



**IJIRCCCE**

e-ISSN: 2320-9801 | p-ISSN: 2320-9798



# INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN COMPUTER & COMMUNICATION ENGINEERING

**Volume 10, Issue 4, April 2022**

**ISSN** INTERNATIONAL  
STANDARD  
SERIAL  
NUMBER  
INDIA

**Impact Factor: 8.165**



9940 572 462



6381 907 438



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www.ijircce.com

# Implementation as a Agriculture Consultant with Android Application for Farmers

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**ABSTRACT:** Agriculture in today's life is not like as our forefa- ther done. The strong climatic changes due to many reasons like global warming cause difficulty to understand climatic conditions. This makes farmers unable to understand many things as which crop to select by which the production will improve, how to market the the crop, where are seeds available and its price,etc. Sometimes farmers are unable to judge water to be provided to crops. Thus for this we propose a Android based agriculture consultant for farmer, the application by understanding soil and climate conditions using machine learning system will provide farmers to take right crop at right place which will improve yields. So it is easy for farmers to decide which crop to take in unpredictable climate conditions. Yield prediction is an important agricultural problem. Every farmer is interested in knowing, how much yield he is about expect. The farmers necessarily requires a timely advice to predict the future crop productivity and an analysis is to be made in order to help the farmers to maximize the crop production in their crops.The application with help of IoT part will detect the soil moisture and control water for soil.At last it will provide timely suggestion to all all queries from farmer.

**KEYWORDS:** Agriculture , Android Application , Machine Learning , IoT , ChatBot

## I. INTRODUCTION

Agriculture field is the backbone of any country. Agriculture supplies the food and raw materials to the people in country. It is the only income source of many peoples. Peoples who belong with agriculture field faces many problems such as decreasing production due to unsuitable climatic changes, flood, dearth and many other natural reasons and rarely factors. They are unable to do agriculture due to this reason. Farmers are facing lots of problems and loss due to lack of knowledge. Most of the farmers are either committing suicide or migrating from the agriculture. Motive behind this project is to provide a system to the farmers that will provide them the suitable information while choosing. Use of Machine Learning with IoT will help farmers to solve problems.Analyze crop patterns with the help of past records and map them with calculated data. Monitor crop yield and find ways for increasing it. Recommend profitable crops for each land type. To help the farmers while choosing the crop. To provide the information about appropriate fertilizers and irrigation method for selected crop. The basic idea of the machine learning is that it generates useful information by extracting from large datasets. To be more accurate, it is a technique of extracting useful information from large amount of data.The application with help of IoT part will detect the soil moisture and control water for soil.At last it will provide timely suggestion to all all queries from farmer.

Farmers are facing lots of problems and loss due to lack of knowledge. Most of the farmers are either committing suicide or migrating from the agriculture. Motive behind this project is to provide a system to the farmers that will provide them the suitable information while choosing.

Paper is organized as follows. Section II describes about the related work done earlier for the system to be developed. Section III presents method used and algorithms used for the detection. Section IV presents experimental results showing results of images tested. Finally, Section V presents conclu- sion.

## II. RELATED WORK

### 1. Crop Recommendation System for Precision Agriculture

Data mining in agriculture is used for analyzing the various biotic and abiotic factors. Agriculture in India plays a predominant role in economy and employment. The common problem existing among the Indian farmers are they don't choose the right crop based on their soil requirements. Due to this they face a serious setback in productivity. This problem of the farmers has been

TABLE I  
LITERATURE SURVEY

Sr. No.	Title of Paper	Method Used	Findings
1	Crop Recommendation System for Precision Agriculture	Data mining in agriculture is used for analyzing the various biotic and abiotic factors of crop. Naïve Bayes And K nearest Neighbor is used to determine the recommendation of crop	Only Machine learning is Used. We have integrated machine learning with Iot and Webinterface.
2	Design of fertilization recommendation knowledge base and application.	Crop fertilization recommendation system involves using models to calculate the needed amount of variety of nutrients during the crop growth, choosing suitable fertilizers, and arranging fertilization time.	Web interface for choosing fertilizers is used. We have used web interface as chat box to communicate about queries.
3	A Study On Various Data Mining Techniques For Crop Yield Prediction	The paper presents the study about the various data mining techniques used for predicting the crop yield. The success of any crop yield prediction system heavily relies on how accurately the features have been extracted and how appropriately classifiers have been employed.	Only Machine learning is Used for crop prediction. We have integrated machine learning with Iot and Webinterface
4	System For Agriculture Recommendation Using Data Mining	This project will help to solve these agriculture problems using data mining algorithms. Algorithms like Genetic Algorithm (GA), Association Rule Mapping (ARM). Knowledge Discovery in Databases (KDD) is the centroid of this project from which we can really understand the concept of data mining	Only Machine learning is used. we have integrated machine learning with Iot and Webinterface

