

Rainfall Prediction with Agricultural Soil Analysis

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Abstract

In India, the last drawback baby-faced by the farmers is the choice of correct yield for farming. There are several factors that influence the yield of crop like rain, temperature, soil, etc. Crop prediction helps farmers in choosing correct crop for plantation to maximize their earning. Prediction of crops may be accurately through with the help of data mining techniques and considering the environmental parameters. During this work, the classifiers used area unit support vector machine and data processing. Prediction of crop is completed by considering parameters like quantity of rain, least and most temperature, soil type, humidity, and soil, pH, scale price. The information is collected from the agricultural website of geographical area. The information is split into 9 agricultural zones. Associate interface has been designed through that farmers will enter the specified information to predict the crop. Classification of soil is required in order that farmer can recognize the sort of soil and may plow the crops counting on the sort of soil.

1. INTRODUCTION

Agriculture is the backbone of Indian Economy. In India, the majority of the farmers don't seem to be obtaining the expected crop yield because of many reasons. The agricultural yield is primarily depends on atmospheric condition. Rain conditions additionally influences the rice cultivation. During this context, the farmers essentially needs a timely recommendation to predict the long run crop productivity associate in nursing analysis is to be created to assist the farmers to maximize the crop production in their crops. Yield prediction is a crucial agricultural drawback. Each farmer is fascinated by knowing, what proportion yield he is regarding to expect. In the past, crop prediction was done by seeing grower's preceding knowledge on a specific crop. The degree of information is gigantic in Indian agriculture. Data Mining is wide applied to agronomic problems. Data mining can analyse versatile data there is no restriction on the type of data [1]. Data processing is employed to research giant information sets and establish helpful classifications and patters within the information sets. The general goal of the information mining method is to extract the knowledge from an information set and rework it into perceivable structure for any use. In this paper, the most aim is to make a user-friendly interface for farmers, which supplies the analysis of rice production supported obtainable information. Completely different data processing techniques are accustomed to predict the crop yield for increasing the crop productivity. Data mining used for forecasting the future trends of agricultural

processes [2].

2. LITERATURE REVIEW

Agriculture is the backbone of Indian economy, still it suffers from a heaping range of disasters like temperature change, unpredictable monsoon or lack of it, droughts, floods, migration of farmers towards the cities in search of better opportunities, and more. Individuals concerned in agriculture area unit the last taken care of, even once they area unit the one United Nations agency feeds the full country. With establishments failing to support agriculture concerning providing loans and farmer welfare schemes, the time has returned for technology to require over the modification. Now a day the researchers, data analysts and scientists has more concentrated on how mining and machine learning techniques are used to analyze various soil profiles to enrich the field of agriculture [3].

Dr. Bharat Misra, et al., [4] observed the research studies on application of data mining techniques in the field of agriculture. This is associate with building digital maps for soil sorts and properties. Some people within the agricultural trade manage many acres of land, it is nearly not possible to urge prompt updates and alerts about potential issues while not ease from technology. Farmers Edge, a Canadian company takes daily satellite pictures of farms and combines it with different relevant information. It includes information from quite 4000 interconnected weather stations! Several countries like eye additionally depend upon satellite-based soil and crop observation to check areas a lot of (quickly) than ancient strategies

permit. This helps when decision had been made what crops ought big on a specific piece of land. It saves a great deal of your time and energy and leads to higher yield production.

Weather plays a really vital role in agriculture production and an influence on the expansion, development, and yield of crops. Amrender kumar (2004) [5] explains the techniques for forecasting of crops. Weather aberrations will cause physical harm to crops and wearing away. The standard of crops from the sector to the market depends on the weather. Inclement will adversely have an effect on the standard of crop throughout transportation or storage. Data science consultant shrewdness to use tools that figure the patterns, and relationships that will somewhat be hidden. They had draw conclusions that push agricultural science forward through the check specific factors resulting in change in weather. The findings caused by separation through databases and studies to close things like this in agricultural process will induce exceptional changes. Elements of agricultural weather forecasts are: Amount and kind of coverage of sky by the clouds, Rainfall and snow, Max, min, and temperature temperatures, Relative wetness, Wind speed and direction, Low-pressure areas, cyclones, tornadoes, and depressions, Events like fog, frost, hail, thunderstorms, and wind squalls

