

Agricultural Crop Recommendation Based on Productivity

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Abstract- Agriculture is the backbone of the Indian economy. Farmers often struggle to achieve expected crop yields due to factors like unpredictable weather, soil variability, and lack of advanced forecasting systems. This paper presents a machine learning-based approach for recommending crops based on historical data, including soil type, rainfall, and crop productivity, using a Decision Tree Classifier. The system provides valuable insights to farmers by analyzing region-specific datasets and enhances their decision-making capabilities

Keywords- Crop prediction, Decision Tree, Data mining, Machine Learning, Agriculture

I. INTRODUCTION

Agriculture is the backbone of Indian Economy. In India, majority of the farmers are not getting the expected crop yield due to several reasons. The agricultural yield is primarily depends on weather conditions. Rainfall conditions also influences the rice cultivation. In this context, 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.

People of India are practicing Agriculture for years but the results are never satisfying due to various factors that affect the crop yield. To fulfill the needs of around 1.2 billion people, it is very important to have a good yield of crops. Due to factors like soil type, precipitation, seed quality, lack of technical facilities etc the crop yield is directly influenced. Hence, new technologies are necessary for satisfying the growing need and farmers must work smartly by opting new technologies rather than going for trivial methods.

Machine learning is the process of extract helpful and significant information from huge sets of data. Data Mining in agriculture field is a comparatively novel research field. Yield prediction is a very important agricultural problem. Any farmer is interested in knowing how much yield he is concerning to be expecting. In the earlier period, yield prediction was performing by considering farmer's experience on particular field and crop. In any of Data Mining actions the

training data is to be collected from past data and the gathered data is used in terms of training which has to be exploited to study how to categorize future yield predictions.

From ancient period, agriculture is considered as the main and the foremost culture practiced in India. Ancient people cultivate the crops in their own land and so they have been accommodated to their needs. Therefore, the natural crops are cultivated and have been used by many creatures such as human beings, animals and birds.

The greenish goods produced in the land which have been taken by the creature leads to a healthy and welfare life. Since the invention of new innovative technologies and techniques the agriculture field is slowly degrading. Due to these, abundant invention people are been concentrated on cultivating artificial products that is hybrid products where there leads to an unhealthy life. Nowadays, modern people don't have awareness about the cultivation of the crops in a right time and at a right place.

Because of these cultivating techniques the seasonal climatic conditions are also being changed against the fundamental assets like soil, water and air which lead to insecurity of food. By analyzing all these issues and problems like weather, temperature and several factors, there is no proper solution and technologies to overcome the situation faced by us. In India there are several ways to increase the economical growth in the field of agriculture.

There are multiple ways to increase and improve the crop yield and the quality of the crops. Data mining also useful for predicting the crop yield production. Generally, data mining is the process of analyzing data from different perspectives and summarizing it into useful information.

Data mining software is an analytical tool that allows users to analyze data from many different dimensions or angles, categorize, and summarize the relationships identified. Technically, data mining is the process of finding correlations or patterns among dozens of fields in large relational databases. The patterns, associations, or relationships among all this data can provide information.

Crop yield prediction is an important agricultural problem. Each and Every farmer is always tries to know, how much yield will get from his expectation. In the past, yield prediction was calculated by analyzing farmer's previous experience on a particular crop.

II. LITERATURE SURVEY

Crop and Yield Prediction Model

An agricultural sector necessitate for well defined and systematic approach for predicting the crops with its yield and supporting farmers to take correct decisions to enhance quality of farming. The complexity of predicting the best crops is high duet unavailability of crop knowledge-base.

Crop prediction is an efficient approach for better quality farming and increase revenue. Use of data clustering algorithm is an efficient approach in field of data mining to extract useful information and give prediction. Various approaches have been implemented so far are worked either for crop prediction. Crop prediction model aiding farmers to take correct decision.

Data mining and wireless sensor network for agriculture pest/disease predictions.

Data driven precision agriculture aspects, particularly the pest/disease management, require a dynamic crop-weather data. An experiment was conducted in a semi-arid region to understand the crop-weather-pest/disease relations using wireless sensory and field-level surveillance data on closely related and interdependent pest (Thrips) - disease (Bud Necrosis) dynamics of groundnut crop.

An Analysis of Agricultural Soils by using Data Mining Techniques

Agriculture is the most basic function to accomplish food demand all over the globe; it is a backbone particularly in the developing countries like India.

The application of Data mining techniques in agriculture especially on soils can revise the situation of pledge making and improve cultivation yields in a better way. The analysis of soils plays an indispensable role for resolution making on several issues related to agriculture field.

Analysing Soil Data using Data Mining Classification Technique

Soil is an essential key factor of agriculture. The objective of the work is to predict soil type using data mining classification techniques. Methods/Analysis: Soil type is predicted using data mining classification techniques such as JRip, J48 and Naive Bayes.

The Impact of Data Analytic in Crop Management based on Weather Conditions

Agriculture is the most significant application area particularly in the developing countries like India. Data mining plays a crucial role for decision making on several issues related to agriculture field. The goal of the data mining process is to extract knowledge from an existing data set and transform it into a unique human understandable format for some advance use.

III. PROPOSED SYSTEM

Proposed System for Agricultural Crop Recommendation Based on Productivity-to address the limitations and drawbacks of existing agricultural crop recommendation systems, we can propose a more robust, comprehensive, and user-centrist system. This system would combine the strengths of advanced technologies like machine learning, remote sensing, and local knowledge while addressing challenges such as data gaps, accessibility, and cost.

