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Suggesting Pesticides for Farmers using Data Mining

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Abstract*: Agriculture plays a vital role in India's economy. Virtually fifty eight % of the rural people rely upon the Agriculture. One amongst the challenges that Indian farmers encounter nowadays is how to use the pesticides in correct way i.e. some pesticides work in some lands properly. For suppose if a chemical works fine in Chennai then the makers in Chennai created pesticides supported their land conditions. However if an equivalent pesticides utilized in Nellore they'll not work because of the different land conditions. Farmers could lose ton of cash. Some commit suicides conjointly. To rectify the above problem, we have a tendency to area unit developing a website that stores all knowledge concerning totally different lands in several areas and conjointly collects the information concerning pesticides that employment in their areas. So, in future farmers will search concerning the pesticides that employment in their areas which is able to work fine in their areas. We have a tendency to develop this product using HTML, PHP and MYSQL languages. We have a tendency to conjointly use a number of the information mining tools like Apriori and association rule.
Keywords:* Pesticides, Technology, Intelligence , Data Mining, Apriori Algorithm, Association Rule.

I. INTRODUCTION

India's agriculture is created out of diverse crops, with the premier nourishment staples being rice and wheat. Indian ranchers likewise develop beats, potatoes, sugarcane, oilseeds, and such non-nourishment things as cotton, tea, espresso, elastic, and jute (a lustrous fiber wont to create bagging and twine). Asian country could be a fisheries monster also. Farmers in Republic of India cultivate the majority forms of crops. In each crop that's cultivated have diseases as a result of some worms etc. To stop these diseases for higher outcome farmers spray pesticides. If pesticides work properly then the yield of crop is high otherwise the yield is low. Then farmers got loss once operating arduous for months. The main reason for can be farmers in India are illiterates and they don't grasp what the pesticides contain. Therefore to form the farmers conscious of pesticides that they need to use for a specific disease in crop we have a tendency to develop an internet site that offers some names of pesticides which will scale back the disease within the crop. In this way we reduce disease in crop at a similar time increase the production of the crop..

Generally farmers use fertilizers to extend expansion of various crops, since they contain plant nutrients like nitrogen, phosphorous and potassium etc. In olden days they used to produce these fertilizers using manure from cow dung etc. But creating natural fertilizers (manure) is incredibly time taking and extremely difficult, technology introduced artificial fertilizers called pesticides,.but problem with these pesticides is all types of crops should not be sprayed with same type of pesticide, since each crop requires some essential products based on the crop and its problem so we need to educate them properly that which pesticide can be used for which crop so that proper fertilization can be done.

A. Motivation

Agriculture field is the backbone of any country. Agriculture supplies the food and raw materials to the people in country. It is the only income source of many peoples. Peoples who belongs with agriculture field faces many problems such as decreasing production due to unsuitable climatic changes, flood, dearth and many other natural reasons and rarely factors. They are unable to do agriculture due to this reasons. We can use Information Technology (IT) to overcome this problems. In today's life Information Technology is used in every field worldwide. The Data Mining is a part of IT which we can use to solve agriculture problems mentioned above. The basic idea of the Data Mining is that it generates useful information by extracting from large datasets. To be more accurate, it is a technique of extracting useful information from large amount of data. It is the practice of automatically searching large stores of data to discover associations and trends that go beyond simple analysis. Data mining can answer questions that cannot be addressed through simple query and reporting techniques.

One of the problems that Indian farmers face today is using pesticides in correct way i.e. some pesticides work in some lands properly. For suppose if a pesticide works fine in Chennai then the manufacturers in Chennai made pesticides based on their land

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conditions. But if the same pesticides used in Nellore they will not work because of the different land conditions. Farmers may lose lot of money. Some commit suicides also.

B. Aim of the Proposed Work

To rectify the above problem, we are developing a website that stores all data about different lands in different areas and also collects the data about pesticides that work in those areas. So, in future farmers can search about the pesticides that work in their areas which will work fine in their areas. Data mining is used for decision making. So, we can achieve this using data mining.

