

Automatic Agriculture Crop Yield Production Maintenance System Based On Remote Monitoring Techniques In Cloud Environment

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Abstract:

In agriculture, productivity can be measured in the percentage of a crop grown and the ratios of the seed are the factors for calculating agricultural productivity. With a change in climate situation to increase pollution and increased world population, it becomes a serious concern to secure world food resources. The proposed system is essentially developed for suggesting the acceptable crop which will be cultivated within the region by considering various parameters like temperature, moisture humidity levels. It is especially designed for farmers also as for soil investigation centers where the soil is given as input for fetching the soil properties using different sensors. We are getting to develop an android application in order that interface is going to be easily accessible and user friendly for the persons with non-technical background. The most objective of the paper is to supply crop yielding process which is satisfactory for cultivation based on the climate changes using the sensor and disease prediction providing fertilizer list for the previous using K means clustering algorithm.

Keywords: Agriculture, sensors, Machine learning algorithm, Crop production, Visualization

I. INTRODUCTION

Agriculture helps to satisfy the essential needs of human beings and their civilization by providing food, clothing, shelters, medicine, and recreation. Hence, farming is that most vital enterprise within the world. Consistent with India's census figure 66% of India working population is engaged in agriculture whereas in UK and USA 2 -3% and in France 7 is functioning population is engaged in agriculture. Therefore, our country's development is very hooked into agriculture sector. For crop production the essential input is land. Crop production is hooked into factors like temperature, humidity, precipitation, solar radiations, wind velocity etc. one among the explanations for the shortage of food across the country are often selection of unsuitable crop for cultivation. The proposed system will contain information of various crops and can suggest the farmers crop which is suitable for cultivation supported the geographical area and climate like temperature, moisture, and humidity by making use of various sensors [1]. To stay faraway from loss and increase the assembly of a crop, to avoid loss and to extend the yield of the crop, much innovative cultivation processes used, like the utilization of fertilizer, the creation of higher farming tools, new methods of farming, and improved crop varieties are the components which improve yields. By using Information communication technology as a platform to enhance production and use of the farmland, for various other products which is not periodic such plant nursery, organic which improves productivity and profitability of a farmer. This directly increases the well-being of farming families. The proposed solution basically developed for suggesting the acceptable crop and plant monitoring which will be cultivated within the region by considering various parameters like temperature, moisture, and humidity levels and proposed the concept of the way to overcome with a periodic income. Particularly designed for farmers soil investigation centers where the soil is given as input for fetching the soil properties using different sensors. We have proposed an android application in order that the interfaces are going to be easily available and consumer-friendly for the persons with a non-technical background. The first aim of agriculture is to cause the land to supply more abundantly and at an equivalent time, to guard it from deterioration and misuse. This proposed system will prefer the crop which is satisfactory for cultivation based on the geographical area and climate using the sensor and disease prediction providing fertilizer list for the previous using K means clustering algorithm.

II. LITERATURE REVIEW

Kunshan Huang et.al, introduced a K nearest neighbor for hyper spectral image classification. It helps to refine the pixel images and matching proposed KNN filtering algorithm that is supported matching

