Secure Android application for Farmers based on Ratings and reviews (SAFR)

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Abstract : **— Agriculture is the backbone of Indian economy as farmers are suffering from huge economic losses. Farmers are confused to take correct decision regarding selection of fertilizer, pesticides, etc., time to do particular farming actions and the price for their products that they produce and sell. To overcome all problems, we proposed an android-based app, which addresses the issues of farmers, benefits them with additional guidance regarding soil type, fertilizers, pesticide, irrigation requirements etc. Our proposed system "Secure light-weight Android application for Farmer based on Rating and reviews" (SAFR) provides security for payment as well as data encryption (AES algorithm) using different security based algorithms. SAFR provides rating and review using the Collaborative Filtering Recommendation Algorithm (CFRA).**

***IndexTerms*--** **Agriculture, Security, Ratings, Agriculture marketing, Collaborative Filtering, Advance Encryption Standard Algorithm.**

I. INTRODUCTION

The agriculture sector has a big contribution in the economic development of India. A large population in India depends on agriculture to fulfill their livelihood. Agriculture combines the cultivation of crops, breeding of animals for food, fiber, biofuel, medicines and other products used to sustain and enhance human life. Farming is the key development in the ascent of human culture, which produces food surpluses that nurtures the growth of culture. In India, most of the population is dependent on farming. However, updating the technology needs reviewing and revitalizing the mechanism. Agriculture may see major changes in upcoming years due to enhancement in technologies. Agriculture is believed to be the mainstay of Indian economy. Now-a-days farmers are having huge economic losses due to several causes. To overcome the problem of economic loss, we propose the System-Secure Android application for Farmers based on Ratings and reviews (SAFR). Farmers are confused to take right decision regarding selection of fertilizers, pesticides and time to do particular farming actions, the price for their products that they produce and sell. SAFR serves as a platform for movement of agricultural products from the farms directly to the consumers or retailers. SAFR is a mobile application, which provides privilege for both farmers and consumers/retailers to buy and sell the required products without the involvement of an intermediary at the product's fair profitable price.

Today everyone, including the farmers and countryside people, utilizes mobile devices frequently. A mobile device is preferred over other devices for presenting SAFR as mobile devices can include a number of applications, which any user can access independent of other applications, and cost is comparatively low. Information & Communication Technologies (ICT) observed that mobile plays vital role in everyday life of farmers [4].

The application management interface of mobile devices includes a menu part and a display part. The menu part of application management interface includes multiple tabs, each tab providing access to particular feature related to particular tab. The display part of application management interface includes one or more than one application objects, each application object presenting information about respective application.

The objective of modern farming technique using SAFR is to enhance transparency in the agriculture commodity market place by providing market price information, facilitating collective buying of inputs and selling of products. Farmers rely on weather forecasts to decide what work to do today and tomorrow. We introduce and provide detailed information on an Android based multilingual app "Secure Android application for Farmers based on Ratings and reviews (SAFR)", which targets to provide solution /suggestion to the farmer's problems, facilities, benefits them with additional guidance in their area of interests like soil type, fertilizers, irrigation requirements etc. Security is the main objective of SAFR. SAFR provides secure payment gateways by using standard algorithm and data security by encrypting the private data using AES algorithm. Collaborative Filtering Recommendation Algorithm is used for rating and review of products. Rating and reviews over products can help the buyers to choose the most convenient product for themselves.

II. MOTIVATION

Farming is the mainstay of our Indian economy, but farmers are the one who face huge economic losses. The responsibility of today's generation is to maintain farming as the backbone of our nation's economy for a lot more generations to come. Farmers suffer a lot when drastic change in climate occurs due to rising global temperature. Crop failure due to unsuitable weather conditions is a major concern, which forces farmer to end their lives. Modern technologies are helpful to many people and organizations, so SAFR can be useful for helping the farmers as well. Our proposed system SAFR solves the problems of farmers at one click and provides secure transactions.

III. RELATED WORK

In a recent survey by Sowmyaa Guptaa and Gaurav Trivedi [4], the proposed system, which is an android based application e-krishakMitra, is intended to address the farmer issues and find an efficient solution for their problems that can help them with smooth farming taking into consideration the present weather conditions. e-krishakMitra is a cloud-based application that integrates

various aspects of farming such as crop selection, soil nutrition, irrigation, seed selection, pest problems and yield estimation. EkrishakMitra addresses all problems of farmers in real-time without the involvement of middleman. ekrishakMitra does not support more than two languages, which are Hindi and English.