addressed through precision agriculture. Precision agriculture is a modern farming technique that uses research data of soil characteristics, soil types, crop yield data collection and suggests the farmers the right crop based on their sitespecific parameters. This reduces the wrong choice on a crop and increase in productivity. In this paper, this problem is solved by proposing a recommendation system through an ensemble model with majority voting technique using Random tree, CHAID, K-Nearest Neighbor and Naive Bayes as learners to recommend a crop for the site specific parameters with high accuracy and efficiency.[1]

## 2. Design of fertilization recommendation knowledge base and application

Crop fertilization recommendation system involves using models to calculate the needed amount of variety of nutrients during the crop growth, choosing suitable fertilizers, and arranging fertilization time. Whether it can be used widely or not, the key point is that the models or parameters in system can be customized easily according with local agricultural production practices. To help address these issues, an infrastructure of knowledge base and its application is proposed. This paper firstly focuses on decomposition of the model by method of object-oriented in order to comply with the requirements of C++ programming. It is divided into three categories of entity, parameter, and operator for converting the entity objects in fertilization to the software system objects. And then the required knowledge to run model are classified to four types by their action, and expressed as a variety of rules form stored in relation database. In the end, a reasonable decision inference engine designed for applying them. It is actually a specific computer program to control local entities and the rules form introduced to system under a certain strategy and produce applicable recommendation.[2]

## 3. A Study On Various Data Mining Techniques For Crop Yield Prediction

India is a country where agriculture and agriculture related industries are the major source of living for the people. Agriculture is a major source of economy of the country. It is also one of the country which suffer from major natural calamities like drought or flood which damages the crop. This leads to huge financial loss for the farmers thus leading to the suicide. Predicting the crop yield well in advance prior to its harvest can help the farmers and Government organizations to make appropriate planning like storing, selling, fixing minimum support price, importing/exporting etc. Predicting a crop well in advance requires a systematic study of huge data coming from various variables like soil quality, pH, EC, N, P, K etc. As Prediction of crop deals with large set of database thus making this prediction system a perfect candidate for application of data mining. Through data mining we extract the knowledge from the huge size of data. This paper presents the study about the various data mining techniques used for predicting the crop yield. The success of any crop yield prediction system heavily relies on how accurately the features have been extracted and how appropriately classifiers have been employed. This paper summarizes the results obtained by various algorithms which are being used by various authors for crop yield prediction, with their accuracy and recommendation.[3]

## 4. System For Agriculture Recommendation Using Data Mining

Agriculture in today's life is not like as our forefather done. The strong Climatic changes due to many reasons like global warming cause difficulty to understand climatic conditions. So the farmers unable to understand which crop to select by which the production will improve. By understanding soil and climate conditions by using these data mining system farmers will be able to take right crop at right place which will improve yields. So it is easy for farmers to decide which crop to take in unpredictable climate conditions. This project will help to solve these agriculture problems using data mining algorithms. Algorithms like Genetic Algorithm (GA), Association Rule Mapping (ARM). Knowledge Discovery in Databases (KDD) is the centroid of this project from which we can really understand the concept of data mining.[4]

**Web based Recommendation System for Farmers** India being an agricultural country is still using traditional ways of recommendations for agriculture. Currently recommendations for farmers are based on mere one to one interaction between farmers and experts and different experts have different recommendations. Recommendation can be provided to farmers using past agricultural activities with help of data mining concepts and the market trend can be merged with it to provide optimized results from recommender. The paper proposes the use of data mining to provide recommendations to farmers for crops, crop rotation and identification of appropriate fertilizer. The System can be used by farmers on web as well on android based mobile devices. [5]

### 4) Web Interface

- Managing chat with farmers is taken care in this module
- Queries of Farmers are solved by chatting



