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RESEARCH ARTICLE

E-Agriculture Information Management System

Sumitha Thankachan[1], Dr. S.Kirubakaran[2]

[1]PG Scholar, Info Institute of Engineering, India

[2]Assistant Professor, Info Institute of Engineering, India

sumitha.thankachan@yahoo.com

kiruba.me07@gmail.com

Abstract— Technological importance have been a great support for making decisions in various fields especially in agriculture. The development of agriculture has been on under development for the past few years due to lack of Agriculture knowledge and environmental changes. The main aim of this paper is to reach farmers for their awareness, usage and perception in e-Agriculture. The study used statistical survey design technique to collect data from farmers for their awareness in e-Commerce. The results obtained indicated the level of awareness is less such that there is a need for e-agriculture for their support. e-Agriculture is a platform for supporting marketing of agricultural products

Keywords— agricultural products, e-Agriculture, e-Commerce, perception

I. INTRODUCTION

The Statistical data includes farmers who were asked whether or not they have incurred unusual high rainfall events, such as a storm or heaving downpour.

- Some 58 percent said they did.

Technically, in machine learning the likelihood of reporting a storm is correlated with treatment in the (Instrumental Variable) IV and heterogeneous effect regressions: which gives up: farmers a more likely report of incurring a storm. Farmers who had received regular weather information became more aware of unusual rainfall events, which became more likely to report them to enumerators. The reports stated whether the farmers receiving were able to reduce output loss or increase output with the storm.

- We find no evidence that this is the case.
- We also find little evidence of beneficial heterogeneous effects.
- Young farmers were reportedly found to have more output loss at harvest in the following storm, not less.
- In India, Agriculture is believed is believed as a major occupation for a most part of population. Most rural population depends upon agriculture as their important occupation. Yet, agriculture in India is in stagnation and in turns needs renewal, the leading cyber security ,Techno legal ICT and cyber law specialist of India and the managing member of 'Association for people of India' (AFPOI), the agriculture development characteristics are analyzed keeping in mind the advent of e-agriculture in India.

1.1 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.

1.2 Problem Definition:

By the use of ICT, India's food production and productivity has been increased for agricultural purposes. 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.

1.3 E-Agriculture

"E-Agriculture" is an emerging field in the connection of agricultural informatics, development and entrepreneurship which is focussing 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 (ICTs).

E-agriculture is a rising field for enhancing existing agriculture and food security through enhanced processes for knowledge access and switch using information and communication technologies. The World Summit on the Information Society (WSIS) Plan of Action comprises e-Agriculture as a region of function of information and communication technologies (ICTs). In short e-Agriculture will connect all concerned persons starting from farmers to researchers together. Farmers can get the desired information at any instant of time from any part of world and they can also get the help from experts viewing their problem immediately by without moving anywhere.

II. RELATED WORK

The following have been analyzed and studied in order to develop an alert system for farmers:

Peter Namisiko et al [1].,2013 have proposed as: A study which is conducted at majority of farmers in Kenya who are not able to sell their produce at market price due to lack of sufficient information available. Also the agricultural productivity is being lessen due to the lack of information and resistance developed by the agricultural universities. For such farmers to produce and sell their products at market based competitive prices, information communication technologies (ICT) tools have be availed to them. This is because the development of agriculture is dependent on how fast and relevant information is provided to the end users. The study concentrated in Trans Nzoia County since it is the heart of Kenya. A lot of research has been conducted in this area, but no research has been to ascertain the awareness, adoption, legislative and regulatory framework, therefore it is must to determine the current research trends in the use and adoption of e-agriculture of e-Agriculture in TransNzoia County.

Marcel Fafchamps et.al.[2] ,2012 have proposed as: This paper estimates the benefits of the Indian farmers if the market and weather information is delivered to their mobile phones. And this has been conducted with a randomized experiment in 100 villages of Maharashtra. This service has been sent in by a commercial service called Reuters Market Light (RML). The treated farmers associate RML information with a number of decisions they have made in the agriculture, and we find that the treatment affected spatial arbitrage and crop grading. But the magnitude of these effects is small. We find no statistically significant average effect of treatment on the price received by farmers, crop value-added, crop losses resulting from rainstorms, or the likelihood of changing crop varieties and cultivation practices.

