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# E-Agriculture - A way to Digitalization

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Abstract—**Agricultural sector is the backbone of our country and it plays a vital role in the overall economic growth of our nation. India has about 59% of its total area for agricultural purpose. The contribution of agricultural sector to our GDP is about 17%. Advanced techniques or the betterment in the arena of agriculture will as certain to increase the competence of certain farming activities. In this paper we introduce a concept for smart farming which utilizes wireless sensor web technology with a web based application. This will play a crucial role in helping farmers. It will aim for the betterment in the facilities given to the farmers and by focussing on the measurement of production of the crops. With the help of data mining techniques and algorithms like K-nearest, decision tree we will gather each and every data related to the farming and it should be updated frequently so that farmers and the consumers will get the right knowledge of the respective crops and about the suitable equipments related to farming. Existing system are not so much efficient in displaying such data characteristics. Our main aim is to enhance the growth in the agriculture sector and make the existing system smarter so that the decision- maker can define the expansion of agriculture activities to empower the different forces in existing agriculture sector.**

**Keywords**—Data Mining, K-Nearest Neighbour, Neural Network Association Rule, Decision Tree, Digitalization, Digital Farming.

## I. INTRODUCTION

E-agriculture is the web based application that will help the farmers to perform the e-marketing of their crop leading to fair price transactions, increased profit and standard of living. In India trade of agriculture product is maintained. Agriculture is an information intensive industry which is adjustable in nature. To provide profit to the farming community from the new global market , the agricultural marketing system of our country needs to be made stronger. Farmer, from planting seeds to dispatching the grown crops spends their sweat and blood and they deserve the actual moment of money for their extreme efforts. In today's scenario ICT will play crucial role for changing lives of the farmer by providing them the right preferences and profit with the help of the Information technology.

## II. LITERATURE SURVEY

We have gone through various papers wherein we have studied about several problems related to agriculture, various data mining techniques to overcome it & much more. The information about following has been discussed here:

L. Pradhan et al**.,** provided us the outline of the problem related to agriculture field, and it mainly focuses on different factors discovered for effective consumption of ICT for agriculture boost up and to maximize profit to the farmers. The demand for agricultural data is now stronger than ever before. Making farmer aware of E- agriculture raised area and the upcoming technology will help to maximize profit and to compete with farmers of developed countries in today's globalised market[1].

Dhakne Aniket et al., ., proposed "E-Agriculture Information Monitoring System using Data Mining" a agriculture based system which will provide easy interactive platform for different stakeholders like farmer, bank authority, government. With the help of this system bank authority will provide loan information and government can display different schemes, weather information for farmers, system will provide an effective communication within three entities and simple and reliable banking system for farmers[2].

V,Kaleeswaran et al., provides us the knowledge and idea about different techniques used in data mining. It will look after the combination of advanced technology and agriculture used to improve the production of crop yield[3].

Abhishek G et al., states E-Agriculture will serve as a superefficient way for the Indian farmers to sell their products across the country just with some basic knowledge about how to use the website or the application. Planned system of this paper will guide & help the farmers in all the aspects, the current market rate of different agricultural products and crops, the total sale of the products ,the profit earned for the sold products, and system will provide way in to the new farming techniques through e-learning process[4].

Mohan Raj et al., provide us the idea about the role of agriculture field in ICT[5].