Knowing the precise plant food rate could be a science and needs a radical analysis of multiple factors. Often, many dynamic limits has compelled to thought of. Such parameters embrace crop nutrient uptake rates, analysis information, soil chemical, physical, and biological properties, weather, water composition, land type, soil testing strategies, irrigation techniques, plant food characteristics, interactions between fertilizers and plenty of because of the quality of finding the “optimal fertilization range,” misuse of fertilizers could be an international development. The bulk of farmers still think about trial and error, idea and estimation. The result’s, crops don’t meet their yield potential, and increase environmental pollution. Information science professionals’ area unit now able to tell the farmers with the proper amount of fertilizers. The discovered knowledge is visually presented to the user [6]

In agriculture advanced algorithms’ area units wanted to decide the patterns and behavior of nature that helps in prediction invade pests and therefore, the unfold of microscopic diseases. Classify soils can started from the viewpoint of soils as a matter and soil as a resource [7]. Farmers ought to manage pests. Digital tools and information analysis in agriculture area unit being used to scientifically handle harmful insects. Agricultural pests will quickly withdraw a farmer’s profits but misusing pesticides will have adverse effects on people, plants and different living things. Luckily, some firms have recruited

information science professionals to develop user-facing platforms that analyze once to use pesticides, and the way a lot of to use. While some insects may improbably helpful to farmers and therefore, the crops, others may deadly and unfold diseases.

Climate change could be a looming concern that has already affected the agriculture sector. However, information science consultants operating arduous to work out ways to catch up on the change. The country prosperity is depending upon soils of that country [8]. One project involves giving IoT sensors to Taiwanese farmers of rice production in order that they will collect information that is necessary about their crops. It’ll help farmers to optimize their production cycles, though climatic changes create it difficult. The normal farming calendar is not any longer spare because of the intense climate changes. However, information analysis will revolutionize the long run of farming. Data scientists {are additionally also are} analyzing agriculture soil information to grasp, however soil will address {climate change global temperature change temperature change} by cathartic greenhouse gases, and however soil will adapt to climate change.

We can additionally use weather prediction within the machine-controlled irrigation system. However, exactly? Having a system that tells you the soil is dry however you don’t have to compelled to irrigate as a result it is getting to rain once some hours looks to be a remarkable use case. All the countries within the world area unit presently in an exceedingly scenario wherever they’re needed to use water in an exceedingly very economical way. In keeping with the recent studies, water is turning into a lot of and a lot of in brief provides worldwide and fierce of the globe population would face total water shortage by the year 2025. In agriculture too, the foremost downside that farmers face is the water insufficiency, thus to enhance the usage of water, one among the irrigation systems victimization drip irrigation that is enforce as machine-controlled irrigation system for little scale farms. Another irrigation system machine-controlled irrigation system victimization weather prediction. The natural classification of the soils is propose by Unified Soil Classification System (USCS) [9].

To improve soil’s quality, we must know current pH levels of your soil. Fertility levels of the principal nutrients. Type and measure of lime your soil needs. Nutrients need to added to your soil as fertilizer. Amount of fertilizer your crop and soil needs. Soil analysis can let you know where your soil needs treatment or improvement. This system can do things like tell you which crop to grow. Prevent poor crops caused by drought, disease, insects, too much water, or other problems. Substitute for proper cultural practices.

3. METHODOLOGY

The primary aim of this method is to classify the soil per the nutrients into it. For this, we've got taken datasets of soil samples. The soil is going to classified victimization call tree algorithmic program and sort of soil going to displayed. we to tend to area unit attending to predict the crops proper for the actual form of soil. Additionally, to the current, we to tend to area unit attending to improve the soil if the farmer desires to yield explicit crop within the same soil by suggesting the wants of the nutrients for same soil. ID3 (Iterative Dichotomiser 3) employed to form call trees supported the categories (e.g. low, high, medium). This data is use by Naïve Bayes to coach the algorithmic program and apply it to a take a look at computer file. Attributes area unit classified in ID3, into many categories like, low, medium or high. The nodes heavy categories' area unit called "decision nodes." The kid nodes that can not any divided (leafnodes), area unit, "classes" to that the attributes belong, given condition. As an example, if N-value (Nitrogen-value) is a smaller amount than forty p.c it is classified as "low." Here, N-value is the call node and "low" is the category to that the soil sample belongs. Entropy may do of however ordered computer file set is. Hence, the number of knowledges needed for classification is directly proportional to extend in Entropy. Entropy, ought to thus be as low as potential. This is achieved by filtering the information manually before providing it as an response to the algorithmic program. Information is the opposite of Entropy. Data gain (I. G) is the price left when classifying the instances. It is the distinction between Entropy when the classification and before.

