontology is built with protégé tool. SPARQL is a language used to query the system to provide answers to the asked questions.

B. Chatbot

It started in 1950 by Alan turing who posed a question "can machines think?" It is known as turing test. In 1964 a first Chatbot was built with pattern matching technique named as ELIZA for human machine interaction. Woods in 1977 gave a system LUNAR for distinguishing and

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analyzing the soil composition[2]. FAQ Finder system has a query list with the assistance of knowledge base questions asked are matched.

In 1996 Ask Jeeves was designed to answer every day posed questions by Garett Gruener et.al[3]. The system to the asked queries.

New technologies have favored the creation of intelligent and autonomous systems, and among them is the emergence of Chatbot. The term “Chatbot” or “chatterbot” indicates a robot that can talk and can be defined as a software that allows the simplification of interactions between humans and machines[5].

The engine is the most important feature of a Chatbot. It is responsible for the transformation of natural language into machine-understandable actions. Chatbot engines are usually developed using several Natural Language Processing and Machine Learning models to provide acceptable levels of accuracy (KAR; HALDAR, 2016). Many companies are using Chatbot and virtual agents all around world. For example, Disney, created an Officer Judy bot on Facebook Messenger to promote the 2016 movie Zootopia[5]. Users helped Officer Judy Hopps to solve cases, spending an average of 10 minutes talking to the bot. An AI Chatbot has two components. They are machine learning and natural-language processing (NLP). Machine learning is an ability of systems to learn from experience without human intervention and then they use what they have learnt. Natural-language processing (NLP) is another component of a Chabot’s intelligence and it refers to the analysis and synthesis of human languages. NLP makes use of predictive analytics, a combination of statistical, data mining, and data modeling techniques aimed at generating information, without having to wait for a prompt from a user.

III. PROPOSED SOLUTION

A. *E-Commerce*

We have developed the E-Commerce platform based on F2C (Farmers to Customers) model to buy/sell crops for farmers and retailers. Farmers add crop details with price and retailer buys them directly without any third parties. Here fig(1) and (2) shows dashboard for customers/retailers.

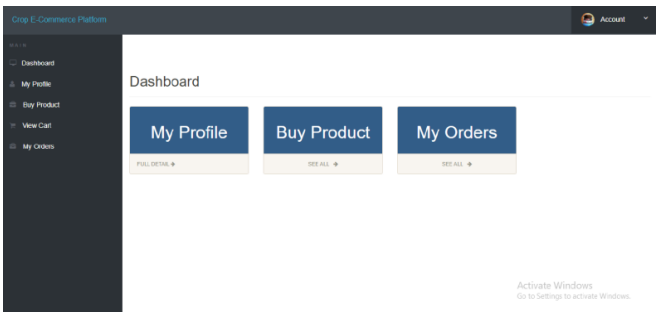

Figure 1. Customer/Retailer dashboard

Answer bag that responds to the posed question on the ranking technique by combining the internet FAQ’s. Amazon developed A9.com in 2003, it provides online knowledge base for finding a product or advertising. In 2005 yahoo answers was built to give responses

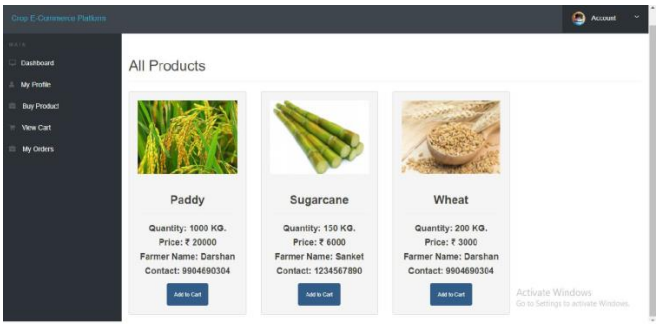

Figure 2. Products in Customer’s Dashboard

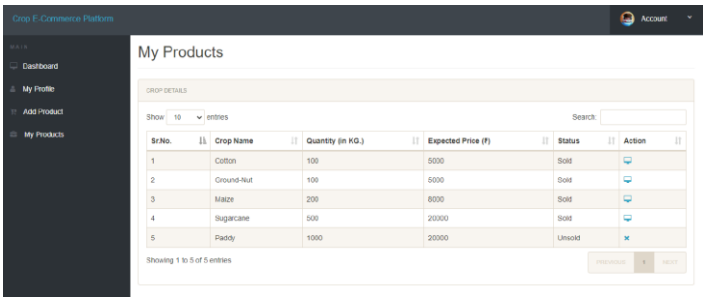

Figure 3. My Products menu for Farmer’s Dashboard

As shown in above fig[3], farmer can see also status whether his crops sold or unsold with accurate time and date.

