

An Enhanced Mobile Based Agriculture Information System for the Farmers

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Abstract— Agriculture Continues To Be The Most Important Sector Of The Indian Economy And Agriculture Is A More Or Less A Compulsion For Livelihood Of Millions Of Farmers. Land And Water Resources Have Almost Reached Their Limits, Price Of Commodities Are Fluctuating Almost Every Day, Profits Are Negligible For Most Of The Marginal And Small Farmers And Most Of All Getting Information Is Cumbersome. In Present Day Agriculture, Soft Resources Like Knowledge And Skills Are As Important As Hard Resources Like Inputs, And Sometimes More Important. But Estimates Indicate That 60 Per Cent Of Farmers Do Not Access Any Source Of Information For Advanced Agricultural Technologies Resulting In Huge Adoption Gap. The Main Aim Of This Paper Is To Reach Farmers For Their Awareness, Usage And Perception In E-Agriculture That Is Sms Based Alert Message Through Simple Mobile Phone User. If The Farmer Want To Register The Crop Details (Like Seed Sowing In Their Own Land). They Receive The Alert Message At Before Every Stage Of The Sowing Crop Is Grown.

Key words: agricultural products, e-Agriculture, e-Commerce, perception, SMS alert message.

I. INTRODUCTION

Mobile Marketing is a set of practices that enables organizations to communicate and engage with their audience in an interactive and relevant manner through any mobile device or network. Mobile marketing is commonly known as wireless marketing. However wireless is not necessarily mobile. The past decade has witnessed a revolution in the use of ICT in Developing countries. Many people and offices as well as rural farmers own ICT facilities such as personal computers and mobile phones [60]. The largest increases in the use of ICT has been in mobile telephony where subscriptions in developing countries increased from about 30 percent of the world total in 2000 to more than 50 percent in 2004 and to almost 70 percent in 2007 [1]. While internet use has not increased as rapidly as mobile communication, it increased tenfold in developing countries in the same period [60]. Other ICT facilities such as telecast, radio FM and information centers have also increased remarkably in number during the same period.

A. The Current Scenario Of Agriculture Sector In India

The agriculture sector in India is currently facing a difficult phase. India is moving towards an agriculture emergency due to inadequate investment in irrigational and agriculture infrastructure, lack of attention, ineffective land management, non-given of fair prices to farmers for their crops and insufficient land reform in India, etc. Food production and productivity in India is declining while its

food consumption is increasing. The situation has further been worsening due to use of food grains because of demand of bio fuels. As India does not have ports and logistical systems for large - scale food imports, the solution of import of food grains would be difficult.

B. Problem Definition:

the developed nations are using technology of laser in place of tractors to plough lands. this helps in optimizing the use of a range of inputs parameter such as water, seeds, fertilizers, etc. the problem occurs here is that Indian farmers cannot pay for this technology. in addition, power and electricity also cause a major problem for Indian farmers and choice of power like solar energy panels, regulated and optimized by Ict.

C. E-Agriculture:

“e-agriculture” is an emerging field in the connection of agricultural informatics, development and entrepreneurship which is focusing to agricultural services, technology distribution and information delivered or developed through the internet and associated technologies. specifically, it engages the conceptualization, design, development, assessment and application of innovative ways to use active or emerging information and communication technologies (Ict)..

D. SMS Alert For Farmer:

Farmer here getting information on weather and tips on agriculture in the form of voice sms or message the free services in tamil has come for farmer. we will be using kernel as an sms gateway server. kernel installed on the linux ubuntu 2.04 installation and configuration sending and receiving sms.automated query response is implemented in java server pages jsp. first of all farmer can subscribe to the server by registration through sms. when system receive the request first of all system check the crop for which farmer is requesting the seed information for sms is generated from the retrived information and reply is sent to the farmer.