II. LITERATURE SURVEY

Work that has been done in the past related to present work has been outlined below

A. Survey of Existing Models/Work

1) *D Ramesh (2013), JNTUH College of Engineering [8]:* In this paper the author's focus is on the application of data mining techniques like K-Means, K-Nearest Neighbour (KNN), Artificial Neural Network (ANN) and Support Vector Machines(SVM) in agriculture. With the help of these tools they find the yield prediction .
2) *G. Nasrin Fathima (2014), Jamal Mohamed College[9]:* In this paper, various data mining techniques like association rule, k-means clustering , classification and correlation are used for decision making in agriculture. So that farmer may know which method is best.
3) *Dr.Siddaraju V.G (2013), University of Mysore[10]:* This paper tells the importance of agriculture in India by analysing the previous results. How new thoughts can improve the yield of agriculture.
4) *B. MiloviC (2015), University of Novi Sad[13]:* This paper tells how one can apply data mining techniques in the agriculture. What are the issues that may happen while applying data mining techniques in agriculture.
5) *Union of Concerned Scientists (UCSUSA) (2015) [14]:* This publication speaks on healthy farm practice of crop rotation and diversity and adverse effects of monotonic farming. Based on survey it reveals the disadvantages with soil, crop and yield by practicing such farming and also advantages by rotation of crops at constant period for greater yield.
6) *National Institution for Transforming India (NITI) Aayog (2015)[15]:* This paper concentrates on the important factors that can improve the agriculture productivity like output per hectare, the farm size, relief measures during natural calamities etc
7) *R Gopala Krishnan (2015), Tata Group of Industries[16]:* This article tells what India can do differently in Agriculture by suggesting new ideas and government initiatives so that farmers can get benefits in agriculture sector .

B. Summary

There are many surveys discussing on application of data mining tools in agriculture like finding yield prediction and decision making. Also there are some papers on improving present agriculture system. But no paper discusses about suggesting pesticides for farmers using data mining. In this survey we are suggesting best pesticides to farmers based on Apriori and Association rule.

III. OVERVIEW OF THE PROPOSED SYSTEM

A. Introduction and Related Concepts

Agriculture is most essential and yet under developed area in present world human life cycle. It has larger scope of improvement by adopting to evolving technology day by day. There are many methods of digitalization in this area at higher level as in surveys and maintaining the database. Also there is digitalization at consumer end in obtaining agricultural products. But there is lack of utilization of technology at production end at individual level for simplifying this easy.

B. Architecture/Design of Proposed System

Fig. 1 shows an illustration of the main components that embodies in the invention. It constitutes front end, back end and data base. It also explains where data mining techniques are used.

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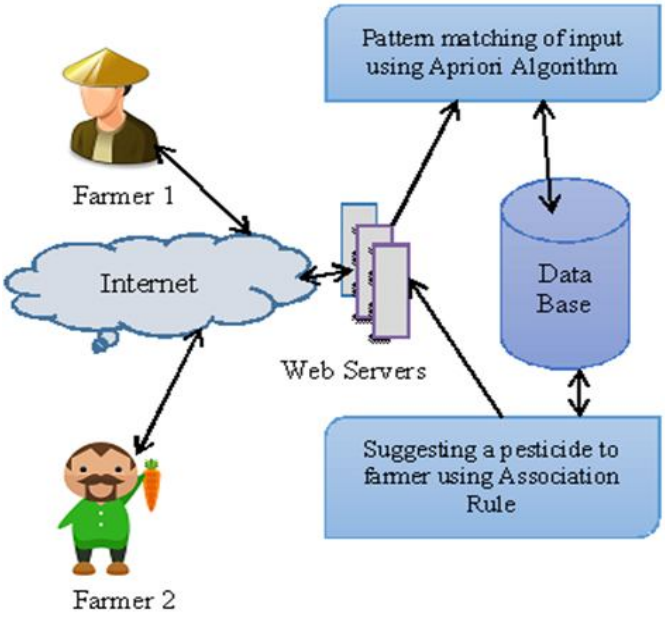


Fig. 1 A system architecture depicting the input

create this product, we need to build a website that takes the details such as Area, Soil type, Crop, Disease from the farmer and gives the right suggestion of pesticides to the farmer This product contains three parts which are interrelated with each other as shown below

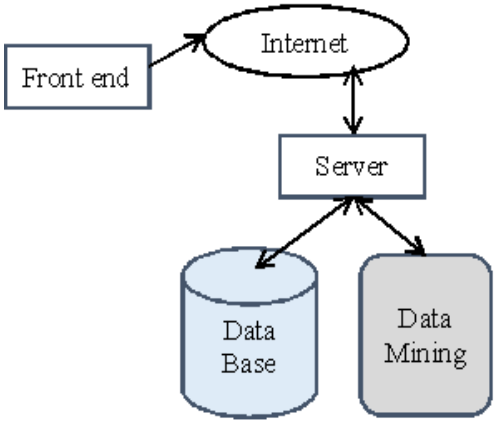


Fig. 2 Basic layout of this project

C. Front End

It collects the details of crop, disease, area and sends the details to the PHP to access the results from database. Front End is designed using HTML, CSS, JavaScript languages.