B. System Architecture

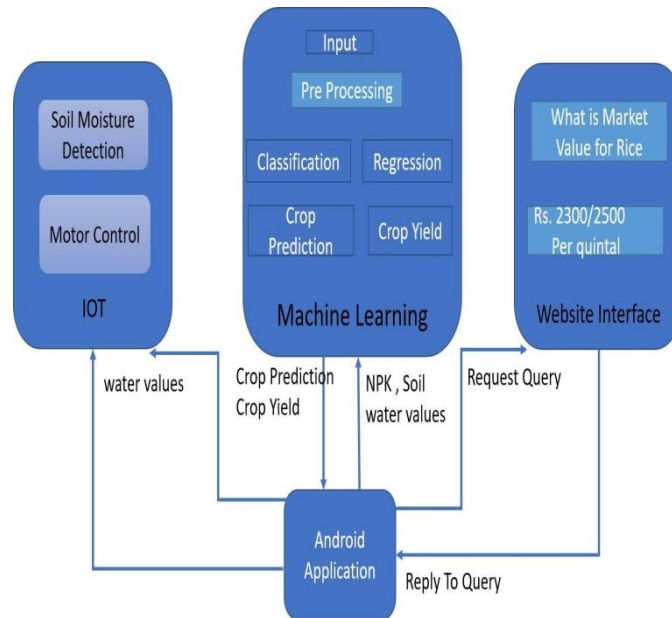


Fig. 1. System Architecture

C. Dataset

N	P	K	Soil Type	Crop Name
100	25	65	Red	wheat
150	60	80	Red	Wheat
85	45	50	sandy	Bajara
100	50	40	sandy	bajara
201	200	155	clay	Sugarcane
300	152	200	Clay	sugarcane
150	50	50	Black cotton	Rice
170	75	75	Black cotton	Rice

III. PROPOSED METHODOLOGY

The system consists of Three methods

1. Machine Learning :Machine learning helps to predict the crop and yield for given soil type , NPK dataset is used for same. The classification and regression is performed for pre- diction of crop and yield.
2. IoT :IoT Interface helps detect the moisture content of soil and maintain as per crop requirement.
3. Web Interface :Web Interface provides timely information to farmers in need

D. Algorithm

```

Input: D dataset, on-demand features, aggregation-based features,
Output: Classification of Application
for each application App-id in D do
  Get on-demand features and stored on vector x for App-id
  x.add ( Get-Features(app-id));
end for
for each application in x vector do
  Fetch first feature and stored in b, and other features in w.
  hw,b (x) = g (z) here z= ( wT x + b)
  if (z > 0)
    assign g(z)=1;
  else g(z)=-1;
  end if
end for
    
```

A. Modules

1. Admin:

- Admin is responsible for maintenance of whole system.
- Adding Farmers, and managing chat with farmers is taken care by admin

2. Machine Learning :

- Machine Learning is responsible for crop prediction and crop yield prediction

3. Iot

- Soil moisture is detected by Iot module.
- Water content of soil is maintained by this module

SVM: SVM (Support vector machine) is one popular algorithm used for many classification problems.

- It is one of the supervised learning models with associated learning algorithms that analyze data used for classification and regression analysis. Given a set of training examples, each marked as belonging to one or the other of two categories, an SVM training algorithm builds a model that assigns new examples to one category or the other, making it a non- probabilistic binary linear classifier.
- An SVM model is a representation of the examples as points in space, mapped so that the examples of the separate categories are divided by a clear gap that is as wide as possible.

1. *Decision Tree:* The decision tree Algorithm belongs to the family of supervised machine learning algorithms. It can be used for both a classification problem as well as for regression problem

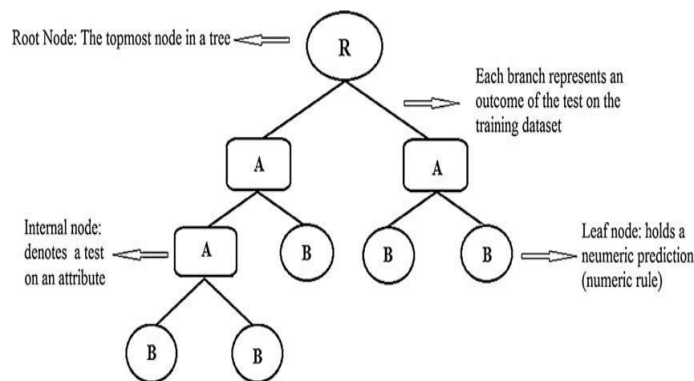


Fig. 4. Decision Tree

E. Mathematical Model

Let S be whole system I is Input

P is Processing O is Output

$$I=I_0, I_1, I_2, I_3$$

I0= Sensor Values I1= Crop Details I2= Soil Details I3= Query

P=P0,P1,P2

P0= Calculate Sensor Values P1= Classify Crop Yield P2= Process Query

O=O0,O1,O2

O0 = Determine Water Moisture O1 = Predict Crop Yield

O2 = Answer Query

#### IV. RESULT & DISCUSSIONS

The system is developed as app for farmers to be used for knowing water moisture in soil and predicting crop yield. The App also helps to answer queries from farmers. The screenshot 5 is the registration form to be filled by any new farmer. ?? is the login screen. The menu can be seen through ??