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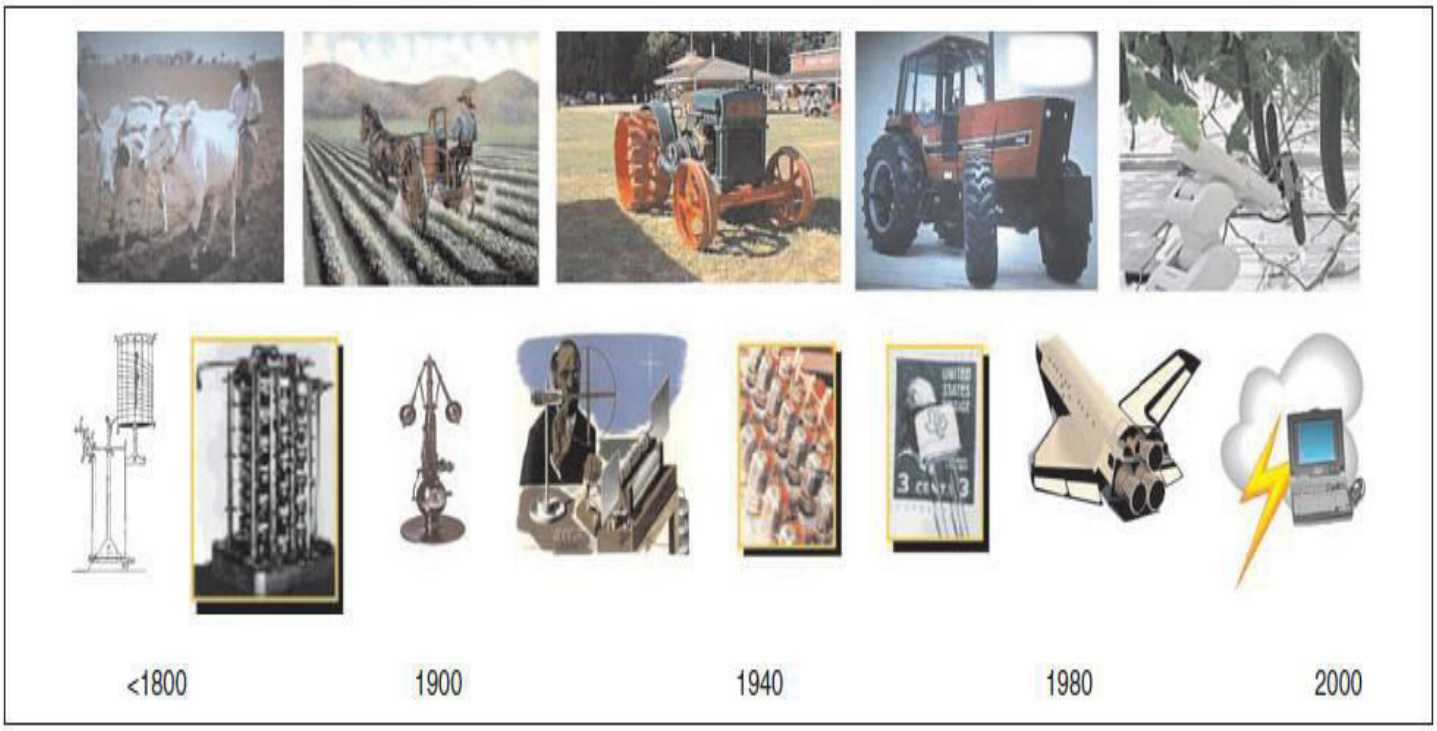


Fig. 1 Evolution phases in Agriculture sector

In the existing system as per we have reviewed ,the increasing cost of agricultural inputs and comparatively low cost of agricultural products in the international market is creating a crisis situation for Indian agriculture. The enormously growing cost of agricultural inputs is affecting the small farmers and their families and they have started thinking that agriculture is not a viable occupation. The small farmers are increasingly under debt and stress. Small land holdings, growing cost of production, increasing debt, low prices of some agricultural commodities in the international market is aggravating the problems of small farmers and leading to some suicides.

## III. PROPOSED METHOD

By over-viewing all the limitations from the existing system we have taken the initiative to overcome these problems in our proposed system. The main aim of our system is to provide easy interactive platform for communication and information exchange between farmer, merchant and government. With the help of the framework designed below we will try to draw your attention towards our system.

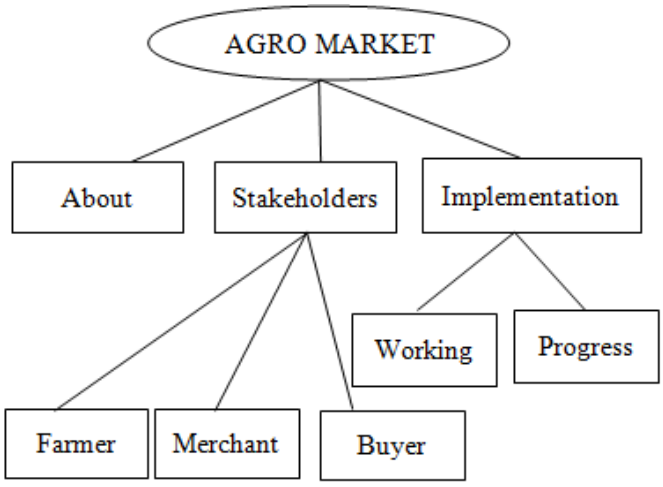


Fig.2 Overview of the system

Our proposed method will consists of different states with respective phase. Here is brief overview of all the states and phases.

