Agriculture Decision Support System As Android Application

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Abstract: *This is android application which will be useful for farmers & agricultural institutes for cultivation of various kind of crops in various type of atmosphere. Android mobile use in Agriculture is as the core component to more helpful to increase productivity of crops and indirectly to increase GDP of India & reduce poverty. Achieving maximum crop yield at minimum cost is one of the goals of agricultural production. Process of taking a decision is so complex as there are several factors affecting entire farming process. This smart phone app is easy to use and in affordable cost which will suggest most probable matching crops to people according to basic inputs like water availability in mm, average temperature, average soil Ph of farm, locality of farm, soil Type, Crop Duration etc so by certain calculation at backend this app will show most probable crops List for that farm. It is one farmer's friend kind of app. By this farmers can cultivate more suited crop and increase production ratio.*

Keywords: DSS, Artificial Intelligence, Agriculture

1. Introduction

1.1 Problem Definition

This Decision support System Used in Agriculture System To suggest Farmer to select a crop for cultivation mapping using different ground parameters Soil type, Soil PH, Average Weather, Water consumption, Temperature range as input.

By making good use of new technology in precision agriculture, farmers can concentrate their efforts toward deciding upon the selection of crop yield, crop patterns and areas which are in need of water, nutrients or other attention (like pesticides), area average temperature, soil Type, Soil PH etc. This information which is collected in real-time can increase agriculture efficiency by providing the farmer with the values of agri-parameters in a timely manner and there for to enable him act on it. Design and development of a wide range of such new applications (there is use of collected crop related data by experienced people and, from internet Pulse use of mobile technology with this statically data calculation) would greatly benefit the agricultural sector which happen to be a driving factor of our economy.

The DSS was implemented and assessed by farmers as a useful tool for accessing information and advisories in agricultural systems. More research is recommended to enable simple and affordable mobile phones be used by farmers to access wealth of agricultural knowledge and policies from research centres and government resources.

1.2 Previous Work

The practices of choosing a crop to grow in a particular area has been determined by several factors including temperature, precipitation, humidity, wind, soil, vegetations cover, radiation energy and socioeconomic conditions of farmers. In short, climatic conditions, physical relief features and human preferences determine what crops could be grown in an area. However, choices of crops to be grown in particular seasons have been complicated with increased impact of climate variability especially in semi-arid areas. As a result, effective crop productivity has been declining due to not only inadequate rainfall but also poor decision making of smallholder farmers(Traditional Methods which are successes but there is need of taking considering a available different resources.

No such limitation of existing systems but as some weak results are possible using Traditional methods which are not assured about 100 percent right decision so as there some chances of less profitable to the farmer or quality of crops also.

As this is Android Application used on Mobile for increased Agriculture profitability of farm as it helps farmer to take decision at the time of crop selection which is a first step towards increase productivity indirectly profitability but from year to year a traditional method are used or by experience or by inheritance. No such any method present which provide a solutions for crop selection decision using a advance technology.

1.3 Current Work

In Precision-Agriculture field variations are monitored, stored for managing and maintaining the precious resources using technologies to manage and improve production or yield. This can be the tool at the hands of agriculturists for crop selection, management with goal of optimizing return on investments while preserving natural resources. Precision Agriculture deals and takes care of viz. three branches of science

1) Crop Science: Understanding needs of crops according to weather and managing resources like fertilizers.

2) Environmental Protection: Precision agriculture helps to reduce Carbon, Nitrogen and Methane emissions.
3) Using Advance Technology in agriculture can help reduce wastage, preserve resources, and utilize them effectively resulting in improved efficiency, reduced efforts and boost economy.

1.3 Purpose

The productivity of a region's farms is important for many reasons. Aside from providing more food, increasing the productivity of farms affects the region's prospects for growth and competitiveness on the agricultural market, income distribution and savings, and labor migration.

As farmers adopt new techniques and differences in productivity arise, the more productive farmers benefit from an increase in their welfare. There are many factors to consider in crop selection, a requisite that must be undertaken before actually starting farming venture.

2. Literature Survey

Two points are very important for the crop to be grown can be decided based mainly on marketability and profitability. But up till now this is inherited or traditional method are used which are not 100 percent assured profitability. In any locality, the prevalent cropping systems are the cumulative results of past and present decisions by individuals, communities or governments and their agencies. These decisions are usually based on experience, tradition, expected profit, personal preferences and resources, social and political pressures and so on.

Variety of crops: Can you guess why India has a variety of crops? As mentioned in the beginning of the lesson, India has diversity of topography, climate and soil. Since India has both tropical and temperate climate, crops of both the climate are found in India. There are very few countries in the world that have variety comparable to that of India.
The major salient features of Indian agriculture are subsistence agriculture, highly dependent on monsoon and animals, variety of crops and predominance of food crops.