The proposed system should be adaptable, flexible, and scalable to different farming environments and user capabilities. Crop production depends on many agricultural parameters. Proposed work is based on the production of crops in previous years, crops can be recommended to the farmers. This kind of suggestions will make farmer to know that whether that particular is yielding a good production in recent years. Production of crops may become less due to any crop disease, water problem and many other factors.

While considering about the production, farmers may get knowledge about which crop is in high volume in the market in that year.

The problem statement of the project is to recommend crops to the farmers using Decision Tree Classifier. The basic process of this project is that we will pre-process the data provided to us, then it is used to prepare the model for the backed and using flask to connect it to the UI interface to show the full and final output.

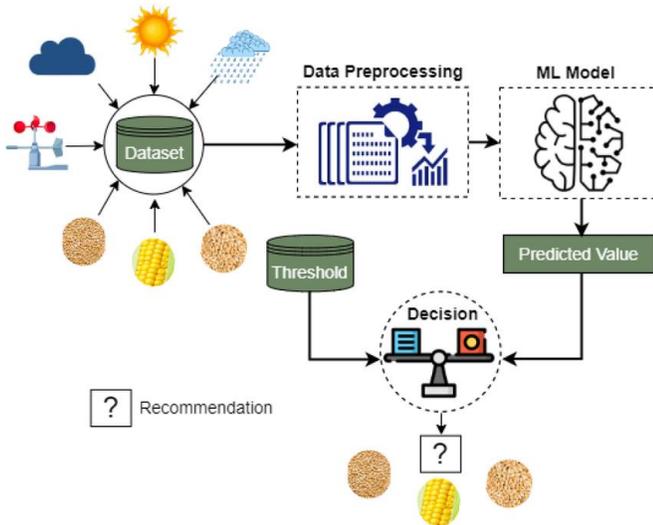
IV. SYSTEM REQUIREMENTS

Hardware: Core i3, 4GB RAM, 500GB HDD

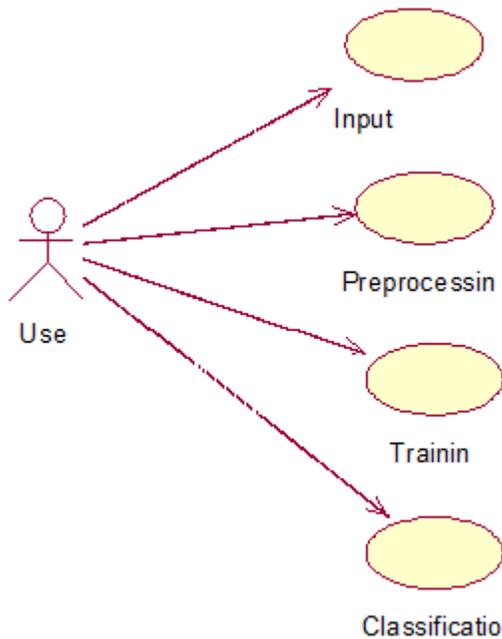
Software: Windows 10, Python, Flask, ML Librarie

SYSTEM DESIGN

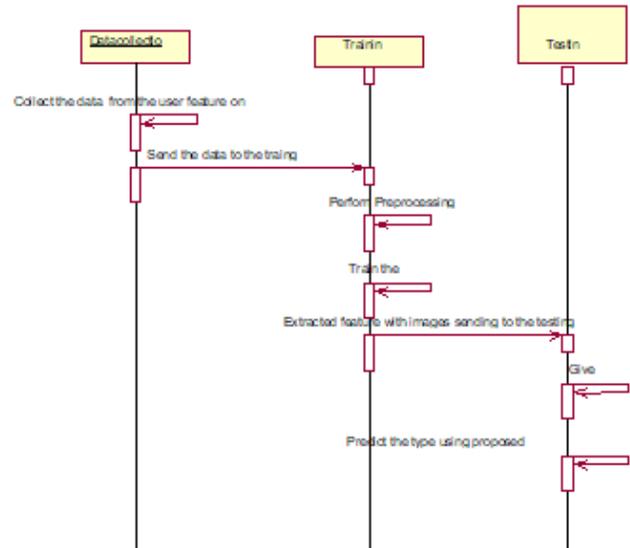
Includes system architecture, data flow diagrams, and UML diagrams (Use Case, Sequence, Activity, Class)



System Architecture



Use Case Diagram



Sequence Diagram

SYSTEM IMPLEMENTATION

Modules implemented:

- Data Collection & Preparation
- Model Building (Decision Tree Classifier)
- Prediction with 90.7% test accuracy
- Web application using Flask

SYSTEM STUDY

Feasibility study covering:

- Economic:** Cost-effective due to open-source tools
- Technical:** Minimal resource demand
- Social:** User-friendly and accessible to rural farmers

SYSTEM TESTING

Describes various testing methods:

- * Unit, Integration, Validation, and User Acceptance Testing
- * Sample input/output screenshots of the web application

Sample Input Of Crop Prediction

Sample Output of Crop Prediction

V. CONCLUSION AND FUTURE ENHANCEMENTS

The model effectively predicts suitable crops based on real-time data. Future enhancements include expanding to CNN-based crop image classification and deeper model training using transfer learning.

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