II. Related work

In Pretty, Ball, information presented the Communication Technology refers to a set of tools that can be used to collect, distribute, store and disseminate information for decision making. As ICT in terms of information collection, storage, dissemination and processing, it does not indicate the ICT tools. A more profound definition can be obtained from who presented by Dewan & Kraemer, 2000 defines ICT as a group of hardware, software, telecommunication networks, and people that can assist in data collection, processing, storage of information.

In (2009) argues that due to enormous change in ICT technology, ICT based developments offers new

opportunities to improve the usage and performance of livelihood technologies such as agriculture, education, artesian technologies. The main challenge in this is to recognize the areas where growth in ICT could be used to improve the performance of these technologies, and construct cost effective ICT based systems improving the living principles of rural people. In this an effort is utilized to improve the utilization and performance of agriculture technology by make use of recent progress in ICT.

E-agriculture is now be familiar with globally as means of allowing farmers make informed decisions on construction and marketing of agricultural produce. According to (2004) presented e-agriculture which illustrates a rising field to be focused on the enhancement of agricultural and rural development through better information and communication processes. In (2010) argues that e-agriculture in affecting all parts of human life. We can exploit these advances to design a cost effective system to provide expert advice to the farmers.

In (2005), presented an advent of modern information technology revolution possible provides latest proficient advice in a timely manner to the farmer and so reduce the effect of the factors that disturb the crop. By exploiting the advances in information technology especially e-agriculture, we can enable the agriculture assistance to get the status of the crop in a cost effective manner.

III. PREVIOUS WORK

In previous more paper work have done for providing information to farmers. Farmers don't have sufficient knowledge to make land highly cultivable. Farmers don't have sufficient knowledge to make land highly cultivable.

- They are not getting high yielding seeds and the seeds which can resist to common illustrate and which can give good crop in less water
- Farmers are not getting soil friendly fertilizers & pesticides.
- Farmers are not getting weather information or timely weather information.
- They don't have 'agricultural experts' for help, experts consultation or guidance is needed regarding:

IV. MATERIALS AND METHODS

The step by step process of proposed framework is as follows

- (1) Information passed on daily basis
- (2) Information passed on seasonal basis
- (3) Other details Information regarding agriculture

A. Information passed on daily basis

Initially, the Administrator has to be registered and logged into their organization. The database can be maintained consists of Farmers details and Crops details. Farmer's details such as Username, password and mobile number. Crop details such as Wind, Humidity, Air temperature, surrounding temperature and Crop. In this phase, farmers receive the information regarding agriculture parameters such as Prices of Crop details, Prices of fertilizers, Weather conditions etc. This information can be sent to farmers through SMS via SMS Gateway.

B. Information passed on seasonal basis

In this phase, particular farmers receive the information on seasonal basis. To do this the farmer's details in the database has been clustered. The clustering of farmer's details can be done by using data mining technique called birch clustering which is one of the Hierarchical clustering method.

1) Birch Clustering

The initial step of the Birch Algorithm is to search data from database file which is from 1 to n. During searching the database the Birch algorithm data points which are near to each other are considered. Points in sparse region are treated as outlier and it must be removed. To consider clustering feature, it is defined as triple (N, LS, SS) where N is any number of data point in the cluster, LS is a Linear sum of N data point and SS is a Square Sum of N data points.

The algorithm flow of Birch clustering is as follows:

- 1) Step1: Consider the input data in the dataset
- 2) Step2: Load the memory by building CF tree
- 3) Step3: Decompose into desirable range by building a smaller CF tree
- 4) Step 4: Global clustering can be done with the obtained smaller CF tree
- 5) Step 5: Finally, the obtained cluster can be refined which results out best cluster

C. Other Details Information Regarding Agriculture

The other detail information included in this phase is as follows:

