SMART AGRICULTURE ASSISTANT AND CROP PRICE PEDICTION

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Abstract - The smart agriculture assistant and crop price prediction web application help farmers, for crops that can be grown, the reference yield for each crop and fertilizer recommendation for crops based on soil sample tested. Secondary and micronutrients required for soil are suggested to the farmer, E- Agri shopping will help the farmer to buy better products for agriculture. The daily live price of crops and crop price prediction will assist the farmer for better crop marketing. The crop price prediction will predict the crop price for the next 12 months which will help farmers to know the crop price at the harvesting time or selling time.

Keywords – small agriculture assistant, crop price prediction, recommendation system, decision tree, commodities.

I. INTRODUCTION

The farmer due to the unavailability of right information and knowledge about agricultural science goes on growing crops which are not suitable for the soil type and adds access amount of fertilizer to the crops which not only harm soil but also to humans who consume those crops. The crops are usually bought from the farmer at a lower price by the broker and later those crops are sold at higher prices. Farmer also gets fertilizer, seeds, tools, and equipment of agriculture for a very high price which makes it too difficult to afford. The farmer usually doesn't have an idea what would be the crop price at harvesting time, and so they sell the crop at the price the broker has offered.

The smart agriculture assistant and crop price prediction web-based application will assist end-user in the field of agriculture. The end-user can request through a web application for collection of soil sample and test the soil sample in the soil testing laboratory. Various crops that can be grown, the reference yield for each crop, the different types of fertilizer combinations for each crop is recommended, the secondary and micronutrients required for soil is also suggested to end-user based on the soil sample tested.

The end-user can also buy seeds, saplings, fertilizers, agriculture tools, and equipment through the web application. The daily information about the price of crops from agmarknet and hopcom is accessed and this information will help end-user to fix the selling price of the crop.

The crop price prediction for 23 commodities will help end-user to know the crop price for the next 12 months, this crop price prediction data will help end-user to expect the crop price at the time of harvesting or selling the crops. Suppose the crop prices are low then the end-user can store crop in the warehouse until the crop gets a good price. The countries where crops can be exported and prime locations where crops are grown, information are also given to end-user.

II. LITERATURE SURVEY

This paper [1] proposes a system where the users are helped to decide which crop can be grown. The membership-based system is used and it has customized data of each user registered. The system incorporates a module that keeps up the data of the past crops grown from different sources and the crops which can be grown with the existing crops. The artificial neural network (ANN) is used for this system. The feedback system helps users to request for changes required and to report the error.

The author [2] proposes a system that is based on the knowledge database and results are drawn from the data. Various modules like users, knowledge engineers, domain experts, man-machine interface, inference engine, and knowledge base are considered. The information is extracted from the knowledge database by establishing a knowledge base. It uses Hadoop for feature extraction. The unstructured data is processed using NoSQL, Hive, Mahout and uses HDFS to store data. The results were presented for the wheat crop.

This paper [3] proposes a recommendation system for users, it considers the location of a user, data analysis and storage module, crops that are growing database, physiographic database. The comparative area discovery module identifies the areas which are like the user's areas and checks the similar crops that are grown in those areas.

The similarity matrix is generated and it consists of the crops grown based on the user's location. The recommendations for users are given based on the similarity matrix. The comparative area discovery module uses Google API services to get the current location of the user to identify similar locations.

The author [4] proposes a system for soil testing by sensors and the result is obtained fast as compared to laboratory-based soil tests. The sensors can produce the result for soil test within 30 minutes whereas results for soil testing in the laboratory require a few days. The results obtained from the soil test through sensors are analyzed using a microcontroller which in turn needs a few seconds to turn on the automatic fertilizer dispensary system. The fertilizer is added automatically and which ensures the fertilizer is neither excess nor deficient in the soil.

The paper [5] proposes the system which considers past research data to provide crop recommendation based on region, type of crop and fertilizer recommendation based on NPK content of the soil. The focus of this system is to increase the production of crops by recommending the correct crop and fertilizer. The accuracy of the system is high when performance evaluation is done.

III. METHODOLOGY

A. Architecture for smart farmer assistant

The input data is taken from soil testing laboratory and the results from the laboratory are taken and data preprocessing is carried out and later the soil test values are used to check the nutrient, secondary and micronutrients levels in the soil and if the nutrients level are low then the required amount of nutrients, secondary and micronutrients quantity to be increased are suggested to customer. The pH and EC values of soil are used to recommend crops that can be grown in the soil. Then based on the crops recommended the reference yield for crop per acre is suggested to the customer. Also, the fertilizer for the crops is also recommended, the customer can choose among the various combinations of fertilizers based on his availability of fertilizers. The customer can choose any one of the fertilizer dosages for the crop that can be either, Organic Fertilizer & Quantity, Bio Fertilizer & Quantity, Fertilizer Combination-1, and Fertilizer Combination-2.