Madhumati, Abinesh Kumar, Karthi, Manoj Krishna [3] proposed a bidding application for auctioning the products in Amazon web services, which includes the bidding information, product information and buyer/seller information. The bidding application provides the highest price of product to farmers. Although, bidding application does not include payment gateways for secure transactions.

Santosh G. Karkhile, Sudarshan G. Ghuge [10] developed a mobile phone based solution for farmers that leads to agricultural area development. Mobile based solution addresses the problem of finding the market updates of different products, weather conditions and support multiple languages. The disadvantage of mobile application is unavailability for every person and not been able to provide proper information.

Tomoki Uchinuno, Yujirou Yasunaga [6] developed the knowledge sharing system for inheritance of agricultural technology by using two methods for collecting data-1) Automatic Acquisition of the environment information by a sensor. 2) Record of the work information by a farmer. Data Sharing System describes the model for the knowledge of skillful farmers and report the experimental result of the environmental-data acquisition about cultivation using some garden planters. Knowledge sharing system does not provide robustness for real data. Abhishek A.G., Bharathwaj M., Bhagyalaxmi L. [6] describes agricultural marketing using Web and mobile based technologies which provides freedom of pricing and ensures the farmers to make profitable selling decisions. Web and mobile-based technologies does not involve middleman in the transactions of agricultural products. Web and mobile-based technologies provide very less awareness of market information.

Shitala Prasad, Sateesh K. Peddoju [7] proposed a system which combines two technologies: (1) Mobile Computing (2) Cloud Computing The developer is connected to Application Service Provider and Mobile End User are connected to Agro Mobile Infrastructure providing application services. The proposed system helps farmers in all possible ways i.e. in education, weather forecasting, crop analysis etc. The limitation of agro Mobile is the architecture.

IV. SYSTEM IMPLEMENTATION

System Architecture in Fig. 1 shows that our proposed system SAFR is a menu driven android application helpful for farmers. SAFR is an integrated software application designed for android-based mobile devices which targets to help assist the modern farmers for market management.

SAFR will be able to solve the following problems regarding farming:

I. SAFR serves as a platform for displaying of agricultural products from the farms or industries (fertilizers, pesticides, machine tools) directly to the consumer/retailer.

II. SAFR provides security for online transactions using standard algorithms i.e. payment gateways are used.

III. SAFR encrypts the data/information such as login information, product information, and history of purchase using AES algorithm.

IV. SAFR uses CFRA, which continuously updates the product, lists according to rank of products based on ratings and reviews.

1. Menu Driven Application

Menu driven application provide powerful options and features like start screen, help, news etc. Menu items are a famous user interface entity. Almost all users are comfortable using menus in their apps.

2. Operations

Registration and login: registration includes information of farmer like name, address, phone number of farmer to give the daily updates. Tasks of Buyer and seller, Buyer, Administrator: Tasks are Check product, check sale, Upload products, add to cart, remove from cart, Purchase, Payment, Rating & reviews, Check history.

3. Algorithms

I. Advanced Encryption Standard: (AES) is symmetric key algorithm for public scrutiny and comment. AES converts the plain text into cipher text.