and averaging non neighborhood. Wei Yao et.al modified Gaussian-test-based hierarchical clustering method is focused on evaluation of a method for satellite image for top resolutions. The aim of this model to become correlated clusters at each grading level which provides the classification and data images are starting from unique sections up to huge satellite data archives and therefore the clustering results are analyzed via visual and valued evaluations. Michael D. Johnson et.al established forecast model for crop yield on the Canadian Prairies for vegetation indices by using machine learning methods. During this model hierarchical clustering are often went to group the crop yield data from Census Agricultural Regions (CARs) for building the forecast models in several regions. R.B. Arango et.al focuses on machine learning approaches for the automated delimitation of cultivable land with satellite data. M. Krishna Satya Varma et.al. state and make the It shows the crop that has powerful benefits for cultivation for a neighborhood of land. [4, 11] To accomplish those outcomes, we are considering six important vegetation that is consist of Potato, Jute, wheat, aus: rice, Aman: rice, Boro: rice. The estimate is predicated on the inspection of a group of knowledge that is static using Supervised Machine Learning techniques. The stable dataset which contains yields data from the Yearbook which contains existing previous years data. [12] The discusses and fact-finding results were considered by applying SMO classifier using Waikato Environment for Knowledge Analysis (WEKA) tool. Data collected from this tool consist many districts almost 20 to 26 of Maharashtra. The dataset is out there on Indian Government Records different parameter like condensation, drizzles, minimum temperature, and maximum temperature. Production yield of various reference crop including dispersal area, for Kharif crops season is taken into interpretation. The observation result manifests that the performance of other techniques like SMO. [6, 10] within the existing study, a ‘Crop Advisor’ software tool has been developed as webpage for predicting the impact of climatic parameters on the crop yields based on consideration of user friendliness. The C4.5 algorithm is employed to get the utmost impacting environmental parameter at the production of crops for which are selected from the Madhya Pradesh District. This application indicates the comparative impact of the various environmental parameters on crop production. The opposite agriculture-input parameters are liable for crop production are not considered during this tool. The parameter varies from with respective fields in space and mapping with time within the referred application [13]. To maximize the assembly of the crop, the tactic considered which might help suggest the foremost suitable crop by analysis of the entire influencing parameters [3]. The conditional parameters are associated with finance and natural condition also as associated with production within the land. [1,15] Economic factors alongside market prices, demand, etc. are considered as a remarkable role in making approximate decisions about crops depend upon the natural factors like rainfall, temperature, which sort of soil and its enzymatic composition, and complete yield. Therefore, it is inevitable to style a system that has all the parameters which are considered for the higher consideration of crops which will be produced over the season. [16] The assembly forecast is important to agriculture a contributor is obtained from multiple sources using machine learning models. Most solutions for production forecasts believe NDVI (Normalized Difference Vegetation Index) data, which has time constrain which to be received and rectified. Although this technique produces remarkable useful results have released the necessity for high-determination of remote-sensing data. Which allows the farmer to organize for unfavorable climatic effects on the crop pattern cycle. In our studies, we forecast the metric for soybean and maize yields forecast for Brazil and therefore the USA, which confine grain production in 2016 which touch with 44% of the world’s grain production. Results exhibit within weeks to months of the crop cycle. [8] Watching the present situation faced by in Maharashtra, we have observed a rise within the suicide rate over the years. The intension behind this is often considered as family economic condition weather and frequent change in natural climate [20]. Sometimes farmers are not perception about the crops which suit their soil characteristics, soil nutrient beneficials, and soil formation and composition. This work proposes to assist farmers check the soil quality counting on the analysis done supported the information mining approach. Thus, the application system focuses on checking the soil quality characteristics to predict the crop suitable for farming environment, which include with their soil type and improve the crop yield by recommending appropriate fertilizers. [7,2] to watch the soil moisture and humidity using various sensors referred from concept sensors. Information and Communication Technologies (ICT) which plays important role in various application given by several studies and investigated. These ICT have successfully implemented in various climatic scenarios often applied to enhance crop yield prediction. [2,5,9,14,17,18,19,21,22] With the event of various ICT based

applications which currently worldwide used by various systems, including the geographical information software (GIS), Navigational positioning systems like the (GPS,) and various stimulating sensing devices and actuators, the probability of this kind of the initiation taken for information-guided this kind of the plant observation and production is considered as the greatest task. Idea behind considered application is to get more précised information is considered into the agriculture farming and growing yield, to upgrade production of the agriculture.

III.PROPOSED SYSTEM DESCRIPTION:

The proposed system is useful in distinctive the crops appropriate for cultivation within the given environmental conditions. The data associated with life cycle of selected crop is provided. The proposed system is utilized by farmers separately. It is may be employed in soil investigation centers. In our system we tend to area unit victimization sensors which can sense temperature, humidity, wetness values from whether or not of field controller can receive weather parameters from sensors. Information is collected by controller can get uploaded on cloud through Wi-Fi. Admin can store trained dataset on cloud as planted in below figure. Values collected from hardware get filtered with trained dataset. Once filtration crop suggestion can show per weather parameters. Then user can choose crop from suggestions to induce its info like pesticides, fertilizers to be used, gather amount, quantity of water needed etc. once choosing any crop from suggestion user will see info of crops which might be plan.

A. PROPOSED SYSTEM: The proposed system has primarily 3 modules -hardware, cloud, and software code. The hardware module has 3 sensors temperature, moisture, and humidness.

