ISSN No:-2456-2165

Soil Quality Analysis and Crop Recommendation

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Abstract:- Analyzing the qualities of the soil to determine whether it is suitable for supporting plant growth is known as soil quality analysis. It involves assessing many elements, including texture, organic matter content, pH level, and nutrient content. This evaluation assists in locating any soil imbalances or inadequacies that may have an impact on crop productivity. The process of recommending acceptable crops to grow based on the findings of soil analysis and other pertinent parameters is known as crop recommendation. It fits the unique requirements of various crops with the soil characteristics existing on a certain farm or field. By choosing the most suitable crops for the existing soil conditions, the objective is to maximize crop yields and reduce the chance of crop failure.

Keywords:- *Soil Moisture, Sensors, Nitrogen, Phosphorus, Potassium, Web Application.*

I. INTRODUCTION

Crop recommendation and soil quality analysis are essential for maximizing agricultural output and sustainability. Analyzing the physical, chemical, and biological characteristicsof soil allows us to gauge its fertility, nutrient availability, pHlevel, and general state of health. Farmers can choose the best crops and management techniques by using this study to assistthem understand the unique properties and constraints of theirsoil. The results of the soil quality analysis are taken into account when recommending crops, along with other elements including climate, water availability, and market demand. It entails recommending crops that are appropriate for the individual soil characteristics and environmental elements of acertain farm or field. Farmers can maximize yields and minimize costs by matching crops to the specific qualities of the soil.The approach that combines crop recommendation with soil quality research offers farmers insightful information andpractical suggestions for sustainable agriculture. It encouragesresource utilisation that is efficient, lessens its negative effectson the environment, and supports farming enterprises' long- term productivity and profitability. Farmers may maximise their yields, enhance soil health, contribute to food security and environmental sustainability, and improve soil health by assessing the quality of their soil and selecting crops wisely.

II. LITERATURE REVIEW

A literature survey or a literature review in a project report shows the various analyses and research made in the field ofinterest and the results already published, taking into accountthe various parameters of the project and the extent of the project.

A literature survey includes the following

- Existing theories about the topic which are accepted universally.
- Books written on the topic, both generic and specific.
- Research done in the field usually in the order of oldest to latest.
- Challenges being faced and on-going work, if available.

Literature survey describes about the existing work on the given project .It deals with the problem associated with theexisting system and also gives user a clear knowledge on how todeal with the existing problems and how to provide solution to theexisting problems .different thing.

III. EXIXSTING SYSTEM

This section provides the proposed methodology used forcrop yield prediction. The purpose of crop yield prediction is to estimate production in agriculture sector for better crop management and make strategic decisions for improving crop yield in future. The Existing model can be incorporated with a decision support system (DSS) that can be used in precision agriculture which aims at complete farm management.

A. DEMERITS

- Factors like climate and location of market and planting area is not taken into consideration
- The system doesn't take area of land being cultivated and the sowing date. The market price ofthe cultivated crops after harvesting is not considered.

IV. SYSTEM ARCHITECTURE

Analysis is the process of breaking a complex topic or substance into smaller parts to gain a better understanding of it. Analysts in the field of engineering look at requirements, structures, mechanisms, and systems dimensions. Analysis is an exploratory activity. The Analysis Phase is where the project lifecycle begins. The Analysis Phase is where you break down the deliverables in the high-level Project Charter into the more detailed business requirements. The Analysis Phase is also the part of the project where you identify the overall direction that the project will take through the creation of the project strategy documents. Systems design is the process of defining the architecture, components, modules, interfaces, and data for a system to satisfy specified requirements. Systems design couldsee it as the application of systems theory to product development. There is some overlap with the disciplines of systems analysis, systems architecture.

ISSN No:-2456-2165

If the broader topic of product development "blends the perspective of marketing, design, and manufacturing into a single approach to product development," then design is the act of taking the marketing information and creating the design of the product to be manufactured. Systems design is therefore the process of defining and developing systems to satisfy specified requirements of the user. figure 1 gives the model of the system architecture.