- **Agromarket:** It is a collection of the records collected in our system. It is updated every time whenever any changes were made it will consist of all the transactions related history, i.e. it is simply the overview of our proposed system. Farmer & merchants have the idea about the

market information and farmer can view agricultural schemes provided by system to them.

- **About:** It will give the information about what actually this system is about and the contents related to it.
- **Stakeholders:** Person involved in the system was the stakeholder i.e. who were interested in the agriculture based system. Stakeholders were Farmer, merchant, buyer.
- **Farmer:** Whenever any of the farmers want to know about any of the merchants they will look for them, if they want to update their crop details they can update by registering to the site and easily interact with the registered merchants.
- **Merchant:** Most important criteria for merchant to register to our system during the time of registration they have to provide the system their APMC unique id. After that they can easily interact with the farmers and buyers involve in that.
- **Buyer:** They will be provided a unique username during the time of enrolling .They have the idea about the farmers and they can also interact with the merchant.
  All these stakeholders have their separate login.
- **Implementation:** This is the working phase of the system. Awareness of up-to date information on prices for products, inputs and end user trends can help in Improving farmer's livelihoods significantly and have a dramatic impact on their negotiating position.

## IV. DATA MINING TECHNIQUES

Data Mining is an important diagnostic intended to explore data. Much like the real-life procedure of taking out diamonds or gold from the earth, the most important task in data mining is to extract non-trivial information from large number of data.

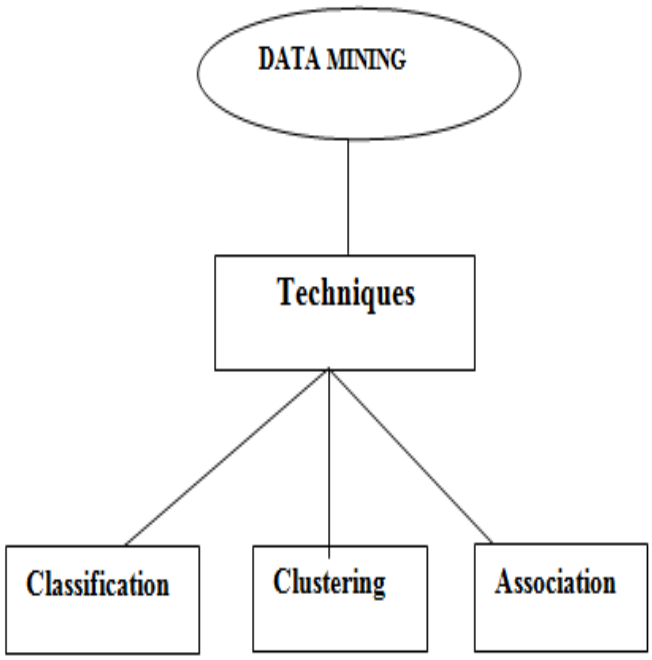


Fig.3 Data Mining Techniques

### A. *Techniques used*

- **Classification**: It is a supervised learning procedure .In this process our main aim is to find a model for the class, that we will be able to predict unknown records from the external same data information.
- **Clustering**: It is an unsupervised method of learning. Main goal is to determine objects grouping i.e. we have to think about different groups of consumer, such that objects within the same cluster are similar to each other.
- **Association:** It is descriptive method of data mining. Our main aim is to find all rules i.e.X → Y that satisfy the constraint related to user specified minimum support and confidence**,** given a set of transactions, each of which is a set of items. Given a set of records: each of which contain some number of items from a given collection: we want to find dependency rules which will determine occurrence of an item based on occurrences of other items.

In our proposed system we are going to use Classification techniques which states that classify the available record in a way that we have classified information about the collection of data's. In this method we have train our data sets in a way that we can able to classify the scene and the unseen data's available to us.

## V. ALGORITHM

*Why Knn?*

*Disadvantage of k-mean?*

- Difficult to predict K-Value
- With global cluster, it didn't work well.
- Different initial partitions can result in different final clusters.
- It does not work well with clusters (in the original data) of Different size and Different density.
- Complexity:n^2

### A. *Decision Tree Algorithm*

A decision tree is a flowchart like structure, where each internal (non-leaf) node denotes a test on an attribute. Each branch represents the outcome of a test, and each terminal node holds a class label. It is a classification approach. A decision tree can be used to visualize and clearly represent decisions and decision making.

The basic idea behind Decision tree is:

- The decision tree is constructed with the help of super incumbent and divide-and-conquer mode.
- All attributes are sorted in categorized way, and the attributes of continuous value must be discredited in advance.