Major crops in India can be broadly divided into four categories **i.e. food crops, cash crops, plantation crops and fruits.** You would realize that when we would discuss the different type of crops in detail. Look at the table No.1 to get an idea.

3. Methodology / Approach

These are the Main Modules of the application; one is for Administration and second for Farmer As per Figure.1.

3.1 Admin Module

3.1.1) Login
3.1.2) Add crops
3.1.3) Delete crops
3.1.4) Update crops info
3.1.5) View crops

3.2 Farmers module

3.2.1) Registration
3.2.2) Login
3.2.3) View crops
3.2.4) Find matching crops using crop calculator
3.2.5) Feedback from Clients

Ground Parameters for Crop Selection

1. Soil Type
2. Region
3. Temperature
4. Water supply
5. Cultivate Duration(Month)
6. Average Weather

The world's crop yield patterns are controlled by a variety of factors, including climate, soil quality, genetic potential and human management (including irrigation, fertilization and other planting practices)

In northern India, there are two distinct seasons, *kharif (July to October), and rabi (October to* March). Crops grown between March and June are known as *zaid.*

This project uses Decision Tree classification methodology and artificial neural network Concept to identification of crops. ANNs provide a method to characterize synthetic neurons to solve complex problems in the same manner as the human brain does.

A subscription system enables personalized information. Background data are collected from different sources, processed by decision support models, and the results are integrated into personalized pages with embedded graphics, expert interpretations and links to additional information.

There are many constrains like temperature, water availability, soil type, soil ph level to sort out the most probable matching crops. So we have created one separate special class to find it out i.e. Neural.java. We have taken user inputs from user and calculate all values at backend and display matching crops to user.
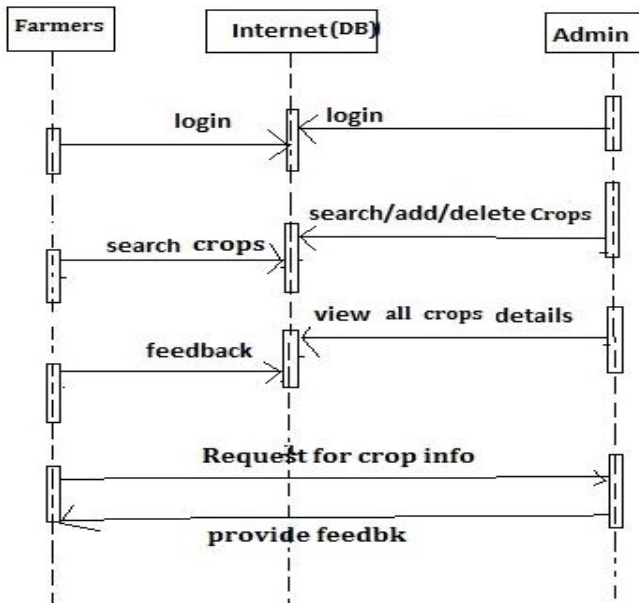
Figure 1: (Sequence of a Application Execution)

To provide a client(farmer) different soil type drop list(Approximately 8 Types of soil), water supply requirement options (Different 4 Ranges), Provide temperature ranges(3 Ranges) and different average climate options and Soil PH(4 Range) and month Duration (Kharif/Rabbi)

Use this Statistical data plus Neural Network Function to calculate a preferred crop list. If particular crop get selected from client from preference list then provide a detail of information related to that particular crop cultivation for e.g

1) Where to get seed or plants.
2) How to crop cultivate process.
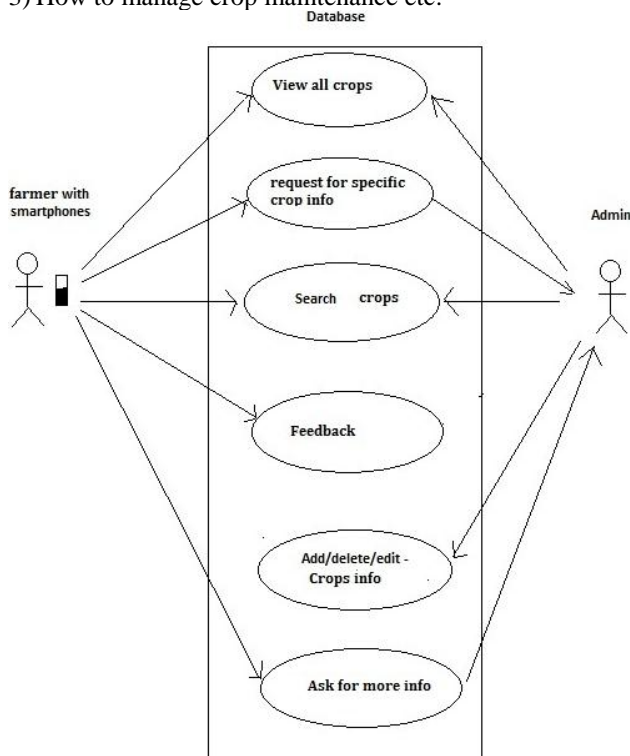3) How to manage crop maintenance etc.

