

Demand Based Crop Recommender System for Farmers

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Abstract—About half of the population of India depends on agriculture for its livelihood, but its contribution towards the GDP of India is only 14 per cent. One possible reason for this is the lack of adequate crop planning by farmers. There is no system in place to advice farmers what crops to grow. In this paper we present an attempt to predict crop yield and price that a farmer can obtain from his land, by analysing patterns in past data. We make use of a sliding window non-linear regression technique to predict based on different factors affecting agricultural production such as rainfall, temperature, market prices, area of land and past yield of a crop. The analysis is done for several districts of the state of Tamilnadu, India. Our system intends to suggest the best crop choices for a farmer to adapt to the demand of the prevailing social crisis facing many farmers today.

Key words- *Agriculture Support System, Big data, Crop prediction, Regional translation, voice synthesizer*

I. INTRODUCTION

Gone are the times when the world used to depend a lot on agriculture and now, agriculture is dependent on the world. Agriculture is something that people have started to become lethargic on, forgetting that it is what is keeping us alive. But there are still some hardworking, passionate farmers whose life runs on just farming. But there's also the corruption that's increasing a lot nowadays. The Main motive of the Department of Agricultural Marketing & Agricultural Business is to have a fair price to the farming community who are pushed behind the current competitive marketing scenario and the mission of achieving the fair price is by making the existing act and rules strong and more effective by implementing new technologies and techniques aimed at reducing pre and post-harvest losses through proper and organised methods and encourage adding value to the market. The main purpose of creating a regulated market is to eliminate the unhealthy trade practice, to reduce the expenses in the market and to provide fair prices to the farmers. Several initiatives have been taken to promote agricultural marketing

in order to foster and sustain the pace of rural economic development.

To benefit the farming from the new global market access opportunities, the internal agricultural marketing system in the country also needs to be integrated and strengthened. In particular, the market system has to be revitalized to:

- a) Provide incentives to farmer to produce more;
- b) Convey the changing needs of the buyers to the producers to enable production planning;
- c) Foster true competition among the market players and
- d) To enhance the share of farmers in the ultimate price of his agricultural produce.

Today the farmers cultivate crops based on the experience gained from the previous generation .Since the traditional method of farming is practiced there exists an excess or scarcity of crops without meeting the actual requirement. The farmers are not aware about the demand that takes place in the current agricultural economy. This results in the loss to the farmers. The expressed reasons in order of importance behind farmer suicides were – environment, low produce prices, stress and family responsibilities, poor irrigation, and increase in the cost of cultivation. The main reason is the low prices of the products and the increased cost of cultivation. The cost of crops are determined by economic demand and the limits of the production.

In recent years, different application domains have been introduced with new constraints and methods for the technology. Information technology has become a part of our day to day life, and is increasing in the field of agriculture. Data mining in field of agriculture is a milestone in the field of research and development. Data mining is the process of discovering previously unknown and likely impressive patterns in large datasets. The mined information is basically represented as a model of systematic structure of the dataset;

this model can be used for new datasets that are used for the classifying and predicting.

A possible reason for the poor contribution of the agricultural sector to the GDP of India may be the lack of adequate crop planning by farmers as well as by the government. The GDP is one of the main indicator that is used to find the health of a country's economy. Rapid fluctuations in crop prices are common in the market. In such a scenario, it is difficult for a farmer to make an educated choice of crop to grow in his land or to estimate the yield and price to expect from it. The objective of our work is to help the farmer by applying predictive analytics on data from previous years.

II. RELATED WORKS

The agriculture production price is proposed by Grey Prediction system proposes a system that gives a excellent accuracy in the price forecast in the agriculture production market. The Prediction method is utilized to forecast the price of the agriculture products in the system. The drawback in this system is, the price of the crops predicted are not stable. Our system overcomes this problem by using demand grade for each crop. [5]

A support system in Bangladesh helps to assist the rural poor to help the farmer to assist about the demand of the crops through a website. But the problem in this system is, uneducated farmers cannot come to know about the system, even when farmers know about it but they don't know how to use the System. In our System the information will be send via phone voice message in their regional language. [9]

The process of predicting the crop yield using Data Mining approach uses a data mining approach through which the analyzed soil datasets are predicted. The disadvantage is that the system does not consider the demand existing in the agricultural economy. In our system the crops are suggested to farmers based on the demand by the market prices. [10]

Crop yield estimation using classification techniques estimates the crop yield and selects the most suitable crop for cultivation using data mining techniques thereby improving the value and gain of farming area. The disadvantages in this system are, that the methods to meet the demand and conveying the suggestions to farmers are not feasible. [15]

III. PROPOSED MODEL

In this section, we are going to present a conceptual model of our system and explain the various aspects of it in a systematic manner.