D. Server

Server collect the details from the front end and query the database to extract better suggestion of pesticides using data mining techniques like Association rule and Apriori Algorithm. Then it sends back to the front end where farmer can see the list of pesticides that can eradicate the disease in crop. Back End is designed using PHP and MYSQL.

E. Data Base

Before creating the database, first we have to collect the data from farmers like

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1) Rating of each pesticide for each area, store it in a table by calculating the average rating of pesticide\
2) Collect the details like for which disease which pesticide is best and store it in table.

Data Base is created using Apache server and querying using SQL language. The ER Diagram is look like as follows:

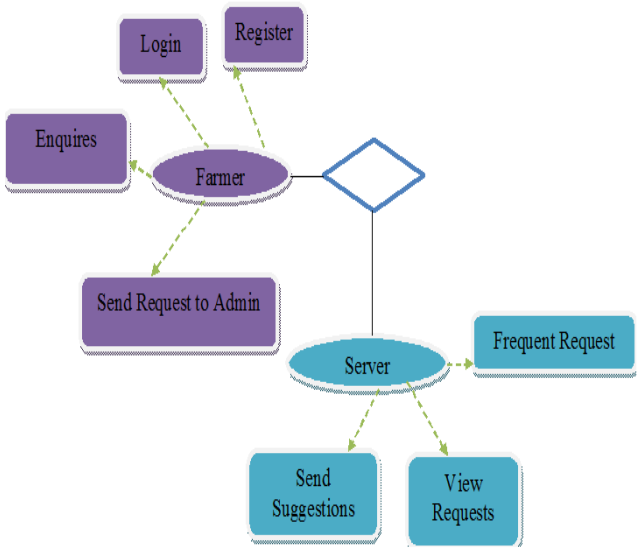


Fig. 3 E R Diagram

IV. METHODOLOGY ADAPTED

A. Association Rule

The main aspect of database mining is to process the interesting patterns and trends and output should be a simple and brief description of original database, it is difficult to achieve due to the imprecision with the term interesting, the solution contains various types, and one of the main one of it is association rule. An association rule consists of two parts, one is antecedent and another one consequent. Antecedent is also called if statement and consequent is also called then statement. An antecedent is the item which is found in data and consequent is the result which we have to get result.

Association rules are generated by examining data for common patterns and by the standards support and confidence to recognize the most significant relations. Support is a sign of how often the items seem in the database. Confidence is the number of times the conditional statements have found as true.

In data mining, association rules are generally useful for examining and expecting client behavior. They play very crucial role in market basket data analysis, frequent pattern matching, directory design and store layout.

Example – Paddy ^ Nellore ^ Disease ➔ Pesticide Name

Wheat ^ Vellore^ Disease ➔Pesticide Name

B. Apriori Algorithm

Forming an association rule is generally divided into two separate steps

1) Firstly, minimum support should be calculated to know all common item sets in a database.
2) Secondly, the common item sets which we got and the least confidence constraint are used to form rules.

We have to pay more attention towards the first step, while second step is very simple and standard. It is very tough to find all the frequent set of items in a database because it requires searching all the combinations of items. The total number of possible set of items is power set of I, since its size is 2n-1, by removing the empty set. Even though the size grows exponentially in number of terms of n in I, effective search can be done using closure property of support which promises that for a common item set, all of its subsets are also common and so for an uncommon item its superset should also be uncommon. So appropriate and useful algorithms can find all the frequent items.

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C. Apriori Algorithm Pseudo Code

1) L1=frequent_1-itemsets(D);
2) for (k=2;Lk-1≠φ;k++);
3) Prune1(Lk-1);
4) end fo
5) Ck=apriori_gen(Lk-1;minsup);
6) for all transactions t∈
7) C= sumset (Ck,t); find out the subset including C
8) for all candidates c∈C
9) c.count ++;
10) end fo
11) Lk ={c∈Ck|c.count≥minsup} //result of Prun
12) (Ck) } }
13) . end fo
14) eturn Answer∪kLk

D. Algorithm for Prune Function

Input: set k-1 frequent items of Lk-1 as input parameter
Output: go back and delete item sets with this number less
than k-1 in Lk-1
Procedure Prune 1(Lk-1)
1) for all itemsets L1∈Lk-1
2) if count(L1)≤k-1
3) then delete all Lj from Lk-1 (L1∈Lk-1)
4) end if
5) end for
6) return L'k-1

V. RESULTS AND DISCUSSION

The Farmer's request need to be categorized with previous requests, because the request that is enquired by the farmers more number of times need to be served first. This can be done by data mining technique Apriori Algorithm.
After collecting the input from farmer , the server need to give best suggestion of pesticides first. For that Association rule is used.