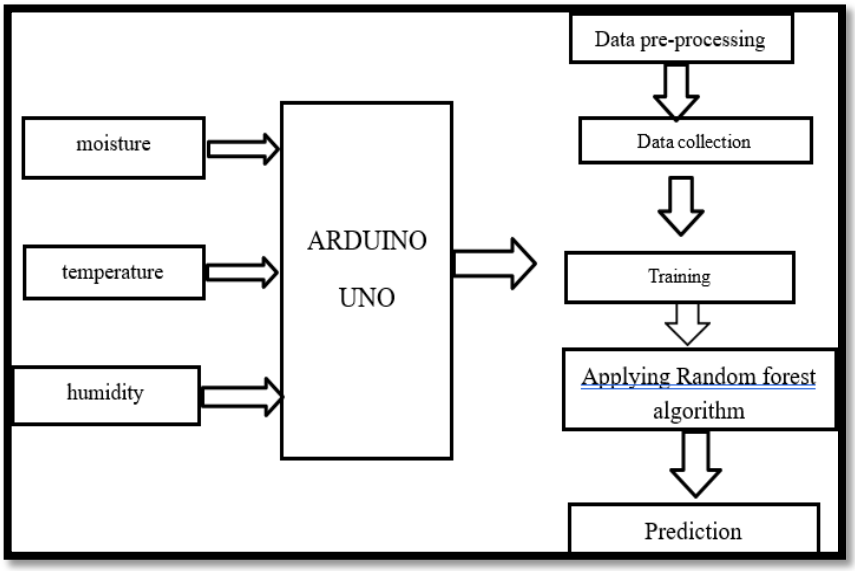

Fig. 1: System Architecture

V. SOLUTION REQUIREMENTS

A. Functional Requirements

- Identify the effect of various factors such as land area, rainfall and temperature on crop production and yield.
- Predict the future market price of crops by taking previous crop price and predicted yield data into consideration.
- To compare the accuracy of multiple linear regression and random forest and determine which algorithm is accurate.
- To integrate this with a user interface and for real-time data.

VI. METHODOLOGY

A. Crop Recommandation

Crop variety, seed type, and environmental factors like sunshine (temperature), soil (ph), water (ph), rainfall, and humidity are the main determinants of crop output. It is possible to estimate the optimum crop to grow there in order to increase crop yield and net crop production by analysing the soil and environment in that area. The farmers will benefit from this forecast. should select the right crops for their farm based on the season, fertiliser, soil PH, temperature, humidity, water level, spacing depth, and months.

B. Crop Fertilization

India has a large population, hence it is important to protect theworld's food supplies against climatic fluctuations. When thereis a drought, framers have significant issues. The kind of soil has a significant impact on crop productivity. Advising farmers to utilise fertilisers could assist them in making the optimal choice for their farming condition.We recommend the sort of fertiliser should be used for a given crop based on the type of soil and soil PH.

C. Random Forest

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VII. RESULT

Important details about the properties of the soil, such as nutrient levels, pH levels, and organic matter contents, are revealed through soil quality analysis. This examination aids in locating any soil imbalances, inadequacies, or constraints that could impede crop development and output.Crop suggestions might be made based on the findings of the soil analysis. These suggestions take into account the individual specifications of various crops and match them with the soil characteristics found on a certain farm or area. By choosing the most suitable crops for the existing soil conditions, the objective is to maximise crop yields and reduce the chance of crop failure. Crop recommendations use the results of soil quality study to advise appropriate crops that are well-suited to the particular soil conditions. Soil quality analysis offers insights into the soil's nutritional status, pH level, and organic matter concentration. The goal of this integrated strategy is to increase agricultural sustainability and productivity.

VIII. CONCLUSION

Soil quality evaluation and crop recommendation are crucial elements of sustainable agriculture, to sum up. Farmers can choose the best crops and management techniques by using soil quality analysis to better understand the unique properties and constraints of their soil. For

maximising crop output, it offers important information about nutrient levels, pH, and organic matter content.In order to recommend crops that are suitable for the unique soil conditions, crop recommendations take into account the findings of soil analysis as well as other elements like climate and water availability. Farmers can increase yields, spend less resources, and lower the likelihood of crop failure by selecting crops that are compatible with the particular qualities of the soil. The integrated strategy of crop recommendation and soil quality assessment encourages effective resource management, enhances soil health, and supports sustainable farming practises. It supports farmers in making educated decisions on crop selection, fertiliser management, and other agronomic practises, resulting in increased output, diminished environmental effects, and long- term financial success. Farmers may improve agricultural production, support food security, and contribute to the sustainability of our agricultural systems by knowing and controlling soil quality through analysis and making knowledgeable crop recommendations.

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