B. *Chatbot*

Chatbot is developed using Artificial Neural Network(ANN). It is divided into two parts. First one is general chat for all users. Second is interacting with bot which is developed using ANN and NLP.

Natural Language Processing(NLP) is helpful to clean and preprocess the data. Firstly, we create a intent corpus on our trained data by using Porter Stemmer method. After that we have to create a Bag of Words model on intent corpus. Bag of Word model is helpful to train data on ANN.

Components of ANN

1. Neurons

ANNs are composed of artificial neurons which are conceptually derived from biological neurons. To find the output of the neuron, first we take the weighted sum of all the inputs, weighted by the weights of the connections from the inputs to the neuron. We add a bias term to this sum. This weighted sum is sometimes called the activation. This weighted sum is then passed through a (usually nonlinear) activation function to produce the output.

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2. Connection and Weighs

The network consists of connections, each connection providing the output of one neuron as an input to another neuron. We have assigned each connection is weight that represents its relative importance. A given neuron can have multiple input and output connections.

3. Propagation function

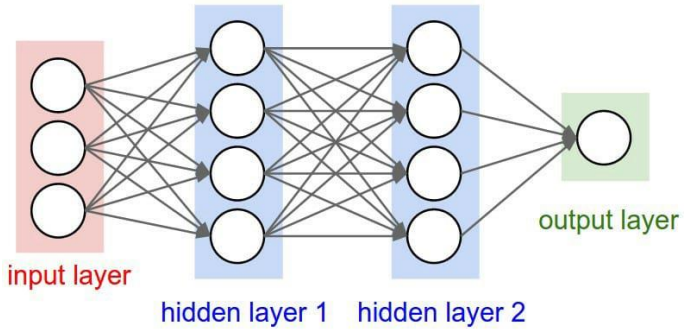

Figure 4. ANN for Chatbot[7]

However, neural networks with two hidden layers can represent functions with any kind of shape. Hidden layers allow for the function of a neural network to be broken down into specific transformations of the data. Each hidden layer function is specialized to produce a defined output.

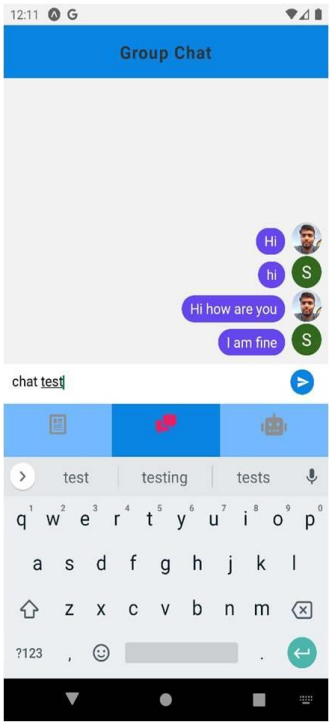

Fig 5. General Chat

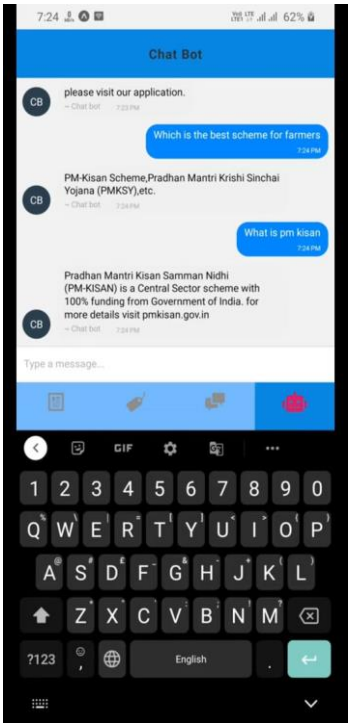

Fig 6. Chatbot

The propagation function computes the input to a neuron from the outputs of its predecessor neurons and their connections as a weighted sum. A bias term can be added to the result of the propagation.

4. Hidden layers

Here, we used Artificial Neural Network with two hidden layers. There is currently no theoretical reason to use neural networks with any more than two hidden layers.