A. Example

1) *Input:* Crop : paddy, Disease : Vires, Area : Nellore
2) *Association Rule:*
a) paddy ^ vires ^ Nellore➔ Coragine . This one needs to be suggested first
b) paddy ^ vires ➔ Acephate. This one needs to be suggested next.
3) *Output:* Suggestions
a) Coragine
b) Acephate

VI. CONCLUSION

After creating this website, farmers will get good pesticides by searching in the website and the profit also increases. So, the income of India also increases as the increase in income in agriculture. Since we have given a new idea of identifying better pesticides using data mining techniques, farmers can easily know that which pesticide can be used in which place. Farmers don't even need to have the technical knowledge or even some computer knowledge, they can get the solution to their problem just by querying about the pests regarding with their land type, area, crop and disease.

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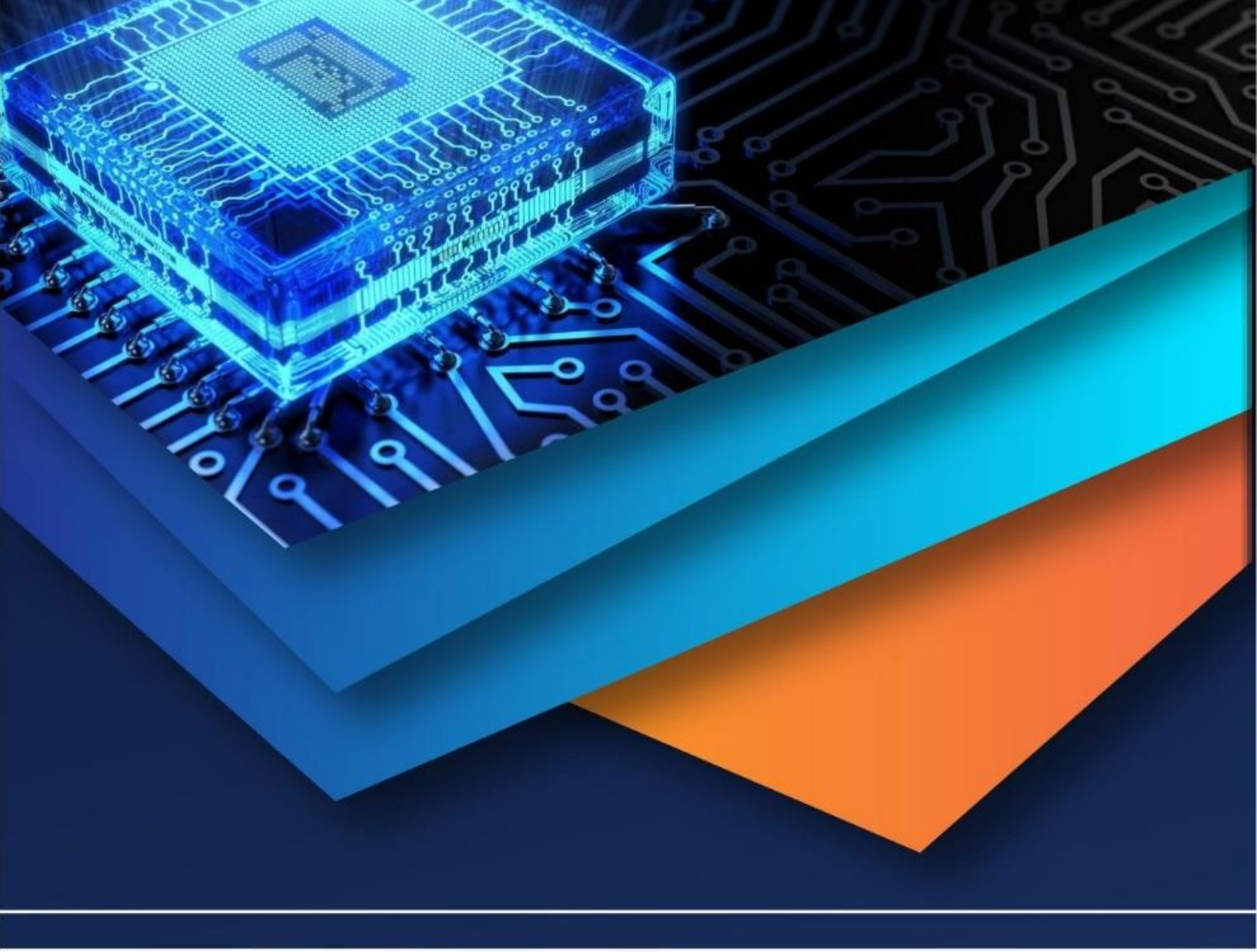
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