Nizar Grira, Michel Crucianu et.al., [3] 2010 have stated as follows: the information[3] that are relevant of the required quality always have the potential of increasing efficiency in all spheres of activity of an Indian farmer, therefore the emerging scenario of the deregulated agriculture, has brought a 'need' and urgency to ensure it in an integral part of decision making. Subsequently, exploring IT as a strategic tool for the benefit of rural India of assumed importance. Here the information meets the Indian farmers in general which are documented extensively. The broad information inputs can be classified as:

- Awareness Databases - those that facilitate proper understanding of the implications of the WTO on Indian agriculture,
- Decision Support Systems - information that facilitates farmers to make a proper SWOT analysis to take appropriate decisions,
- Systems that facilitate Indian farmers to forge appropriate alliances for collective benefit,
- Information on new opportunities
- Monitoring systems for corrective measures.

Recent publications demonstrate the following : First and foremost, it is essential to provide an unambiguous interpretation and implications for ordinary people. The jargon and the language under various articles of WTO require to be distilled by experts and their implications are clearly to be spelled out for all the segments of Indian agriculture and allied activities. The implications for all the stake holders and the time frames are to be spelt out. This is a priority item which is to be addressed immediately. The mandatory changes in government policies on tariffs, imports, year wise phasing of the same, the impact on various subsidy schemes would be of concern to people. An area of immediate concern to farmers is to get an analytical input on how his/her life is going to be affected. Since removal of restrictions throw open Indian agricultural markets, the macro economic situation related to foreign exchange, inflation, the current tariff structure within and outside the country etc. and their likely impact on Indian agriculture will have a direct bearing on the decisions of segments of Indian agriculture.

Sylvester O. Ogutua [4] et.al have projected the following: The size of land and its holdings play a major barrier in recognising any export potential. In order to remain competitive and to have a goods price realisations, it is highly recommended for the farmers to come together up through online alliances. It should be ensured a possible for relieving farmers of geographical barriers for facilitating them to come together online and facilitate disposal of their produce at attractive prices. Online bidding can be introduced for various agricultural product categories. This will require development of complicated IT systems which are to be supported by proper bricks and motor infrastructure and post harvest technologies, storage etc.

Nidhi Dwivedy [5] have proposed as: Decision Support Systems for is more important and usually avoids risk developing environments. It has been suggested that the WTO is stipulating reductions for export subsidies on farm products will make Indian exports more competitive. It has been estimated that the export potential may increase upto $ 1.5 billion by 2020. The advantage of the emerging order, is that the Indian farmer needs to be equipped with information that have been facilitated by undertaking a proper SWOT analysis and its comparison may led to conventional wisdom and satisfy himself on an appropriate course of action. The Available information does not satisfy which projects on the weaknesses of the adverse affect of WTO on any specific agricultural product will help in taking the necessary corrective measures. In the present scenario, the competitive advantage is necessarily required to be fully exploited for increasing the export potential.

Jaideep Vaidya [6] et.al have stated in as: Privacy and security mechanisms can prevent sharing of data and derailing data mining projects. Distributed knowledge discovery, when done exactly, can eliminate this problem. The major key to obtain valid results, is to provide guarantees on the (non)disclosure of data. A widely used method for k-means clustering when different areas include different attributes for a common set of entities is being presented. Each area learns the cluster of each entity, but learns nothing about the attributes at other areas.

Tian Zhang [7] have projected the following: Cluster analysis goals to organize a collection of data items into clusters, such that items inside a cluster are more "similar" to each other than they are to items in the other clusters. This characteristic is of similarity which can be expressed in different ways, according to the purpose of the study, to domain-specific assumptions and to prior knowledge of the problem. Clustering[4][5] is performed when no information is available concerning the membership of data items to predefined classes. For this reason, clustering is traditionally seen as part of unsupervised learning.

III.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.

3.1 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.

3.2 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.

3.2.1 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. Next stage is to form a hierarchical tree which is same like B+ Tree. If the tree is sufficient to fit in memory, it will be spitted in two. The leaf contains the original data points of the database.