A. Pre-Processing of Review

The agricultural data of the previous year is collected and used by the system. This dataset includes the crop areas, types of crop cultivated, nature of the soil, yields and the overall crops consumed. Using this previous available farming dataset, the future demand of the crops are predicted.

The total crops cultivated and the overall consumption of each crops are identified from the dataset.

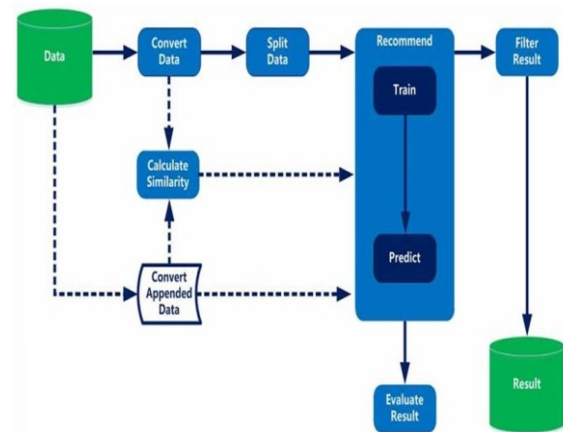


Fig. 1: Pre-Process Diagram

B. Demand Level Classification

The demand of the crops is predicted by classifying the collected dataset based on the change in the market prices of the crops. The data mining techniques are applied in order to classify the dataset. The system classifies the data into the following categories:

- **Excess**
Sudden decrease in the price or less consumption of the crop compared to the cultivation
- **Scarce**
Sudden increase in the price or less consumption of the crop compared to the cultivation
- **Neutral**
No change in the price and a standard price is maintained throughout

Based on the classification, we infer the demand. The scarce and increase in the price of the cultivated crops the demand of the particular crop is identified.

The outlier algorithm is to find the sudden change or a misplaced value in the dataset. In the samples of data, some data will point away from the sample average or mean of the dataset. This is the accidental change or sudden change in the price of each crop that is generated as a point of the distributions of the observations that are pointed far from the center of the data. Outliers indicate the outside data or the data that is being out of the sample average range. In large samples of data, a number of outliers can be found whenever there is change or a sudden increase in the price.

Initially,

$$\text{Demand} = (\text{cnum-cons})/\text{pc}$$

$$pc = d(p)$$

Where,

cnum = total crop cultivated
cons = total crop consumed
pc = change in price

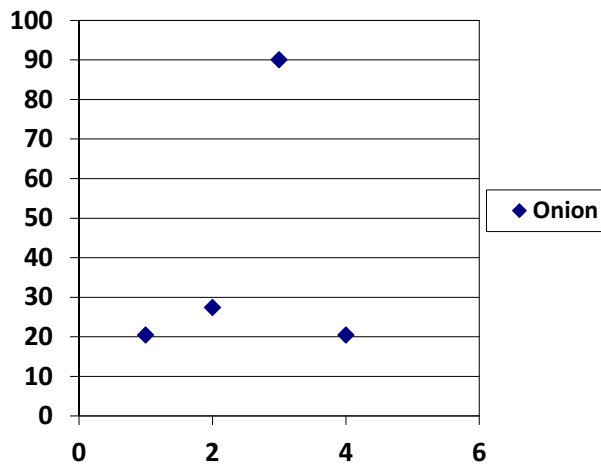


Fig. 2: Outlier in onion production quarterly

periods. The calculated demand is based on the total crop cultivated and total crop consumed along with the change in price which is the difference in the outlier price and the sample mean price.