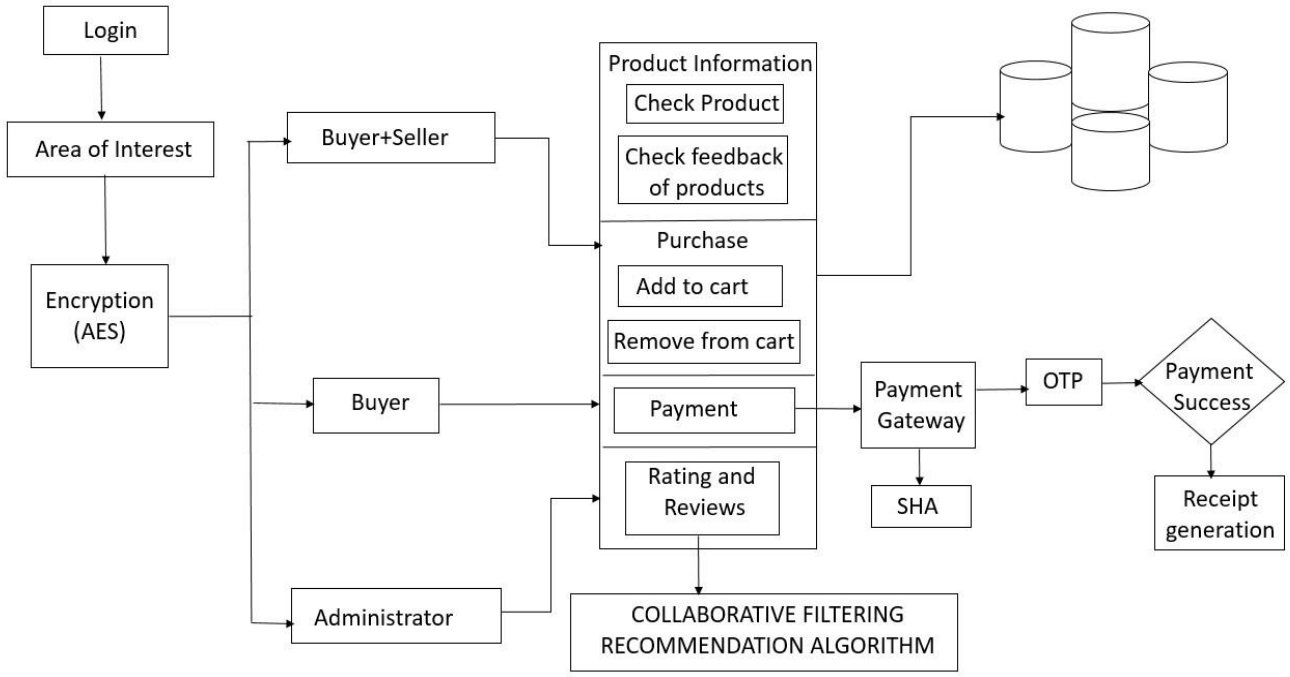

Fig1:-System Architecture

AES Algorithm:

```
1: void AddRoundKey (int n ){
 2: for i =0 to 15 do
3: key[ i ]=rkey[16 × n + i ]; //16 leaks
4: state[ i ] ∧ =key[ i ]; //16 leaks
5: end for
6:}

7: void SubBytes ( ){
8: for i =0 to 15 do //16 leaks
9: state[ i ]=S[state[ i ]];
10: end for
11:}

12: void ShiftRows ( ){
13: for i =0 to 15 do
14: temp[ i ]=state[ R[i] ];
15: end for
16: for i =0 to 15 do
17: state[ j ]=temp[ j ];
18: end for
19:}

20: void MixColumns ( ) { //52 leaks
21: for i =0, 4, 8, 12 do
22: a=state[ i ] ∧ state[ i + 1]; b=state[ i + 1] ∧ state[ i + 2]; //2 × 4 leaks
23: c=state[ i + 2] ∧ state[ i + 3]; d=state[ i ] ∧ state[ i + 3]; //2 × 4 leaks
24: e=a ∧ c; //1 × 4 leakages
25: state[ i ] ∧ =xt(a); state[ i ] ∧ =e; //2 × 4 leaks
26: state[ i + 1] ∧ =xt(b); state[ i ] ∧ =e; //2 × 4 leaks
27: state[ i + 2] ∧ =xt(c); state[ i ] ∧ =e; //2 × 4 leaks
28: state[ i + 3] ∧ =xt(d); state[ i ] ∧ =e; //2 × 4 leaks
29: end for
30:}

31: void AES (byte *in, byte *rkey, byte *out) {
32: for i =0 to 15 do
33: state[ i ]=in[ i ];
34: end for
35: for i =0 to 8 do
36: AddRoundKey( i ); SubBytes(); ShiftRows(); MixColumns();
37: end for
38: AddRoundKey(9); SubBytes(); ShiftRows(); AddRoundKey(10)
39: for i =0 to 15 do
40: out[ i ]=state[ i ];
41: end for
42:}
```

II. Collaborative Filtering Recommendation Algorithm: Collaborative filtering algorithm used for providing rank to products based on rating and reviews.