The daily live price of the crop from agmarknet and hopcom, API are accessed and that would help in choosing the selling price of the crop for farmer. Later the farmer can also buy fertilizer, seeds, saplings and agricultural equipment from the web application. This would ease the work of the farmers.

B. Architecture for crop price prediction

The crop value forecasting will first take the farmer's current month, year, and then the data preprocessing is done and then the crop forecaster will predict the top 5 gainers and losers of crop price based on the present month and year. The change in the crop price percentage from the previous month is also updated to the farmer. Customer selects a particular crop then the current price of that particular crop, min and max price of the crop information is available to the farmer.

Countries, where the crop can be exported information, is also given to the farmer. The next 12 months crop value is predicted from the present month of the farmer. The line chart for a better understanding of crop price predicted.

C. Crop price prediction using decision tree algorithm

Algorithm: (Generate decision tree) To Generate a decision tree from the given training data.

Input: The training samples rainfall, wpi, represented by discrete-valued attributes; the set of candidate attributes, attribute-list.

Output: A decision tree for input dataset.

Method:

1) create a node k for data;

2) if samples are all of the same class, D then create a similar class

3) return k as a leaf node labeled with the class D; perform next step

4) if attribute-list is empty then go to step 5

5) return K as a leaf node labeled with the most common class in samples; // majority voting

6) select test-attribute, the attribute among attribute-list with the highest information gain;

7) label node K with test-attribute;

8) for each known value bi of test-attribute // partition the samples for better performance

9) grow a branch from node K for the condition test-attribute=bi; then continue to step 10

10) let zi be the set of samples in samples for which test-attribute=bi; // a partition

11) if zi is empty then

12) attach a leaf labeled with the most common class in samples; // add common sample

13) else attach the node returned by Generate decision tree(zi , attribute-list - test-attribute); returns node for decision tree