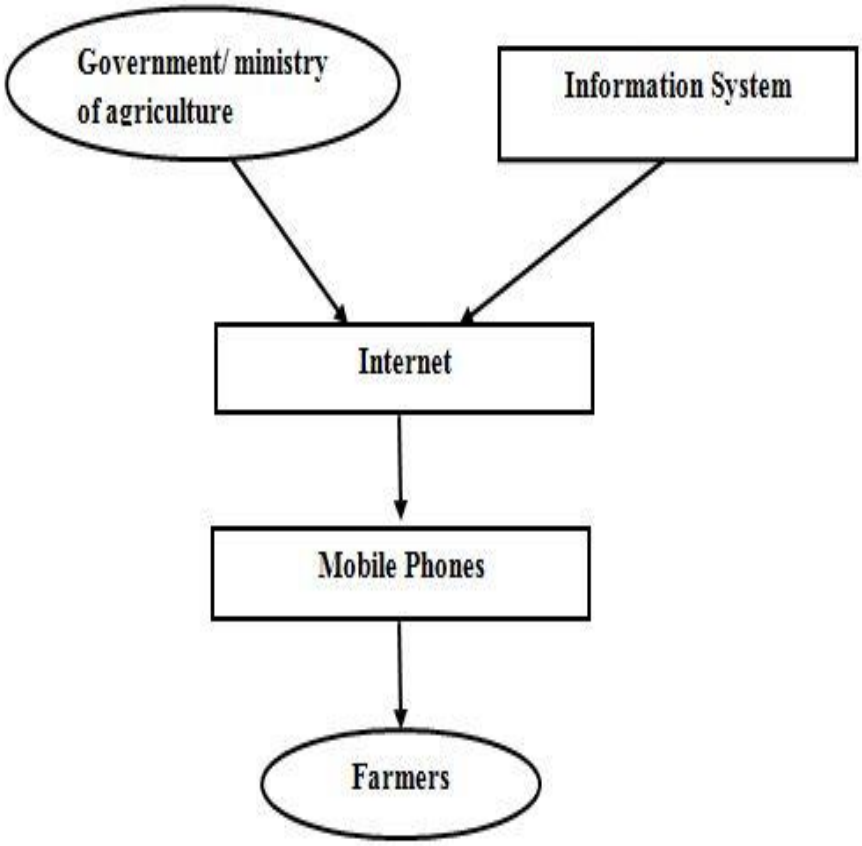
The clustering of database can be done from this tree based on some threshold value and distant measurement. As the parameters of this algorithm include centroid, average distance of all member point, the spherical form of clustering can be obtained. The next step of the algorithm is to take two random points and estimate the portion of the clusters cover by the area. Major task of this algorithm is performance analysis with respect to time and memory space.
The algorithm flow of Birch clustering is as follows:
Step1: Consider the input data in the dataset
Step2: Load the memory by building CF tree
Step3: Decompose into desirable range by building a smaller CF tree
Step 4: Global clustering can be done with the obtained smaller CF tree
Step 5: Finally, the obtained cluster can be refined which results out best cluster

3.3 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.

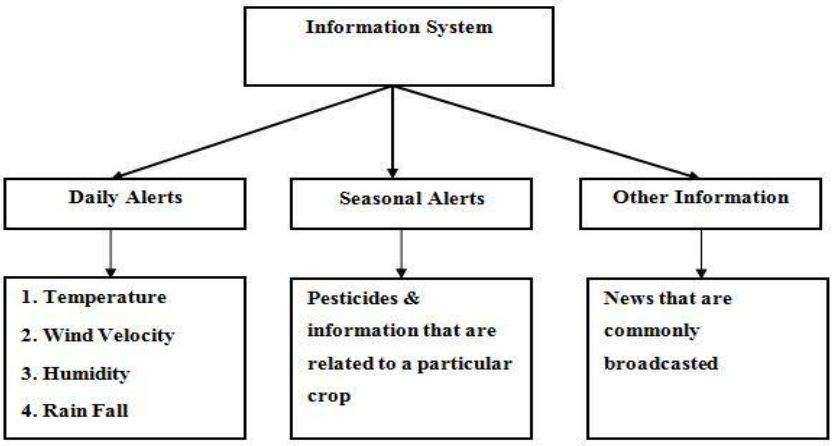
IV. PROPOSED SYSTEM

For improving agricultural productivity an expert [14] [15] 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 endowments and their usage patterns at present and future technology available for their utilization and other information about markets, weather, insurance, subsidy, etc.
The Architecture of the proposed system is as follows:

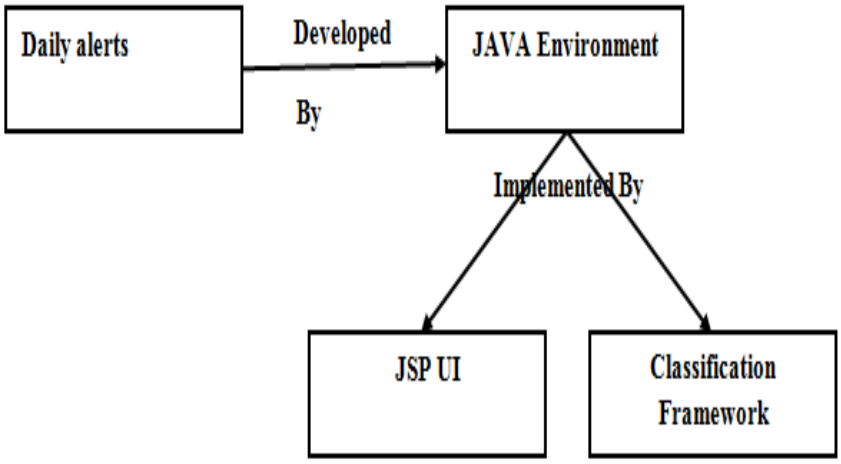


The news releases from the government does not reach the farmers in time, therefore an alert system is being built for daily releases and for seasonal releases.

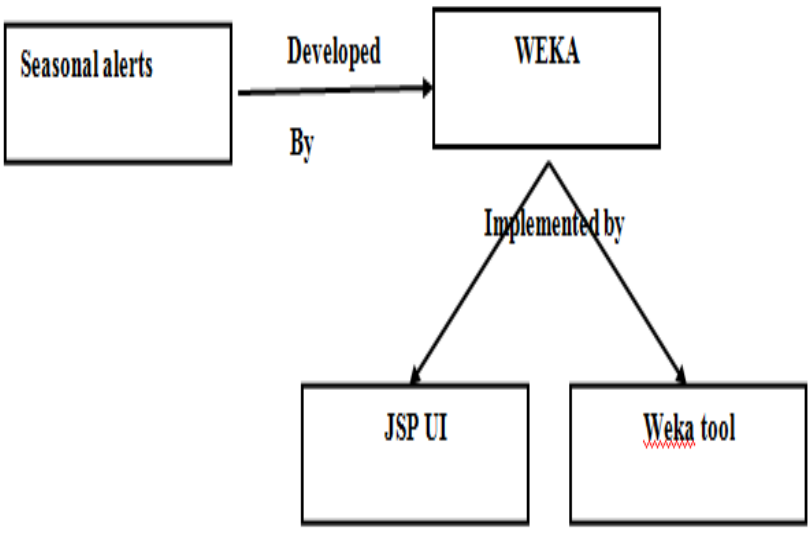
The Information System is classified as follows:



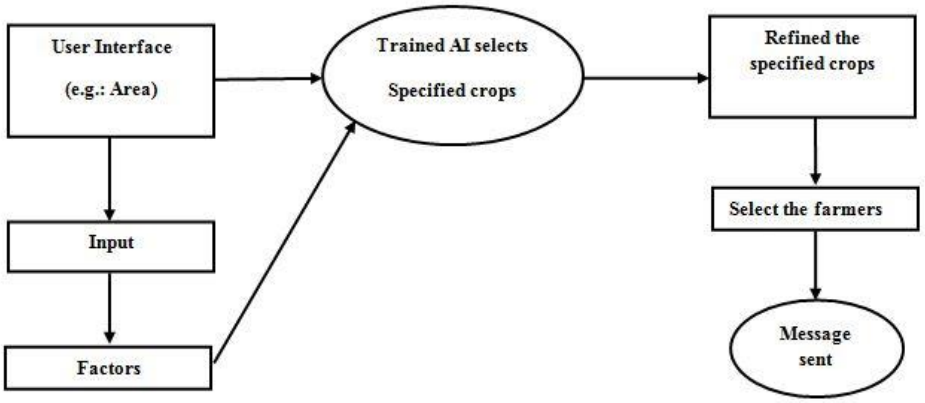
The daily alert system is being built using JADE environment.