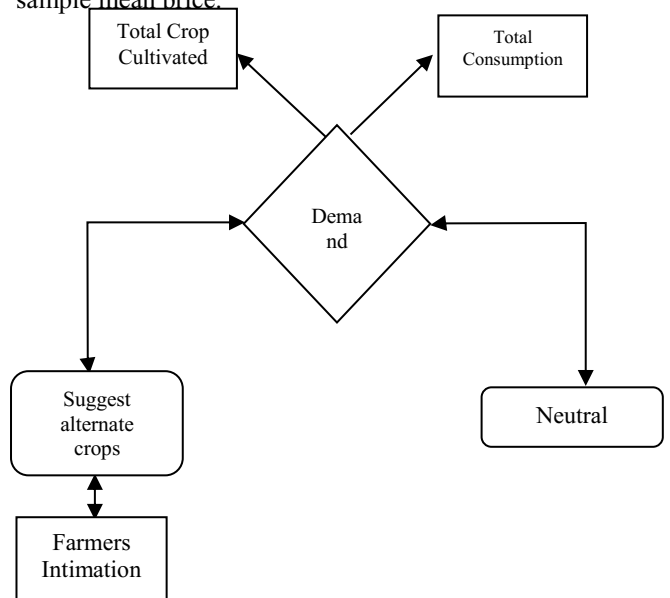


Fig. 3: Demand Classification

C. Suggestion of Crops

The system suggests the crops to be cultivated by

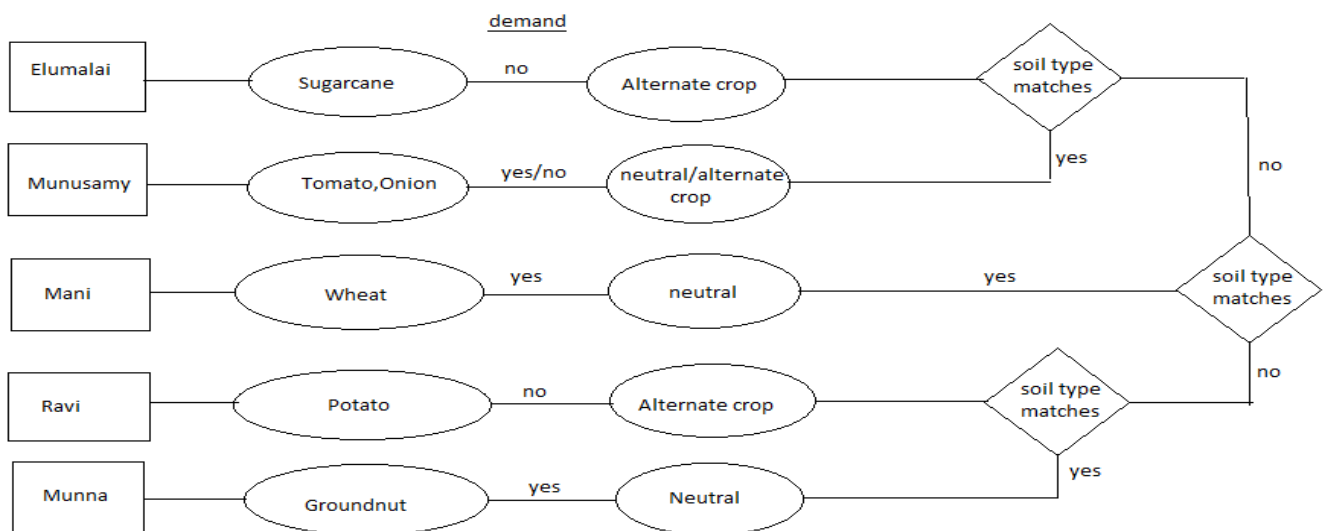


Fig. 4: Crop Suggestion

In the above figure demand is calculated by comparing total crop cultivated with total consumption of the same crop along some period of time. Then if the demand is low then alternate crop will be suggested. If the demand is high then such crop will be suggested as alternate crop.

The demand is calculated based on the formula and the outlier. The outlier provides the sudden increase in the crop price which is not in the same price of the other time

the farmers based on the data mining results. The various parameters such as the total cultivation of crops, area, overall consumption and the demand grade are considered for recommendation. The suggested data may contain one or more crop but the priority is given to those crops which correspond to the higher demand grade. Thus our system intimates the farmer about the demand and helps to cultivate the type of crops.

In the above figure each farmer data is analyzed along with their current cultivating crops and if it is in demand then the farmer will be intimated with a neutral message. If the current cultivating crop is in low demand then an alternate crop will be suggested after checking the suitable crop in demand which matches their soil fertility.