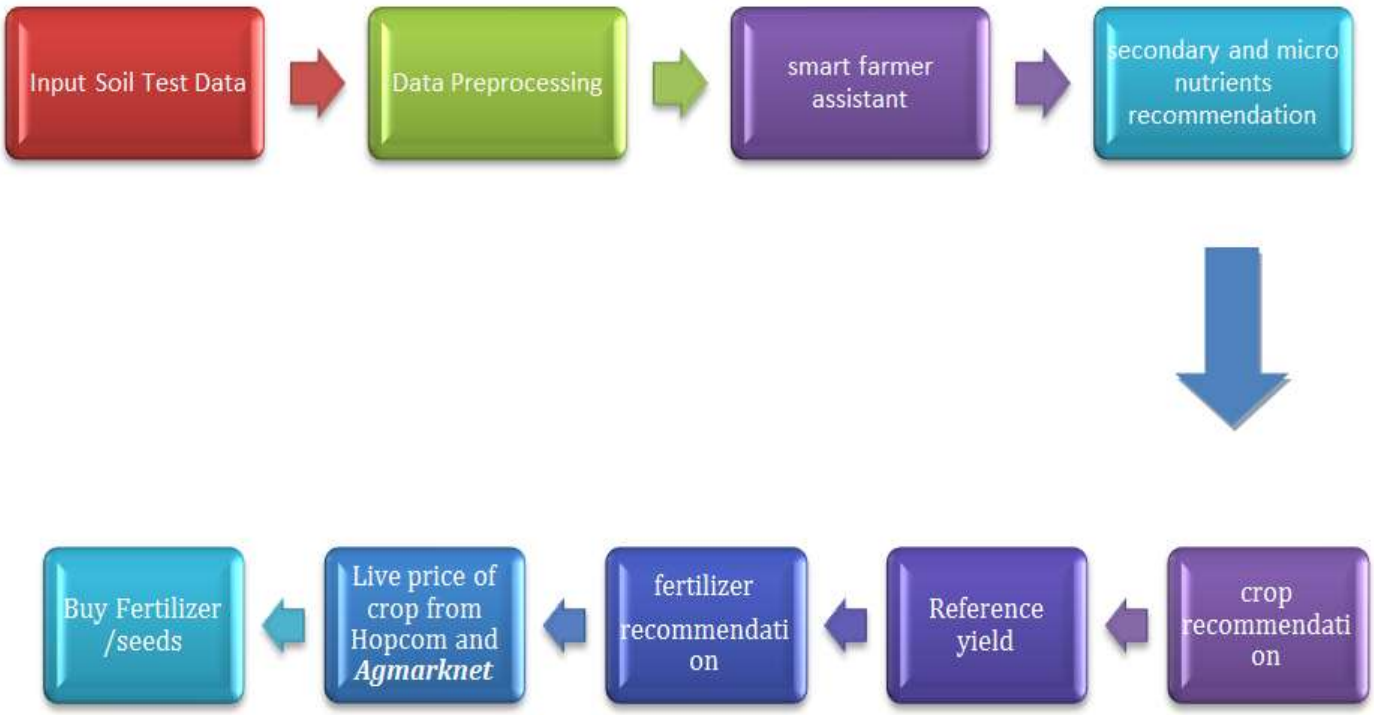


Figure 2.1**:** Block diagram for smart farmer assistant

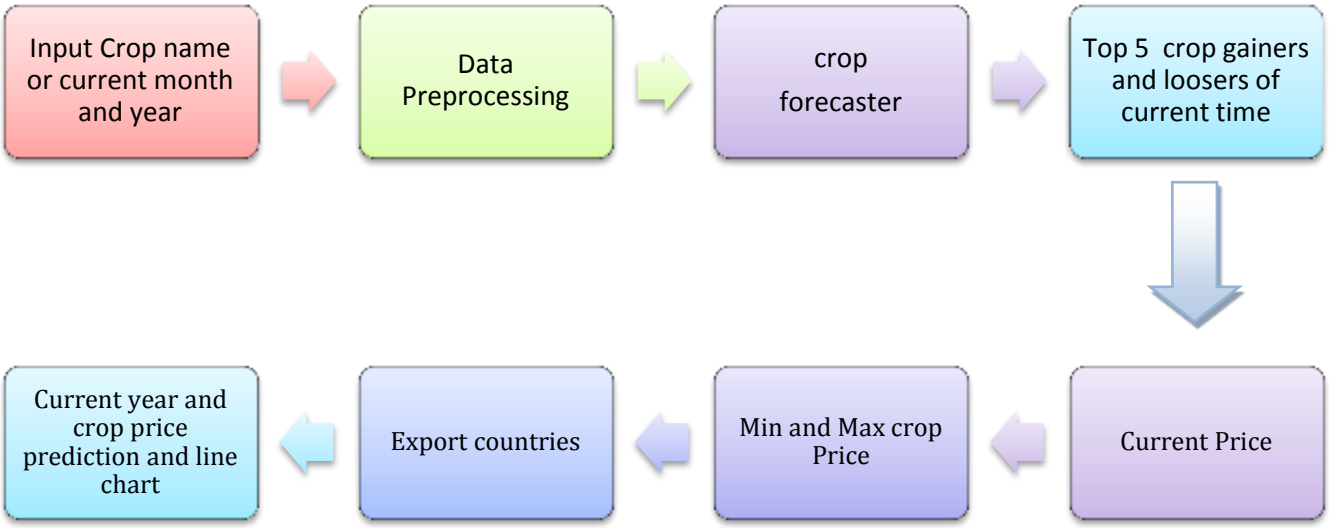


Figure 5.6: Block diagram for crop price prediction

IV. EXPERIMENTAL RESULTS AND SCREENSHOTS

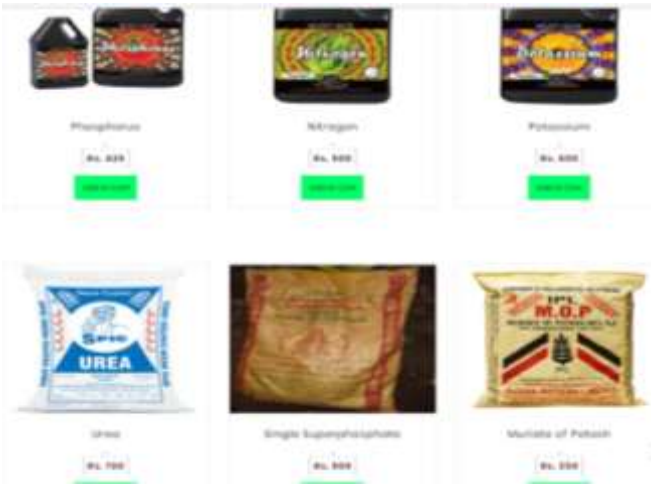
In this section, Screenshots represents the results obtained while running the project and the expected results are obtained. The client can request for soil test, and then based on soil values the crops and fertilizer are recommended, the reference yield is suggested for crops and later the daily live crop prices are also displayed to client. The client can also buy products for agricultural and equipment online. The admin can view soil request and later generate the results for soil values obtained from laboratory, fertilizer orders from client can be managed through web application.