- At the beginning all disciplinal samples are on the root node.
- The samples on the nodes recursively based on the decided detachment of the attributes
- The selection of attributes is based on the statistical measurement.

Algorithm: Generate_decision_tree

1. Create node N
2. If samples are all in the ,same class C then
3. return N as a leaf node, marked as class C
4. If attribute list is ,vacant then
5. Return N as leaf node, marked as the majority class ,of the samples; // majority vote
6. Use attribute_selection_method (D, attribute_list) find out the "best" splitting_criterion
7. Use splitting_criterion to mark N
8. If splitting_attribute is discrete and allows multiprogramming then //un restrict to double-branch tree.
9. Attribute_list←attribute_list– splitting_attribute; // delete plot attributes
10. for splitting_criterion, each result j //plot meta group and produce sub tree for each partition
11. Suppose j D is the set of metadata in D be up to the result; // one classification
12. If j D, is vacant then
13. Plus one leaf, marked as the majority of j D
14. Else, plus a node which returned from
15. Generate_decision_tree ( j D , attribute_list) to N;
16. Return N ;

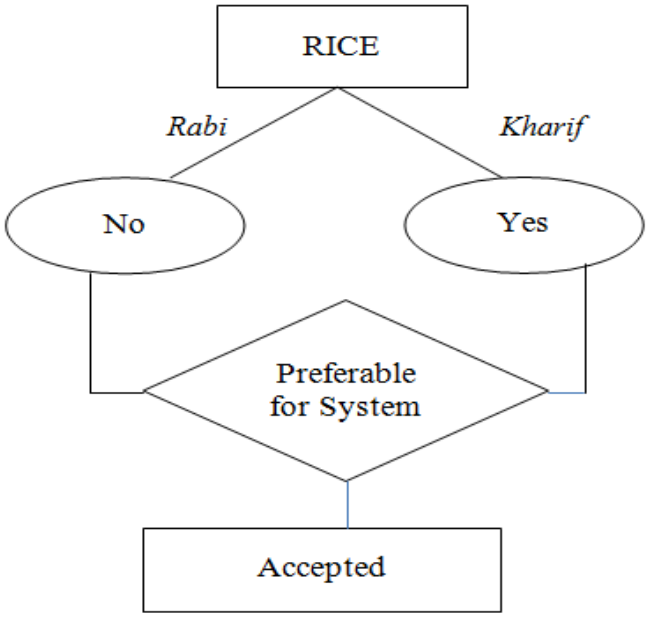


Fig. 4: Example of Decision Tree

Time Complexity is nlogn

*B. K-Nearest Neighbour Algorithm*

- The k-nearest neighbour's algorithm (k-NN) is a non-parametric mode used for classification and regression. In both the cases, input consists of the k closest training examples in the point space.
- Knn is a k-nearest neighbour's algorithm. In this system Knn algorithm is used to find out the nearest APMC market from farmers location. Knn algorithm is used in both farmer and merchant module. In Farmer module it finds nearest APMC markets and in Merchant module it is used to display farmers registered in nearest APMC. During registration users geographical co-ordinates longitude and latitude are stored in database; location co-ordinates of APMC market are also stored in another database table. Knn algorithm uses Euclidean distance formula for calculating distance between user's location and APMC market. After this information from nearest APMC is displayed.
- Let X be the coordinate of users i.e. farmers/merchants locality such that X (Longitude, Latitude) and (M1, M2,M3.....Mn) and M (Longitude, Latitude). Knn algorithm calculates distance between users location i.e. X and every markets location. Such as Dist (X, M1), Dist (X, M2),. . Dist (X, Mn).
- After finding all distances these distance records are compared and arranged in ascending order and nearest market is displayed.

$$d(p,q) = d(q,p) = \sqrt{(q_1 - p_1)^2 + (q_2 - p_2)^2 + \cdots + (q_n - p_n)^2}$$

$$= \sqrt{\sum_{i=1}^{n} (q_i - p_i)^2},$$

Euclidean Formula
Time Complexity is nlogn

## VI. CONCLUSION

E- Agriculture system will play important role in bringing farmers to digitalization's main stream and will prepare them to compete with globalized market.The proposed survey analyse the use of data mining techniques in forecasting weather, classifying users.E-Agriculture platform will serve as an easy and efficient way to farmers their marketing crops and sell them across different market through computerized system**.** E-agriculture will establish direct communication

between farmer traders this will avoid intermediate commission agents and farmer will not be levies with extra unnecessary taxes and charges, this will help farmer to gain fair and wrathful price for their product**.**

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