Temperature Sensor: A temperature is measured with temperature detector device, through associate electrical signal. Within the planned answer the temperature (in °C) is measured Fig 1 below shows the proposed system

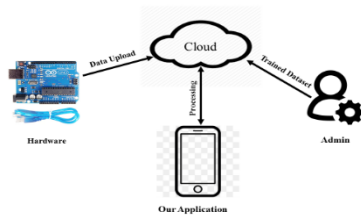


Figure1:ProposedArchitecture and wetness sensor

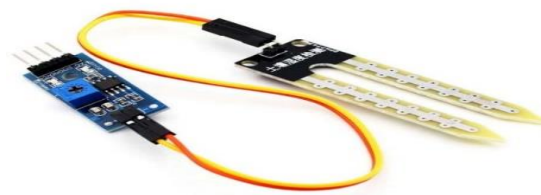


Figure2. Humidity sensor

LM35 temperature with associate electrical o/p. LM35 live the Temperature a lot of accurately as compared with a thermal resistor. The temperature (in°C). The high output voltage generated by the temperature detector as compared to the thermo couple that ends up in not got to amplify the output voltage. The Celsius temperature is proportional to LM35 has associate output voltage that the dimensions issue is $.01V/^{\circ}C$.

Humidity detector and wetness sensor: Humidity detector has operating voltage vary from three.3 V to -5 V. humidness measure varies from 2 hundredth to -95% %, humidness measure error +5%. Vary zero to -50, measure error +-2 degrees. DHT11 digital device will operate each temperature and humidness detector module. [26] and humidness detector. Fig 2 shows the humidity sensor and wetness sensor

ESP8266: The ESP8266 is semiconductor, delineates as a affordable Wi-Fi feature with full TCP/IP protocol and has microcontroller options and capability that is created by Shanghai-based Chinese manufacturer. Third party manufacturer AI-Thinker came to the eye of western manufacturers in August 2014 with the ESP-01 module. The options delineate in little module that permits microcontrollers to attach and act communicate to a straightforward TCP/IP module with Wi-Fi network victimization Hayes vogue command connections.

• **Arduino:** Arduino device that provides the platform that is open supply and easy-to-use and act with hardware and computer code. An Arduino board has several options that contain LEDS, that emit inputs as lightweight on a detector. These input lightweight thought of to come up with output, activating a motor. Fig 3 shows the soil moisture values with sensor. Consider the fig 4 shows the temperature, humidity values with the help of sensors.



Figure 3. Soil moisture

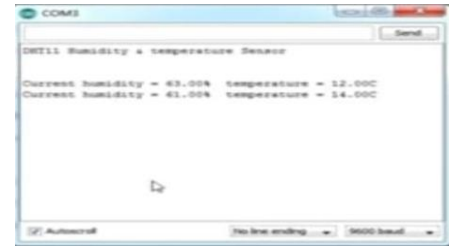


Fig 4. Temperature

Humidity values

B. SYSTEM IMPLEMENTATION: This method has the subsequent modules for the implementation of the system.

A. Registration: This module helps the new users to induce registered with the applying by getting into details like name, address, mobile variety, email id, Arcanum etc. every and each field is given validations so application can settle for correct information solely.

B. Login: solely registered user is allowed to log in to the system. This module ensures the protection of the system by permitting solely licensed users to access the application.

C. Dataset: The trained dataset having parameters like id, crop name, needed temperature vary, needed humidness and wetness vary, style of soil, quantity of water cycles, fertilizers to lean pesticides, crop life cycles etc. is hold the cloud for analyzing the system.

D. Wi-Fi Interfacing: the information is fetched from sensors are sent on cloud by Wi-Fi interfacing. For this purpose ESP8266 chip is employed. Additionally, the trained dataset are holding on the cloud through Wi-Fi interfacing.

E. Fetch Values from H/W: For taking real time values from the sphere, 3 sensors area unit that senses the information and through Wi-Fi chip it's passed to cloud for any type of analysis.

F. Analysis of H/W values: The particular operating of algorithmic program starts from this module. Here we have a tendency to area unit K-Means clustering algorithmic program to cluster the information. The detected information hold on cloud is passed to algorithmic program for predicting the foremost appropriate crop to be cultivated within the given field by analyzing totally different parameter vary.