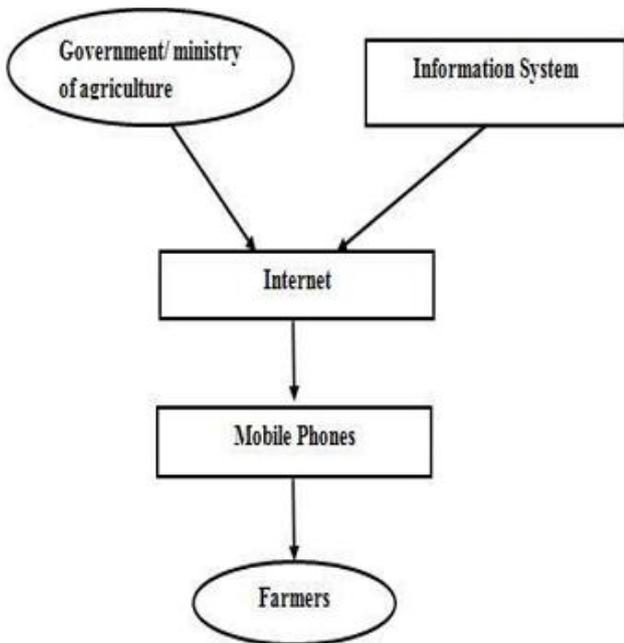
- (1) Announcement form agriculture board
- (2) Board members update of agriculture
- (3) Additional Crops and fertilizes details.

Etc Besides from details of daily and seasonal basis, the above additional or other details can be sent to farmers whenever the additional information provided by the agricultural board or from agricultural members.

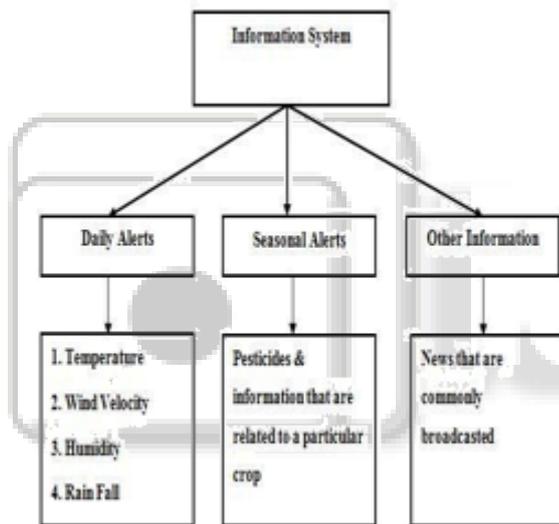
V. PROPOSED SYSTEM AND DESIGN

The proposed system can be experimentally verified in terms of clustering efficiency. Comparison can be made based on parameters such as Time and Accuracy. A previous method of E-agriculture does not use any data mining algorithms. The proposed system uses data mining method of clustering technique to group the data of farmers. The clustering performance can be measured in following terms namely precision, recall, f-measure For improving agricultural productivity an expert agricultural advice is given to the farmers both in a timely and personalized situations. Here, in this system agricultural experts generate the advice by using the modern agriculture which is highly knowledge intensive which also requires timely, reliable and accurate information on natural resource about markets, weather, insurance, subsidy, etc.

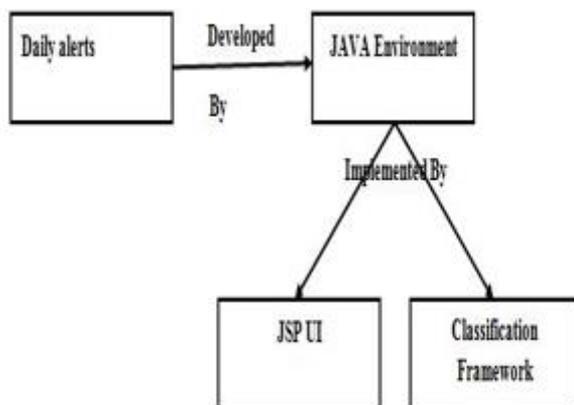
The Architecture of the proposed system is as follows:



