Agriculture Decision Support System using Data Mining

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Abstract— **In agriculture sector, achieving maximum crop yield at minimum cost is a goal of production. Process of taking a decision is so complex as there are several factors affecting entire farming process. This smart phone app is easy to use and in affordable cost which will suggest most probable matching crops to people according to basic inputs like water availability in mm, average temperature, average soil ph of farm, locality of farm, soil type, crop duration, etc. so by certain calculation at backend, this app shows most probable crops list for that farm..**

Proposed decision support system is useful in agriculture system to assist farmers for selection of a crop for cultivation mapping using different ground parameters like soil type, PH-value of soil, average weather required, required water consumption, temperature range, etc. This system used to increase productivity of crops by providing basic information and the list of the crops. Using of on-line analytical processing and date mining enriches knowledge base with new agriculture information. Android mobile use in agriculture is as the core components to more helpful for growth in agriculture sector. The main challenge in traditional method is selection of crops as per soil type. This user-friendly android application suggests most probable matching crops to farmers according to season and the soil type so that farmers can cultivate more suited crops and increase production ratio. Application takes inputs parameters required to identify the best possible crop and outputs the most probable matching list of crops. As this system more helpful to increase productivity of crops and indirectly to increase GDP of India reduce poverty.

Keywords: Agriculture, Classification, DSS, OLAP, d atabase

I INTRODUCTION

In recent research world, Data mining is a very critical domain for research. The methods are useful to provoke important and compatible knowledge which can be understood by many individuals. Data mining programs consists of various approaches which are mainly produced and used by commercial enterprises and biomedical researchers[1]. These techniques are well inclined towards their respective data domain. This Data mining software applications includes several methods that have been developed by both commercial

and research centers. This type of Data Mining application have been finding it's application in Scientific, Biomedical, etc purposes. For example, Data Mining has been used to examine large data sets and establish useful classification and patterns in the data sets. Various techniques of data analysis for e.g Natural trees, statistical machine learning and other analysis methods have been used in Agrarian and organic research studies[2].

Farming or agribusiness is the backbone of Indian economy, as two-third of the inhabitants live in rural areas and are depended(directly or indirectly) on farming for a living. The farming communities in India are facing a multiple problems to maximize their agriculture productivity[3]. In spite of fruitful researches on new farming practices regarding crop cultivation, majority of the farmers are not getting high and guaranteed yield due to numerous reasons. One of them is that skilful/systematic advice relating to crop growing is not reaching the agrarian public in a well-timed manner. The issues of global food security and the environmental penalties of incrementing production of food to the required heights are a important international worry. The growing human population over the past era has been closely related with an growth in food production. Generally, production has increased slightly faster than population. Also climate change will cause moves in areas appropriate for farming of a extensive range of crops. We have made an effort to present a solution to this problem. Efficient techniques can be developed and tailor-made for solving multifaceted soil data sets using data mining technique to improve the efficiency and correctness of the classification of large soil data sets.

The proposed system will be used in Agrarian sector. It will recommend Farmer to select a crop for production or cultivation mapping using diverse parameters like the type of Soil, Soil PH, Average Weather, consumption of water, Range of temperature as input. Good use of the new technology in precision farming can be done, due to which the cultivators can emphasize their hard work towards determining the crop yield, crop patterns and areas which are in need of water, nutrients or other considerations (like pesticides), average temperature of area, soil Type, Soil Ph value etc. This data which will be collected in real-time can increase farming efficiency by providing the farmer with the values of ground parameters[3] in a timely manner and there for to enable him act on it. Designing and developing of such wide range of such new applications (there is use of composed crop connected data by expert people and, from internet use of mobile technology with this statically records calculation)would greatly profit the agrarian sector which happens to be a driving factor of our Indian economy. The DSS was executed and evaluated by farmers as a useful tool for accessing data and advisories in agricultural systems. More research is suggested to in order to enable simple and reasonable mobile phones be used by agriculturalists to access wealth of agricultural data and policies from research centers and government resources. Further, it focuses on performance tuning of c4.5ss decision tree algorithm with the help of meta-techniques such as attribute selection and boosting.

II LITERATURE REVIEW

Two points are very essential for the crop to be grown that can be decided mainly on the basis of market and profit. [4]But up till now this is inherited or traditional method used which are not 100 percent assured effectiveness. In any area, the main cropping systems are the combined results of past and present conclusions by individuals, communities or governments and their actions. These conclusions are typically based on practice, tradition, predictable profit, personal first choice and resources, communal and political pressures,etc.