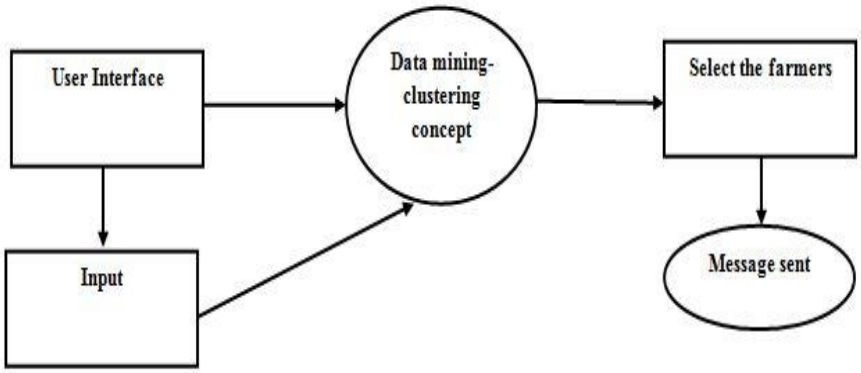
For a seasonal alert system WEKA environment is being used.



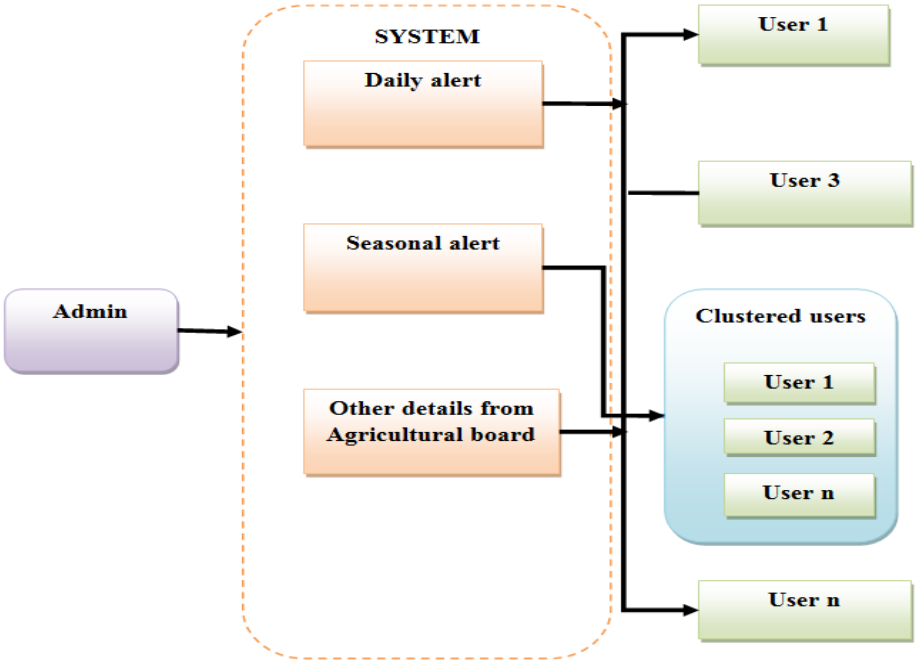
The process view for a daily alert system is as follows:



The process view for a seasonal alert system is as follows:

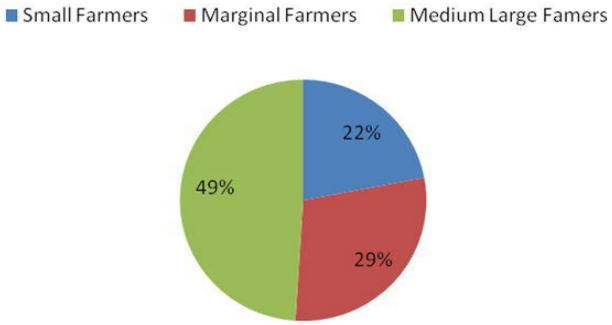


The following diagram shows the system architecture of the proposed system.