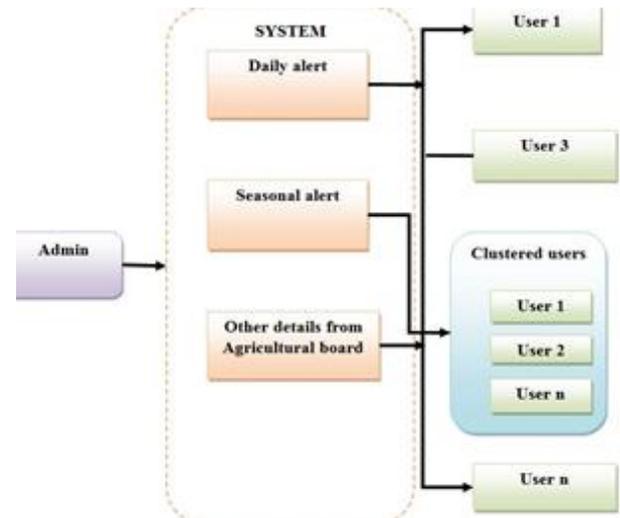
The Information System is classified as follows:



The daily alert system is being built using JADE environment.



The following diagram shows the system architecture of the proposed system.



VI. EXAMPLE OF BIRCH ALGORITHM

The Birch algorithm builds a den diagram called clustering feature tree (CF tree) while scanning the data set. Each entry in the CF tree represents a cluster of objects and is characterized by a 3-tuple: (N, LS, SS), where N is the number of objects in the cluster and LS, SS are defined in the following.

$$LS = \sum_{P_i \in N} \bar{P}_i$$

$$SS = \sum_{P_i \in N} |\bar{P}_i|^2$$

A. CF-Tree

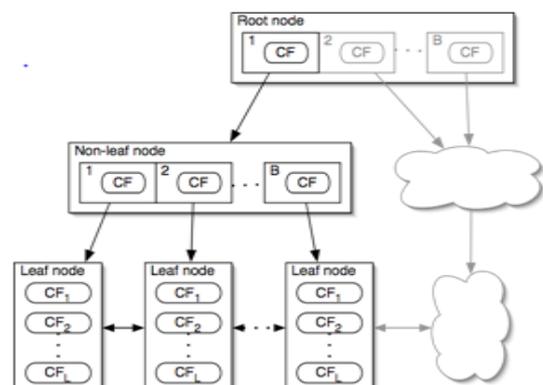
- (1) Each non-leaf node has at most B entries
- (2) Each leaf node has at most L CF entries, each of which satisfies threshold T

Node size is determined by dimensionality of data space and input parameter P

- (3) Recursive down from root, find the appropriate leaf.

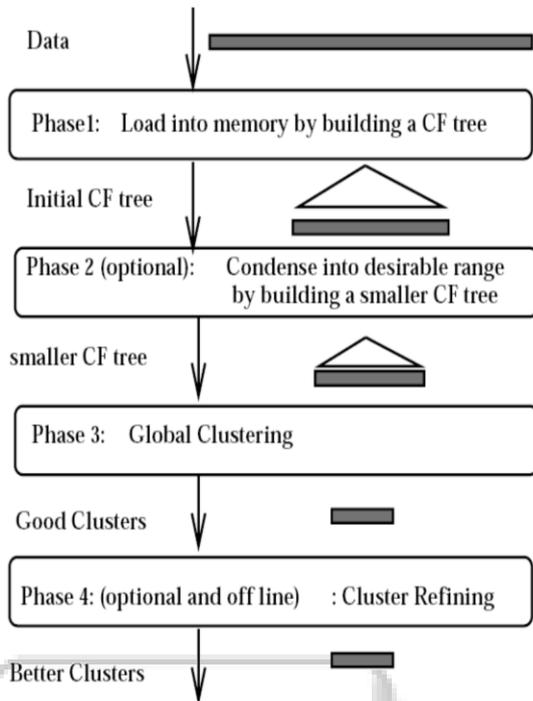
Follow the "closest"-CF path, D0 / ... / D4

- Modify the leaf: If the closest-CF leaf cannot absorb, make a new CF entry. If there is no room for new leaf, split the parent node
- Traverse back : Updating CFs on the path or splitting node
- BIRCH is a scalable clustering algorithm with respect to the number of objects, and good quality of clustering of the data.