D. Text translation

Our system employs a text translator that converts the text from English to regional language with the processing of the natural language using artificial intelligence. It is done by the rules that are applied on the lexical words and phrases in the linguistic rule set by parsing the grammar tree. The system of with correct information under the proper intelligence that improves the efficiency of the system based on the linguistic rules. It enables us to share the suggestion of crops to the farmers in their regional language.

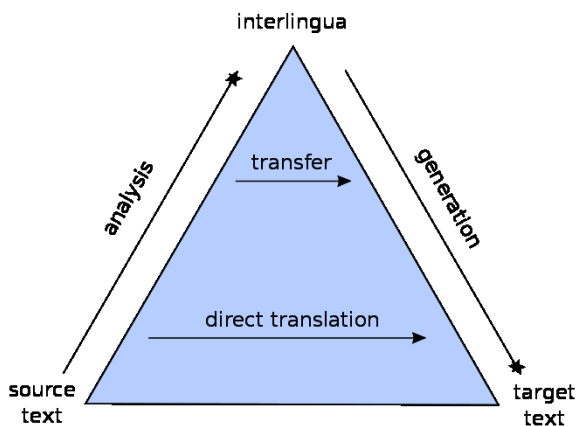


Fig. 5: text translation

In the above figure the source text in English will be converted into regional language by analyzing with the text to speech software.

E. Text to Speech conversion

The speech can be created by adding the pieces of prerecorded voices or speeches that are already stored in the database. Some systems have various input and output range based on the storage. Based on the size of the storage and lacks clarity or some systems with large words provide better quality. The speech can be synthesized by a modal voice or a track of voice and human characteristics to synthesize the output.

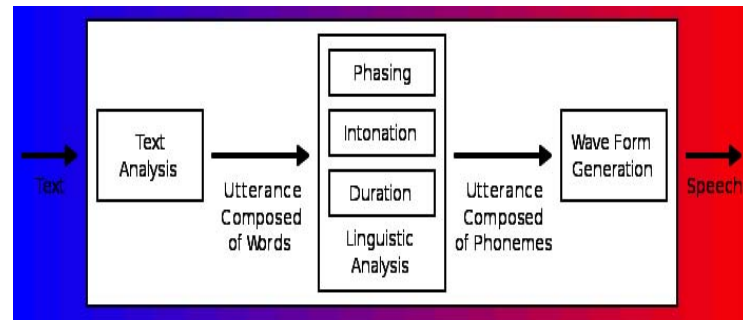


Fig. 6: text to speech conversion

In the above figure text in the regional language is first analyzed and then text is split into utterance composed of words like phrasing, intonation, duration, linguistic analysis. Then wave form generation is held. After that speech is saved in database.

IV. SIMULATION

Table I: total crops cultivated and sales account

Farmers name	Crops cultivating	Quality(in ton)	Profit/Lose
Elumalai M	Sugarcane	20	134500L
Munusamy	Tomato, onion	10,5	45000L,15000P
Mani S	Brinjal, potato	3,5	20000L,12000P
Munna D	Wheat	12	10000L
Palani E	Cucumber	1.5	30000p
Ravi R	Groundnut	3.5	12200P
saravanan	Maize	2.2	30000P