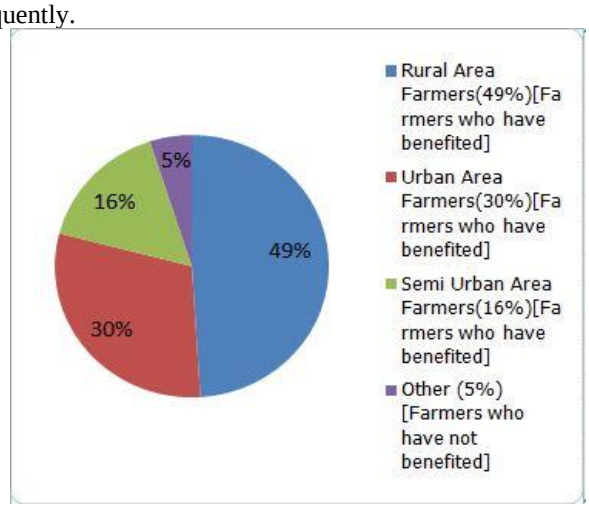


4.1 Performance Evaluation

The performance evaluation before using the alert system.



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



V. 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.

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.

Precision =TP/ (TP+FP)
TP-True positive
FP-true negative

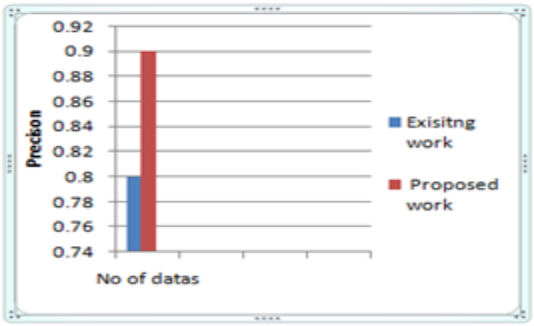


Figure 5.1: Precision comparison

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,

Recall =TP/(TP+FN)
FN – false negative

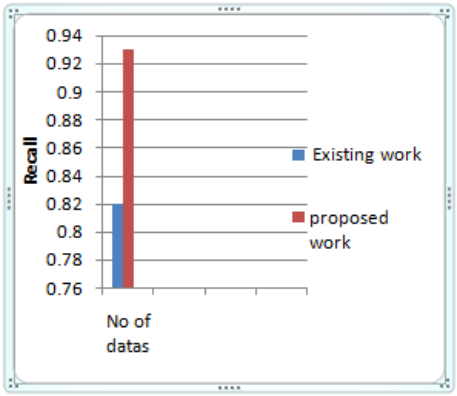


Figure 5.2: Recall Comparison

F-measure

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

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

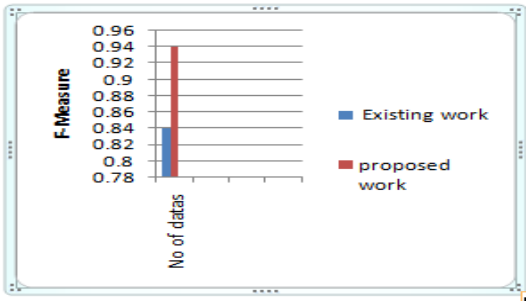


Figure 5.3: F-Measure comparison

VI. CONCLUSION

Based on the results obtained from the above, the following conclusions were made:

- Majority of farmers in the state or country are not aware that mobile phones can be used to conduct businesses and receive information. Mobile phone costs should be lowered to enable majority of farmers for having access to the current information about agribusiness within the state or country.
- e-Agriculture[1][18] has not been implemented because farmers in the country have not been sensitized about it & young farmers were in lack of information about the agriculture such that e-agriculture might provide them useful information's regarding the plantations that they have grown.
- The government should also conduct sensitization to create awareness for the farmers on how best they can use information technologies to conduct agribusiness.
- Illiteracy among farmers in reading message is also another factor that pertains the usage of technology in agriculture, to overcome this it is necessary to create awareness of learning the state language such that the message sent will be in the state language.

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