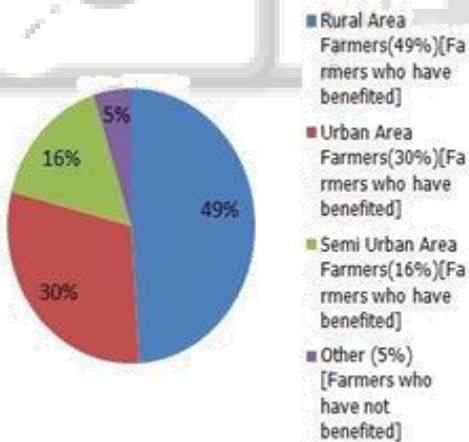
VII. BIRCH OVERVIEW

Birch is a scalable clustering algorithm with respect to the number of objects, and good quality of clustering of the data.



A. Performance Evaluation

Small farmers are more in numbers. But they do not receive the required information whereas marginal farmers receive information periodically but not frequently.



B. Results and discussions:

The proposed system can be experimentally verified in terms of clustering efficiency. Comparison can be made based on parameters such as Time and Accuracy. A previous method of E-agriculture does not use any data mining algorithms. The proposed system uses data mining method of clustering technique to group the datas of farmers. The clustering performance can be measured in following terms namely precision, recall, f-measure.

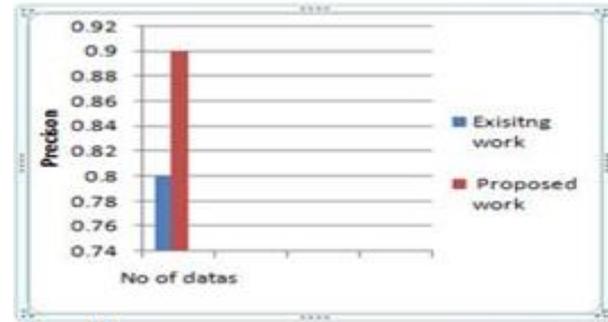
C. Precision

Precision value is calculated is based on the retrieval of information at true positive prediction, false positive. In healthcare data precision is calculated the percentage of positive results returned that are relevant.

$$\text{Precision} = \frac{TP}{TP+FP}$$

TP-True positive

FP-true negative



D. RECALL:

Recall value is calculated is based on the retrieval of information at true positive prediction, false negative. In healthcare data precision is calculated the percentage of positive results returned that are Recall in this context is also referred to as the True Positive Rate. Recall is the fraction of relevant instances that are retrieved

$$\text{Recall} = \frac{TP}{TP+FN}$$

FN – false negative

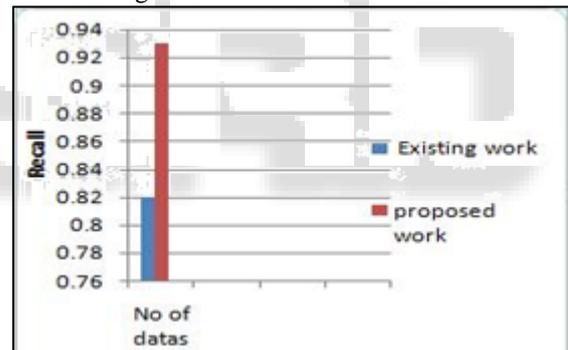


Fig. 5.2: Recall Comparison

E. F-measure:

The F-Measure computes some average of the information retrieval precision and recall metrics.

$$\text{F-Measure} = \frac{2 \cdot \text{Recall} \cdot \text{Precision}}{\text{Precision} + \text{Recall}}$$