Figure 2: (Case Diagram of App)

Different Functions are provided to Farmer as first List of all Crops approximately production wise available from Maharashtra that will help to farmer to take a particular decision clue or overview of crops.

3.4 Expert System for Decision Making

The conventional decision support have predefined set of input data, after that they begin analysis. They precede the data, step by step as directed by algorithm, to reach conclusion. They rely on extensive knowledge base (in their mind) which may contain facts, assertions, past mistakes, trial – by – error method. The machine equivalent human experts are expert systems. The expert system works with cognitive approach and stress the knowledge in knowledge base which is separate component. So that changes in knowledge do not change whole structure of expert system. Another advantage is reasoning capability. They can explain reasons for arriving at particular decision.

Classic decision support system design comprises of components for i) sophisticated database management capabilities with access to internal and external data, information, and knowledge, ii) powerful modeling functions accessed by a model management system, and iii) simple user interface designs that enable interactive queries, reporting, and graphing functions

3.5 Mobile Use in Agriculture

Advance technology use in agriculture which will help to increase productivity of farm. Mobile is now very commonly use by all people so make use of that to increase agriculture production.

Android is one of advanced Operating System of Mobile which has lots of advantages. Android is a Linux-based, open-source operating system designed for use on cell phones, e-readers, tablet PCs, and other mobile devices. Mobile technologies provide a clear opportunity for sharing and exchanging knowledge more widely and in a more cost-effective way than has previously been possible.

Now in Advanced Technology era maximum number of people use Mobile Phones not only for communication but also increased their knowledge, learn new things, more and more farmers now own mobile phones and this, coupled with recent developments in Information Communication Technologies (ICTs), has created a new opportunity to ensure that farmers can get the information they need. But up till now for this inherited or traditional method are used which are not 100 percent assured Profitability. As in this era of advanced technology lots of uses of mobile in different fields and one of them is agriculture field.

3.6 Different Functionality

There are two users for this application. **1) Admin 2) Farmer,** there are different options are available to different as per user

1) Admin login have facility of
a) Add crop
b) Edit/Delete
c) Search Particular Crop
d) View All Available Crops

2) Farmer has to register first and provide personal information and its create a user id. Next sign up first using a username and Password and there are different options are available of
a) View all Crop List
b) Feed back
c) Crop Calculator

Login options for different users as per there login different facility. View all crop is a display of all available crops and Feedback is a option for farmer to write some suggestion, advice or any related improvement for app. Crop calculator is main module from which farmer can give different available inputs to app, on these input backend calculation using different statically backend data and provide a list of preferable crop list to user.
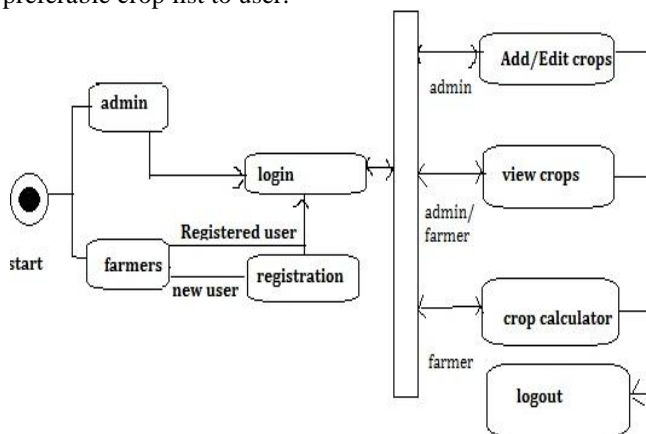

Figure 4: (Overall Data Flow Design of App.

4. Results &Discussion

However 80% of farmer said the use of Mobile Phones improved their livelihood. This application provide a preferable crop lists to user(Farmer) after providing inputs of environmental data to app. However this can be helpful for those who are new to agriculture which will help farmer to take a decision which crop productivity will be more and increase a income from farming

5. Conclusion

This Decision support System will be Useful in Agriculture System to suggest Farmers to select a crop for cultivation mapping using different ground parameters Soil type, Average Weather, Water consumption, Temperature and soil PH. As this system more helpful to increase productivity of crops and indirectly to increase GDP of India reduce poverty.

6. Future Scope

Modern agriculture offer a range of benefits including greater production and higher income for farmers in both developed and developing countries for e.g using a mobile for take a decision in crop selection so that increase a production of field in available environmental situation.

Farmer empowerment can be successfully achieved by providing them right information at right time. Informed decision making by effectively utilizing the different new technology and different agriculture model tools will increase productivity. This will not only motivate the farmers in the rural area, but also drive urban youth towards hi-tech farming.

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