3.1. Algorithm:

- Step 1: Calculate the entropy of every attribute using the data set
- Step 2: Split the set into subsets using the attribute for which entropy is a minimum
- Step 3: Make a decision tree node containing that attribute
- Step 4: Recurs on subsets using remaining attributes

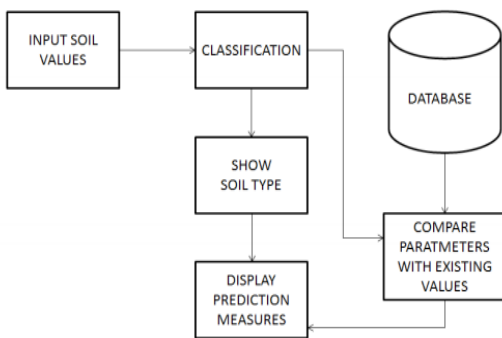


Figure 1: Block Diagram of Rainfall & Soil Analysis System

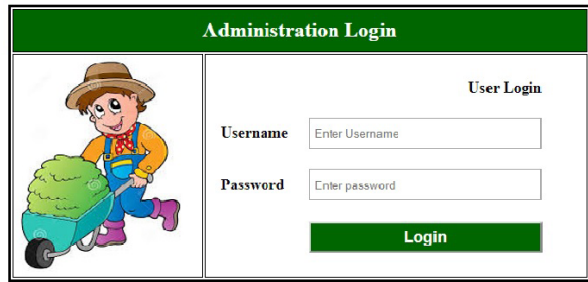


Figure 2: Administration Login

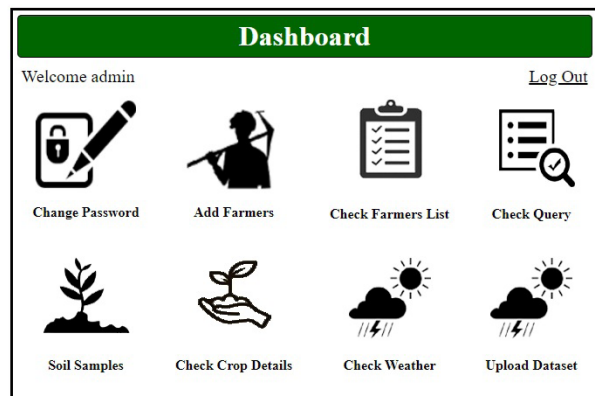


Figure 3: Dashboard

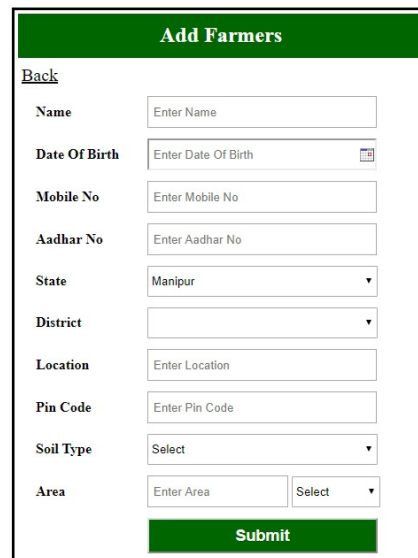


Figure 4: Add Farmers

ID	Name	Date Of Birth	Mobile No	Aadhar No	State	district	Location	Pincode	Soil Type	Area
1	Umakant A. Goyakavad	13/12/2005	9876543210	646646448331	Maharashtra	Nasik	Ambe-Dundori	456451	Black Soil,Red Soil	100 Hectare,4.6 Hectare
2	Vyankatesh Sayajirao Jagdale	13/10/2005	9876543210	646646448331	Maharashtra	Latur	Sarola	456451	Black Soil,Red Soil	100 Hectare,4.6 Hectare
3	svagmi	13/10/2005	9821771615	1254123654	Maharashtra	Mumbai	dadar	400015	Alluvial Soil	100 Hectare
4	Darshan	19/04/1997	8423912211	123456789	Maharashtra	Mumbai	bhayandar	401101	Black Soil	2 Acres