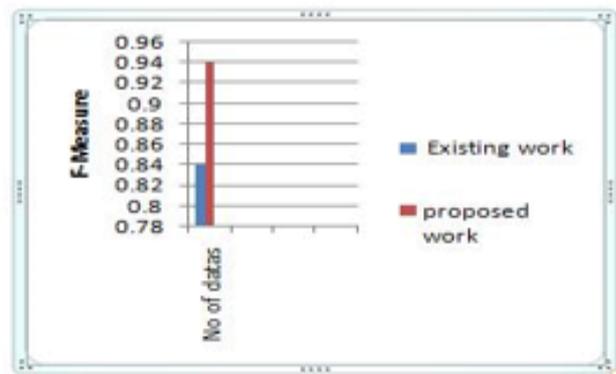


Fig. 5.3: F-Measure comparison

VIII. CONCLUSION

In the present work, E-agriculture scheme using the data mining technique namely birch clustering has been used for clustering the large datasets of farmers details. The present work on E-agriculture conveys the information regarding agricultural details to farmers in SMS via SMS gateway. The details such as daily alert, seasonal alert and other additional details can be sent to farmers. The daily alert can be sent to all farmers in the database. Seasonal alert can be sent to farmers only for selected farmers based on clustering result. Finally the other or additional detail which is announced by agriculture can be sent to all farmers. Experimental result shows better result when compare with the existing work.

REFERENCES

- [1] D.A.Cieslikowsk, N.J. Halewood Kimura, K., & Zhen-Wei Qiang, C. (2009). Key trends in ICT development (World Bank Report). Retrieved August 7, 2010, from the Communication Initiative Network.
- [2] P Esselaar, Hesselmark, O., James, T., & Miller, J. (2001). Final report: A three country ICT survey for Rwanda, Tanzania, and Mozambique.
- [3] G. Farrell, & S. Isaacs, (2009). Survey of ICT and education in Africa: A summary report, based on 53 country surveys. InfoDev / World Bank.
- [4] <http://www.sciencedirect.com/science>
- [5] T Halett. SMS boom to continue. ZD Net UK; 2005. September 6. Available at:<http://news.zdnet.co.uk/communications/wireless/0,39020348,39216536,00.htm> (accessed July 10, 2006).
- [6] F. Cutitta Mobile advertising around the world. Presentation materials: "preconference wireless promotional strategies around the world." The annual conference of the American academy of advertising, Houston; 2005.
- [7] http://www.sciencedirect.com/science?_ob=ArticleListURL&_method=list&_Article
- [8] <http://www.organicfarmermagazine.org/farmers-sell-products-via-sms/> link for page number 2 statement of problem http://www.anancy.net/documents/file_en/RRRP08-5e.pdf
- [9] <http://agrimarkettell.com/content/objective> objective of establishing and networking of agriculture market
- [10] <http://www.agrinetug.net/products-a-services/sms.market-info> market intelligence through mobile phones
- [11] E. van Baars & R. Verbrugge "Knowledge-based Algorithm for Multi-Agent Communication"
- [12] D.Rajesh "Application of Spatial Data Mining for Agriculture" in International Journal of Computer Applications (0975 8887) Volume 15– No.2,2011
- [13] Darcy Miller, Jaki McCarthy, Audra Zakzeski "A Fresh Approach to Agricultural Statistics: Data Mining and Remote Sensing" in National Agricultural Statistics Service,2009
- [14] Michel Charest and Sylvain Delisle "Ontology-Guided Intelligent Data Mining Assistance:Combining Declarative and Procedural Knowledge
- [15] B. G. Buchanan and R. O. Duda. "Principles of Rule-Based Expert Systems. Report STAN-CS-82-926. Stanford University, August, 1982."
- [16] Srivastava, U.K. agro-processing industries: potential, constraints and tasks ahead. Indian journal of Agricultural
- [17] Varun Kumar intelligent data mining: data mining powered by artificial intelligence" in Journal of Computer Science and Information Technology. ISSN 0973-4872, Vol. 3, No.1 pp. 44-47,2006
- [18] Latika Sharma and Nitu Mehta "Data Mining Techniques: A Tool For Knowledge Management System In Agriculture" in international journal of scientific & technology research volume 1,issue5,issn 2277-8616,201.