As shown in fig[6], farmers ask queries regarding their crops farming tips, new agriculture technologies, Government Schemes and also current market prices.

C. Data Visualization

1. Data Collection

We collected our data from https://www.kaggle.com. We are collecting data for all of Gujarat State. Since 1997, with automated the whole process through a JavaScript program which downloads and store files as Comma Separated Values (CSV)[6]. CSV file contains district name, crop year, season, crop, area and production.

TABLE 1 DATASET OF CROPS IN GUJRAT

	District_Name	Crop_Year	Season	Crop	Area	Production
0	AHMADABAD	1997	Kharif	Arhar/Tur	2900	2200
1	AHMADABAD	1997	Kharif	Bajra	41700	43700
2	AHMADABAD	1997	Kharif	Dry chilies	700	700
3	AHMADABAD	1997	Kharif	Groundnut	500	600
4	AHMADABAD	1997	Kharif	Jowar	42500	33500

2. Data Preprocessing

Firstly, we find out null or missing values in the dataset then put missing values by “Mean” method.

3. Data Interpretation

To understand data our dataset we explored the features we are already presented with, namely, the state names from where each query was asked, the season and query type.

The data analysis gives a better picture of the agricultural landscape of Gujarat State. Using Seaborn and Matplotlib, we had plotted graph regarding which crops are popular in which district fig[7], what kind of crops are most sowed per season per district fig[8] and which crops are most popular in particular season per district fig[9].

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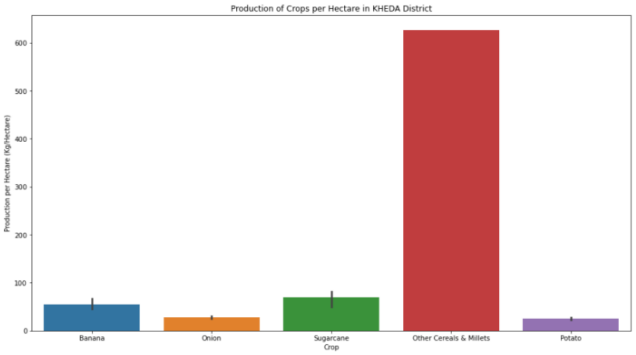

Figure 7.

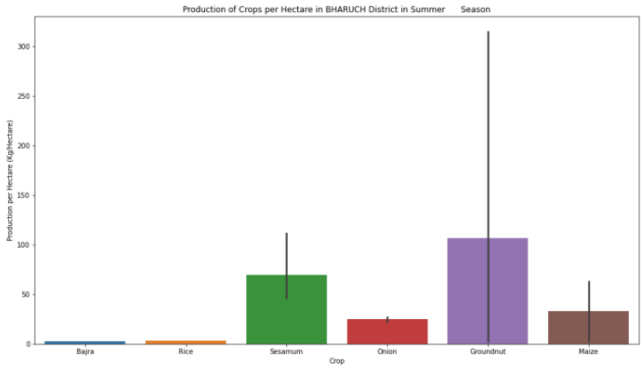

Figure 9.

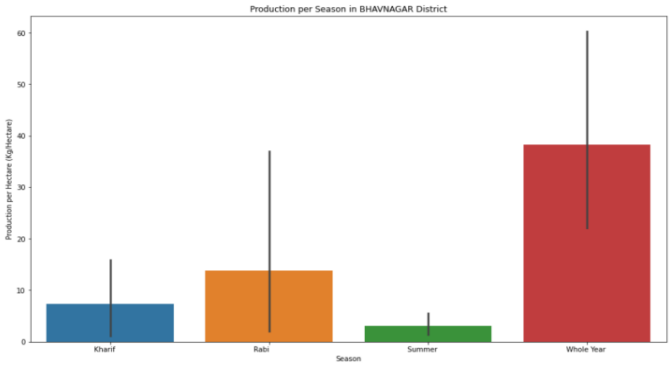

Figure 8.

III. FUTURE SCOPE

Chatbot is supporting English Language only, for illiterate farmers we have to develop Chatbot in other native languages also. We have to collect data of all the states India, so that we can plot graph of all regions by Data Visualization. More customization in F2C model will be develop.

IV. CONCLUSION

New technologies have favored the creation of intelligent and autonomous systems, and among them is the emergence of Chatbot. We have worked and brush up our skills in emerging area like farming and we are expecting that our work will helpful to all needy ones. So, we are concluding our work with hope that our work will have a great effect on farming sector.

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