Fig. 7: login page



Fig. 8: admin page



Fig. 9: crop selection



Fig. 10: alternate crop suggestion

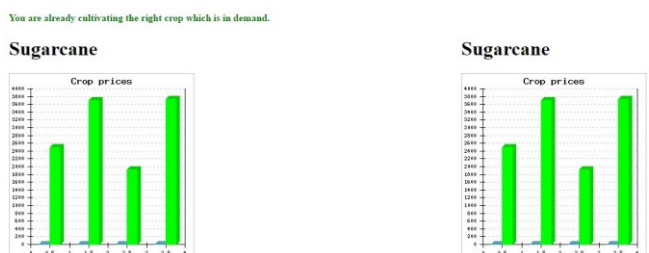


Fig. 11: crop suggestion when neutral

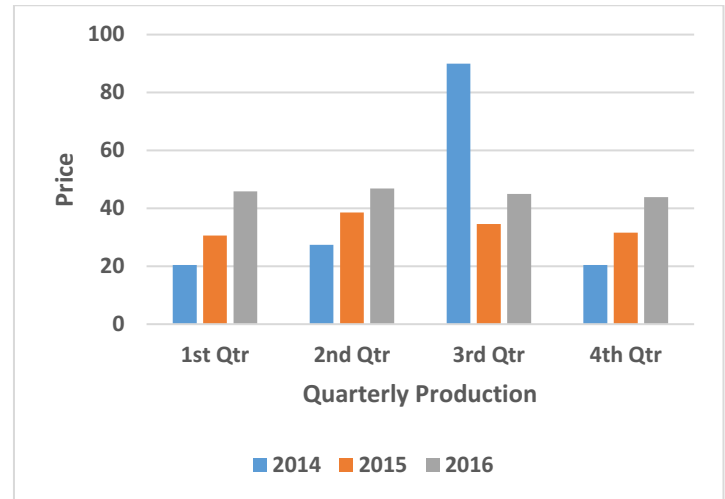


Fig. 12: the price in the three previous years

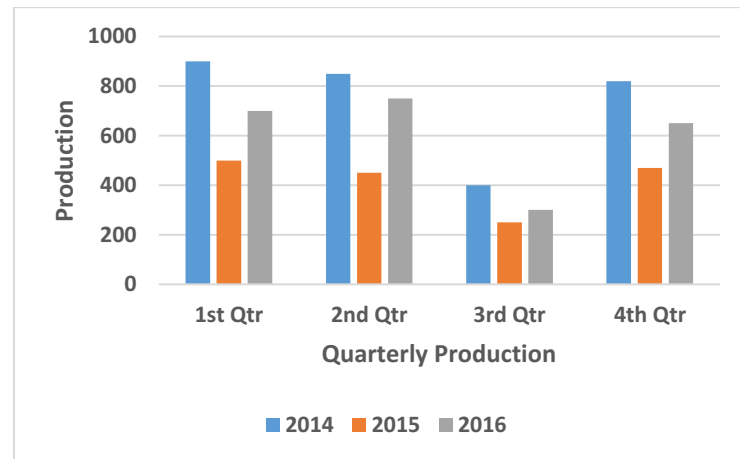


Fig. 13: production in three previous years

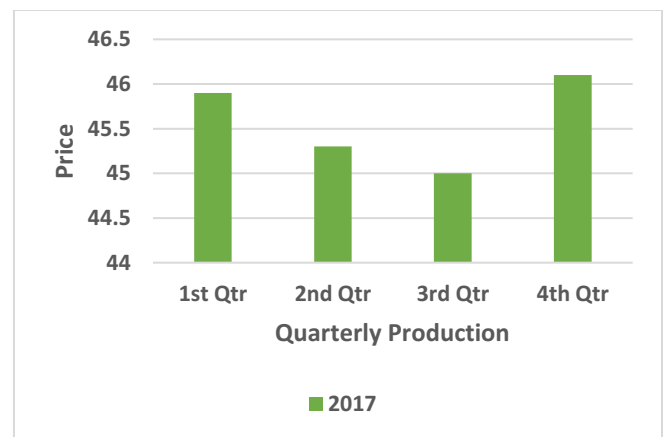


Fig. 14: the price after recommendation of crop

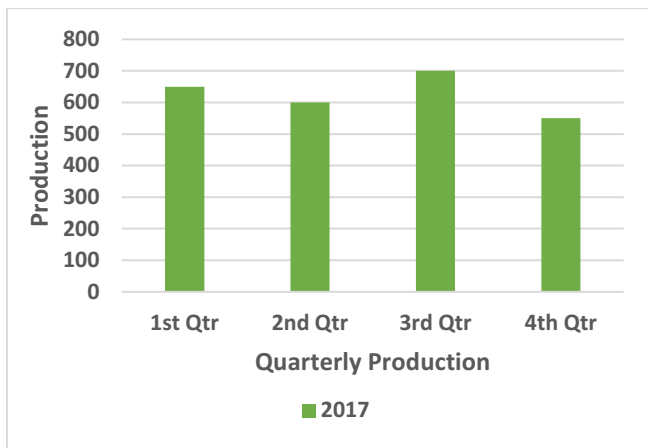


Fig. 15: production of crop after recommendation

The crop production is equaled and the demand of each crop based on the change in the price that increases gradually is reduced and the output provides the meeting of the demand.

V. CONCLUSION

Thus implementing the above system would further lead to the agricultural development of our country. The above system will further reduce the loss faced by the farmers today and would improve the yield for the farmers. The system can further be improved by integrating this with other departments towards the agricultural development of our country.

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