1: function REVIEWERRECOMMENDATION(r, k)
2: Construct matrix M at
3: Get all reviewers as a set reviwerSet
4: C ← φ
5: colSet ← transform(r)
6: for reviewer ∈ reviewerSet do
7: i : Get label of reviewer in reviewerSet
8: score ← 0
9: for col ∈ colSet do
10: j : Get label of col in requestSet
11: if M at(i, j) is not void then
12: score ← score+M at(i, j) //utilize explicit relations
13: else
14: score ← score+eval(i, j) //catch implicit relations
15: end if
16: end for
17: reviewer.score ← score
18: C ← C ∪ {reviewer}
19: end for
20: Sort elements in C by score of every reviewer in descending order 21: Return the top k elements in the C as a list
22: end function

V. RESULTS AND DISCUSSION

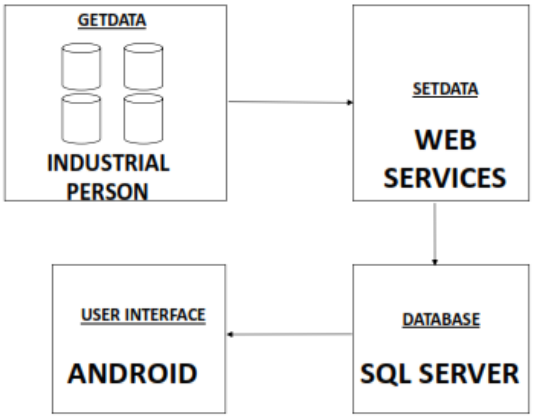

Fig2:-Implementation Overview Diagram

Explanation:

I. First block represents the data entered by any user which is stored in web panel. II. It can only accessed by the industrial person. III. Those data are moved to the database through web services. IV. Web services contains all the methods. V. URL is used for accessing the web panel. VI. Database stores all the data related to the app. VII. Android app displays the data according to our desire with the help of user interface.

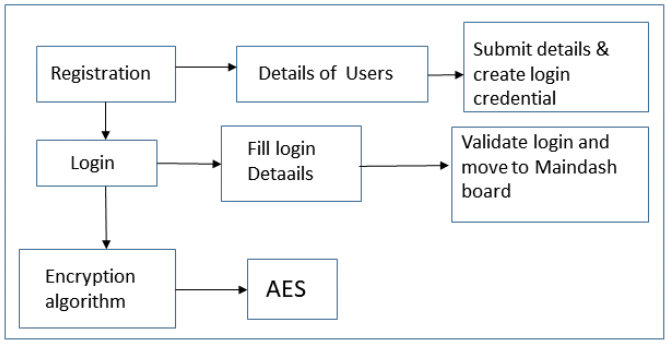

Fig3:- Implementation Module 1 (Data Entry and Security)

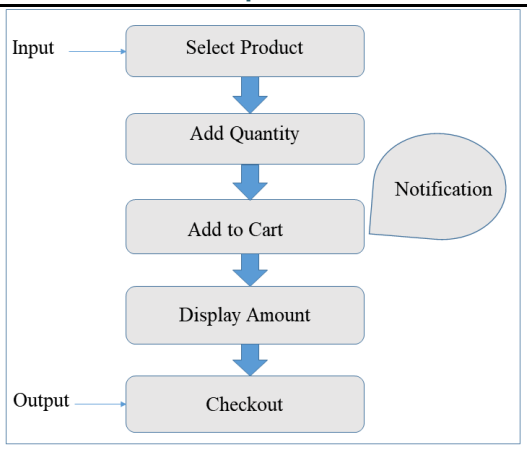

Fig4:- Implementation Module 2 (Main Dashboard for Purchase)

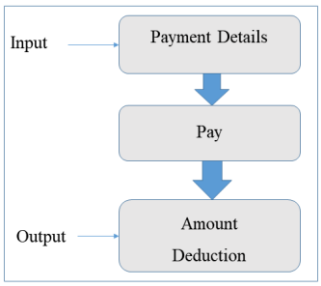

Fig5:-Implementation Module 3 (Payment)

VI. CONCLUSION

Our proposed system SAFR will support all the smart phones on the Android platform. This application is more helpful to farmers to get all information exclusively in one touch at any time, at any place. SAFR provides utility to the farmers as presently there is no single platform where all the problems of farmers are addressed in the real time without the involvement of a middleman. SAFR not only provides fair selling prices to the farmers, but also provides additional features such as information sharing and guidance based on area of interests. Through this mobile application SAFR, we can make sure it is profitable for both farmers and consumers. We also aspire to provide support for more Indian languages for the widespread outreach and utilization of the application. SAFR provides payment gateways for secure transactions using standard algorithm and data encryption for private information using AES algorithm. Collaborative Filtering Recommendation Algorithm (CFRA) is used for rating and reviews which provides a ranking of products after selecting the area of interest.

VII. ACKNOWLEDGMENT

The authors would like to thank the publishers, researchers for making their resources available and teachers for their guidance. We thank the college authority for providing the required infrastructure and technical support. Finally, we extend our heartfelt gratitude to friends and family members.

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