My Soil Tests

Farmer Name	Ananda
Request Date	2019-08-24
Pickup Address	Vidyanagar Hubli
Note	ABC

PH	5	Strongly acid
EC	0.34	Normal
Organic Carbon(OC)	20	High
Available Nitrogen(N)	24	Low
Available Phosphorus(P)	25	Medium
Available Potassium(K)	30	Low
Available Sulphur(S)	30	Medium
Available Zinc(Zn)	40	Low
Available Boron(B)	40	Low
Available Iron(Fe)	1	Low
Available Manganese(Mn)	20	Low
Available Copper(Cu)	0	Low
Irrigation	Irrigated	

S.No	Crop Name	Reference Yield	Fertilizer & Quantity	Bio Fertilizer & Quantity	Fertilizer Combination1	Fertilizer Combination2
1	BLUEBERRY Fruiting Plants	22 q/a	FYM 10 t/ha	Rhizobium 1.250 kg/h	Urea-20,Single Superphosphate-525,Muriate of Potash-47	DAP(16:44:0)-151,Urea-5,Muriate of Potash-28
2	POTATO Vegetables	24 q/a	FYM 11 t/ha	Azospirillum 0.500 kg/h	Urea-435,Single Superphosphate-781,Muriate of Potash-21	DAP(16:44:0)-111,Urea-5,Muriate of Potash-28
3	AZALEA Bush Tree,Shrub	24 q/a	FYM 12 t/ha	Rhizobium 1.250 kg/h	Urea-600,Single Superphosphate-781,Muriate of Potash-29	DAP(16:44:0)-991,Urea-20,Muriate of Potash-28
4	HOLLY Bush Tree,Shrub	82 q/a	FYM 14t/ha	Rhizobium 1.125 kg/h	Urea-500,Single Superphosphate-256,Muriate of Potash-95	DAP(16:44:0)-211,Urea-14,Muriate of Potash-28
5	HYDRANGEA, BLUE Bush Tree,Shrub	07 q/a	FYM 19 t/ha	Azospirillum 0.900 kg/h	Urea-72,Single Superphosphate-525,Muriate of Potash-28	DAP(16:44:0)-391,Urea-54,Muriate of Potash-46
6	AZALEA Flowers	24 q/a	FYM 12 t/ha	Rhizobium 1.250 kg/h	Urea-600,Single Superphosphate-781,Muriate of Potash-29	DAP(16:44:0)-991,Urea-20,Muriate of Potash-28
7	CACTUS Flowers	82 q/a	FYM 14t/ha	Rhizobium 1.125 kg/h	Urea-500,Single Superphosphate-256,Muriate of Potash-95	DAP(16:44:0)-211,Urea-14,Muriate of Potash-28
8	AMARYLLIS House Plants	07 q/a	FYM 19 t/ha	Azospirillum 0.900 kg/h	Urea-72,Single Superphosphate-525,Muriate of Potash-28	DAP(16:44:0)-391,Urea-54,Muriate of Potash-46



Forecast Trends

Month	Price (per Qtl.)	Change
Aug 19	₹5650.8	-0.36%
Sep 19	₹5650.8	-0.36%
Oct 19	₹5579.4	-1.62%
Nov 19	₹5814.0	2.52%
Dec 19	₹6318.9	11.42%
Jan 20	₹5659.9	3.33%
Feb 20	₹5941.5	4.77%
Mar 20	₹5946.6	4.86%
Apr 20	₹5880.3	3.69%
May 20	₹5910.9	4.23%
Jun 20	₹5773.2	1.6%
Jul 20	₹5671.2	0.0%

V. CONCLUSION AND FUTURE WORK

This project will mainly bridge the gap between farmer and agricultural science. The farmer can easily adapt modern agriculture with the help of the web application. The farmer can now request for soil test through the web application. The farmer can easily know the contents of

the soil with the help of soil testing. The farmer without any struggle can easily get the information required to grow the crops. So the crops that can be grown are recommended and also the reference yields for the crops are also suggested. The fertilizers required for the crops are also recommended but the fertilizer recommended has different types so that farmers can adopt the fertilizer combination whichever is convenient. The different types of fertilizer are organic fertilizer, bio fertilizer, the combination of urea, single super phosphate, murate of potash (fertilizer combination-1), combination of DAP, single super phosphate, murate of potash (fertilizer combination-2). The daily live prices of the crops are also suggested for farmers both from agmarket and hopcom so that farmers can know the current crop price and which will help to fix the selling price of the crop. The farmer can further buy directly fertilizer, seeds, sapling, farm equipment and tools required for agriculture through the web application.

The crop price prediction for 23 commodities will help the farmer to know the crop price for the next 12 months, the crop price prediction will help the farmer to expect the crop price at the time of harvesting or selling the crops. Suppose the crop prices are low then the end-user can store crop in the warehouse until the crop gets a good price this will ensure that farmers can have good profit at any point of time. The countries where crops can be exported and prime locations where crops are grown, information are also given to the farmer.

In the future, the soil testing can be automated by using IoT which will help in real-time data acquisition and better, analytics, crop cultivation, production. The precision farming will have edge over traditional farming and will increase the profit for farmers. Also, the farm produce could also be sold on this web application which will remove the brokers of crops and will help farmers to get a good price for the crop.

VI. REFERENCES

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