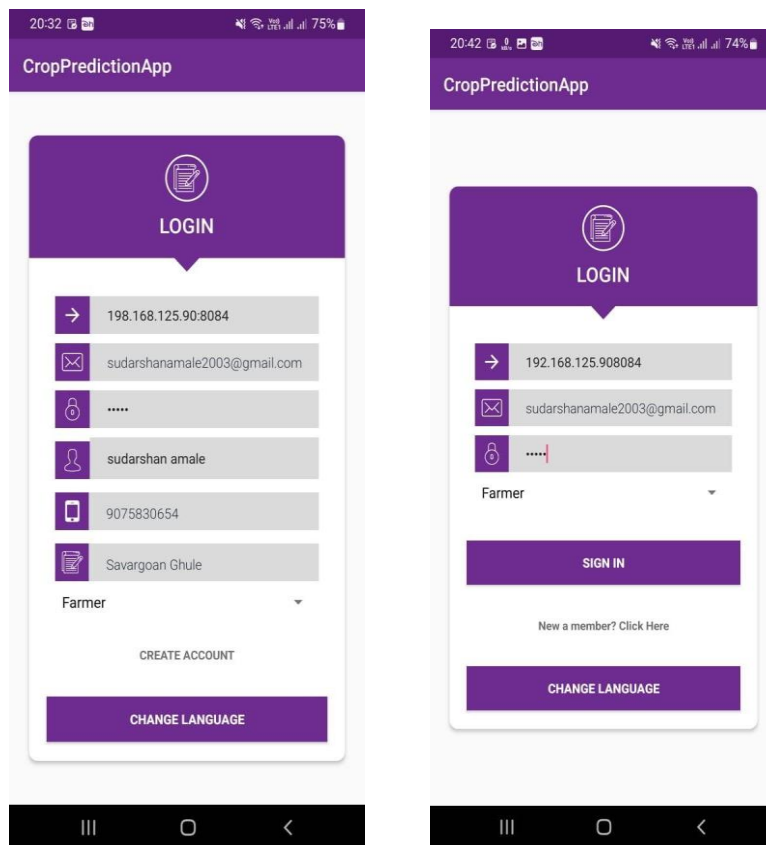


Fig. 5. Registration Login

The below screenshot 8 shows the query put-forth by farmer and answer to same captured from database.

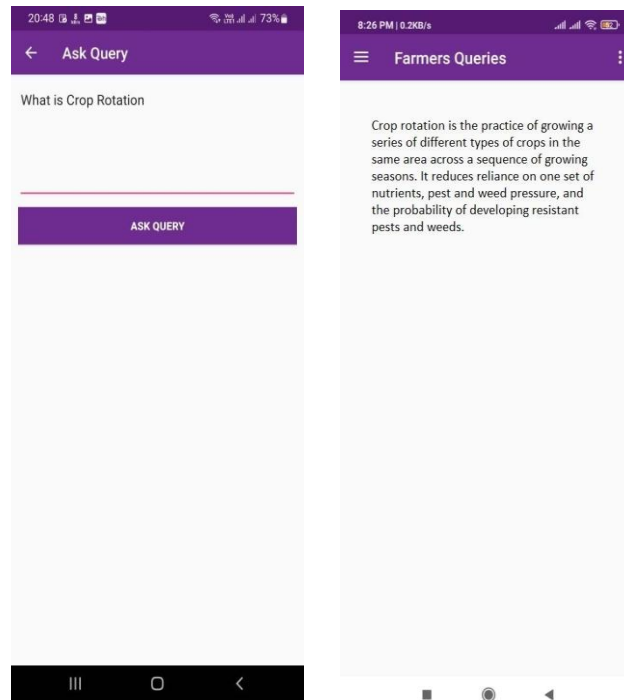


Fig. 8. Farmer Query

## V. CONCLUSION

Crop Prediction and crop yield prediction for rice crop will be performed. System is trained on a standard data values of NPK and soil type required for the good growth of crop . System will be tested on a real dataset which contains NPK values and soil type. SVM, Decision Tree is used to predict crop to be cultivated. Moisture level of soil is detected to determine the water content. Web interface establishes a communication with farmer in need to resolve their queries.

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Impact Factor: 8.165

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STANDARD  
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