There is a lot of diversity in crops in India. In north India, there are two seasons, kharif, it's duration is July to October, and rabi whose duration is October to March. Crops produced between March and June are called as zaid. Can you make a guess why India has a diversity in crops? India has range of topography, climate and soil. Since India has tropical as well as moderate climate, crops of both the climates are found in India. There are very rare countries in the world that have variability as compared to that of India. [5]The major significant features of Indian agriculture are sustainable farming, which is highly dependent on monsoon and animals, variation in crops and predominance of food crops. Major crops in India can be generally divided into four categories i.e. fruits crops, plantation crops, cash crops, and food crops. In Precision-Farming field disparities are checked, stored for management and upholding of the valuable resources using technologies to achieve and increase cultivation or produce. This can be the apparatus at the hands of agriculturalists for selecting crop, management with objective of refining return on investments while preserving natural resources. Precision Farming deals and takes care of mainly three branches of science:

1. Crop Discipline: Thoughtful needs of crops rendering to weather and managing resources like fertilizers
2. Environmental Defense: Precision farming helps to decrease emissions of Carbon, Nitrogen and Methane.
3. With the use of Advance Technology in farming can help lessen depletion, reserve resources, and use them meritoriously causing improved efficiency, abridged efforts and boost economy.

Traditional classification structures include use of tables, flow-charts. This type of manual method takes a lot of time, hence fast, dependable automatic system for soil classification is required to make better use of technician's time.[6] The world's crop produce patterns are controlled by network Notion to identify the crops. The yield of a region's farms is significant for many reasons. Apart from providing more food, increasing the yield of farms disturbs the region's prospects for development and competitiveness on the agrarian market, income circulation and reserves, and labor immigration. As farmers accept new techniques and differences in production arise, the more productive farmers profit from an upsurge in their welfare[7]. There are various factors to consider while selecting a crop, a requisite that must be commenced before really starting farming venture.

A) *Existing Systems*

According to the survey, it is observed that the existing Applications in the field of agriculture are categorized as Applications on Farming, Applications on management of farms. Applications on Farming category focuses on providing aids to the farmers in their day to day works on the fields.

Agriculture refers to a sequence of agrarian processes which involve several day-to-day doings on the field, for e.g, sowing, fertilizing, weeding and making all the decisions related to agriculture. Farming activities focuses on how to apply fertilizers, grow plants, identify and correct plant diseases, kill weeds/pests and estimate the growth or the yield of crops. Current advances in development of Android application and an increasing availability of Android phones allow for particular agrarian burdens to be picked up and directed. For e.g, farmers may compute proper quantities of fertilizers for crop production upon examining color of crop leaves with some benefit from Android applications. The following are the subcategories of smartphone applications for farming: Crop disease detection and diagnosis, Fertilizer Calculator, Study of soil, Study of water

Applications on Management of farms[8] category examines the literature on applications of Android-based sensors for management of field. The Research papers under this category also studies agricultural issues from a system viewpoint. Precisely, Android applications under this category focus on a complete farm system as compared to the agricultural applications deliberated in the prior subsection. The key objective of the Android applications under this category is to enable users to manage the overall resources of the farm and activities more capably and meritoriously in order to attain their objectives, for e.g, To achieve maximum profit and farming yield. Following are the Android applications under thus category: Management of Water, Vehicle Monitoring, Land Management

Applications on Extensive services :In several countries around the globe, farming is the chief driver of the economy, but farmers are yet poor and under educated. Governments deliver agricultural extension lead as a service that spreads out to farmers to offer help, for e.g, teaching farmers of new crops, assisting farmers identify disease of the crop, and record-keeping farms to deliver subsidy to areas affected by disaster. Android phones and information technology have made the process easier and more manageable in recent times. This section assesses research papers that enables extension services. The Android applications under this category includes: Inspection of pests and Diseases by the experts

III Proposed System

ANNs provide a technique to illustrate synthetic neurons to resolve complex glitches in the same way as the human brain does. A subscription system allows personalized material. Background information is collected from various sources, handled by decision support models, and the results are combined into personalized pages with embedded graphics, skilled clarifications and links to extra data. There are many obliges like temperature, availability of water, type of

soil, soil Ph level to sort out the maximum likely matching crops. So we have formed one discrete special class to find it out that is Neural.java. We have taken inputs from the user and compute all values at back end and show matching crop. The Android Application will have two main modules for admin and farmers respectively. The admin and the farmer will have the permissions for accessing the content accordingly.