Figure 5: Check farmers List

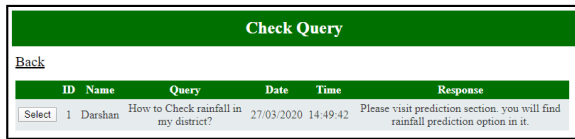


Figure 6: Check Query

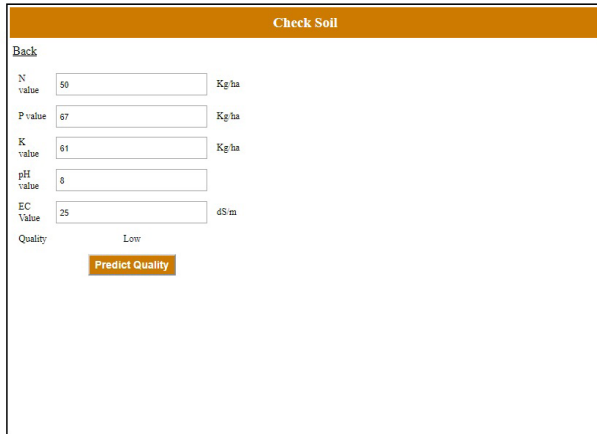


Figure 7: Check Soil

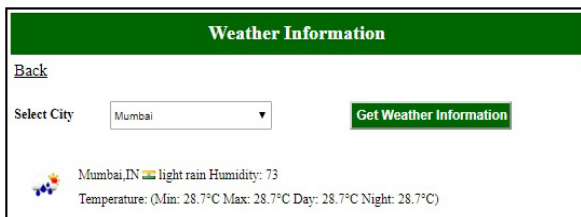


Figure 8: Weather Information

ID3 algorithm imperatively classifies all the data.

4. RESULT AND ANALYSIS

The performance testing has been performed on testing datasets, and we merely used crop datasets to evaluate our system. Figures 8, 9, and 10 show the Weather information, Prediction of Soil Quality, and Prediction crop using rain & fertility, respectively. Accuracy can be obtained by sum of True classified cases (TP) and True No classified cases (TN) divided by the total number of instances which is given in Eq. 1.

$$\text{Accuracy} = (\text{TP} + \text{TN}) / \text{Total number of Instances} \quad (1)$$

5. CONCLUSION

In this paper presents an analysis of the soil knowledge & treatment totally different algorithms and prediction

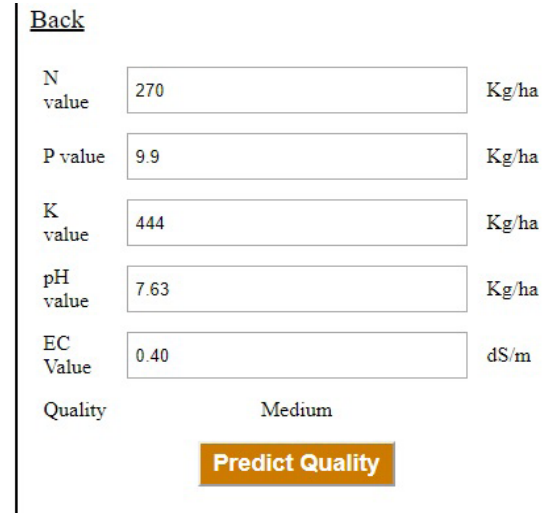


Figure 9: Prediction of Soil Quality

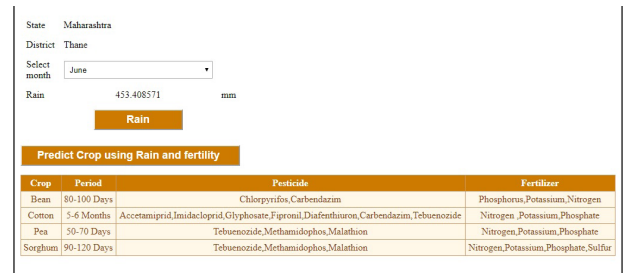


Figure 10: Prediction crop using rain & fertility

technique. This technique can suggest applicable plant food for the given soil sample and cropping pattern. The greatest Indian regions' area unit chosen for the long run precipitation analysis. Testing showed that the results of proposed system is better. The future work mainly concentrates on improving the agriculture sector.

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