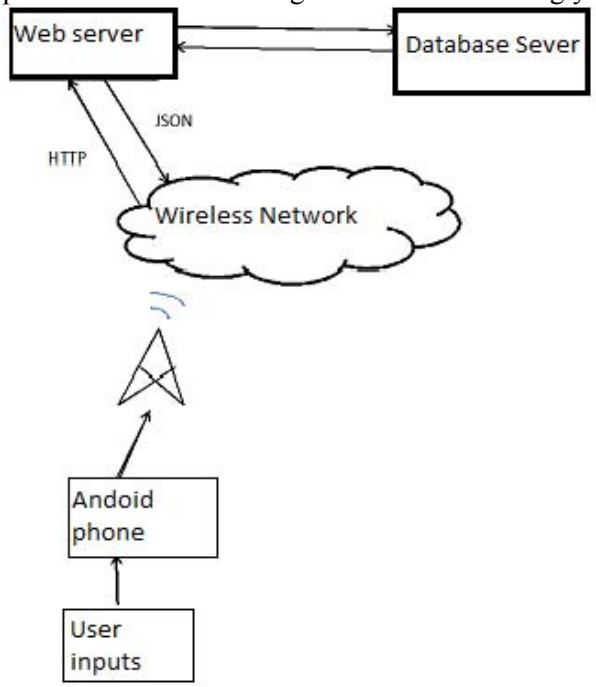

Fig. 1. System Architecture

Processing module will consist of:

1. Login
2. Add crops
3. Delete crops
4. Update crop information
5. View crops.

User Module will contain:

1. Registration
2. Login
3. View crop
4. Find Matching crops
5. View crop information.

The Application will also consists of a crop calculator which will display the Best probable matching crops to the user by calculating the values at the back end when the Following parameters will be provided:

1. The temperature range
2. Water Supply
3. Soil Type
4. Soil PH
5. Month of Cultivation
6. Average Whether

To deliver a user(farmer) diverse soil type drop list(Around 8 Types of soil), water supply constraint choices (Different 4 Ranges), Provide the ranges of teperature(3 Ranges) and various average climate choices and Soil PH(4 Range) and Duration of month (Kharif/Rabbi) Use this Statistical information plus Neural Network Function to compute a favored list of crops. If specific crop gets selected from the user from favored list then deliver a detail of data related to that specific crop for cultivation for example:

1. From Where to pick up seed or plants.
2. How to cultivate the specific crop and it's process.
3. How to manage the maintenance of the crop, etc.

After the whole process the Farmer or the client will be provided with a feedback link. Due to which the administrator will get an idea if any changes is supposed to be made to make the mobile application more user friendly.

Following Inputs will be accepted from the user: Soil type, Soil PH, Water Supply, Region, Temperature, Average Weather.

Matching crop = (Sn+Pn+Wn+Rn+Tn+An)

Here,

S= Soil type

P=Soil PH

W=Water Supply

R= Region

T= Temperature

A=Average Weather

n= nth crop

crop Matching:

Let J be set of crop and S be set of Matching Crop

If (Matching crop in S)

then

Select J

I. MATHEMATICAL MODEL

System description: The system can be defined as the following set of tuples:

Let I be set of inputs

I =S, P, W, R, T, and A

Where,

S= Soil type,

P= Soil PH,

W=Water Supply,

R=Region,

T=Temperature,
A=Average Weather
crop matching is carried out with the help of inputs
crop matching has two keys CC, CM
Where,
CC = Crop Calculation
CM = Crop Matching
It is illustrated as:
Crop Calculation (CC):
Let S be set of values assigned for Soil Type
S = {S1, S2, S3,...,Sn }
Let P be the set of values for Soil PH
P={P1,P2,P3,.....Pn}
Let W be the amount of Water Supply in the region
W={W1, W2, W3,.....,Wn}
Let R be set of values assigned for Region
R = { R1, R2, R3,...,Rn }
Let T be set of values assigned for Temperature
T = { T1, T2, T3,...,Tn }
Let A be set of values assigned for Average Weather
A = { A1, A2, A3,...,An }

Crop Matching (CM)
Let C be set of crops
C = { C1, C2, C3,.....,C_n }
Let S be set of crops calculated according to all parameters
S = { S1, S2, S3,.....,Sn }
Suppose,
C1 = (1st crop)
S1 = (B1, MF...) ..... [crops assigned according to all parameters]
Some x : Sn | Score ..... [Crops holds strongest probability x in Sn]
Jn is selected

CONCLUSION

There is a need of identifying best matching crops in farming. The traditional ways of farming cannot help farmer achieve the required yield. Therefore a digitized method or system should be developed to help farmer increase the yield of their farms. As India is an Agrarian country. This system will provides a generalized solution for most of the problems in farming related to cultivation of crops. The main purpose of developing such system is to help farmers increase the productivity of their fields and to increase the gross domestic product and reduce poverty in India.

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