G. Result display: once the completion of research, the list of crops appropriate to be cultivated within the given parameter vary is displayed on the applying clearly shows the workflow method the proposed system screen. Then user can choose anybody crop from the given list. Once choosing specific crop, the entire information is associated with its displayed on the screen.

c) K-Means clustering Algorithm: Clustering is employed to cluster the things with same properties. K suggests that is one in every of the foremost wide used algorithmic program of cluster. K suggests that clusters all things into totally different clusters betting on nearest norm. K suggests that uses Centre of mass technique similarly as geometrician distance technique to cluster the things Here within the dataset we've 3 major parameters particularly Temperature, wetness, and humidness [23]. Suggests that algorithmic program can type the clusters of the observations obtainable within the dataset supported the temperature, wetness and humidness vary. Depending on these clusters, the crops classes with matching environmental conditions area unit determined. Information is fetched from sensors can get hold the cloud Wi-Fi chip ESP8266. The algorithmic program can work on fetched information and the results are presented user on android application.

Analyzing K means clustering algorithm on seed dataset:

The unvaried technique for gathering information from the cluster using K-means may be a measurable, independent non-deterministic the various articles into similar kind of clusters [26]. The k-means calculation has finished up being to an excellent degree intense in designing with new clusters in numerous handy system applications in making regions, as an example, in Bioinformatics, advertise division, PC vision, geo statistics, observance and cultivation. Least complicated unsupervised learning calculations renowned for its speed, ease, and convenience. In any cubic centimeter analysis, you would like information of any model will solely be powerful if you sustain it with the appropriate information. The on-target information ought to have the precise options and the correct outcomes because of it'll have an effect on the connectedness and the accessibility of the model similarly result and facts. Gathered information is considered for the work was acquired from Kaggle, the world's greatest information science group with powerful instruments and various assets. Focus is given for crop yield

forecast. During the implementation, it measures the geometrician distances between the various temperature values and common precipitation which are taken in the evaluation for checking the information. Then supported distances taken in the consideration which determines three information occurrences that area. From those k occurrences it predicts the output and finding, worth that is on an average of the yield rates of the chosen [27,28]. Below Fig.5 shows the variety of clusters now, we will conclude that the best variety of K clusters which will be employed in my prophetic analysis is seven. We will conduct associate correct and economical K-means clump analysis to predict the crop yields [29]. The below fig shows the optimal number of clusters.

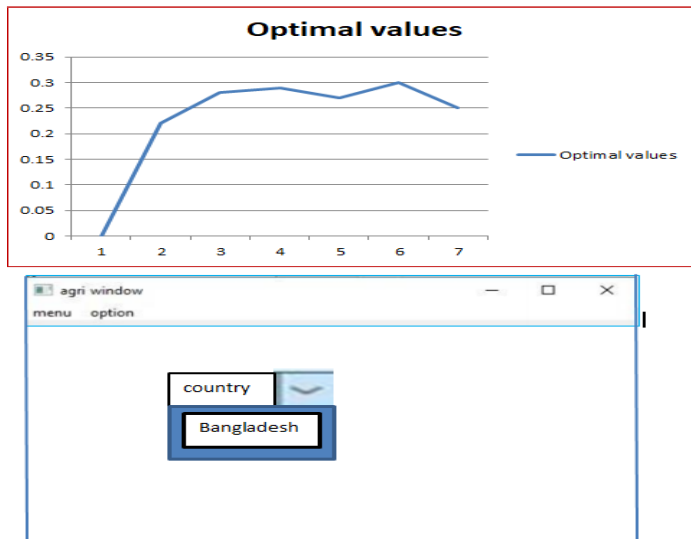


Figure 5. Optimal number of clusters interface

Fig 6. Window

4) Experimental analysis and Results: Cluster analysis divides the information into teams that area unit significant, helpful or each. It’s additionally used as a place to begin for alternative functions of information account. The results area unit tested on UCI machine learning information repository for Seed information analysis. The dataset was analyzed with totally different cluster algorithms with the assistance of R data processing tool. Each algorithmic program has its singularity and antithetic behavior [29]. Every algorithmic program is analyzed by passing totally different parameters like space, perimeter, compactness, length, and breadth of the kernel, uneven constant and length of the kernel groove utilizing R programming. Wheat seeds area unit important in cultivating and totally different kinds of wheat seeds area unit giving United States of America distinctive yields that should create swollen each year for lookout of demand for the final population. Aggregation the wheat dataset with the quantity of instances: 210, variety of attributes: eight, missing values: zip, variety of continues attributes: three, variety of classes are three.

Agriculture information image for Crop field: The information so analyzed would be projected and unreal victimization bar graphs and pie charts that indicate the specified and obtainable values of water handiness and temperature readings. The ratios of the obtainable and needed values would indicate the likelihood of growth. If the worth is nearer to one, that individual crop would have the very best possibilities of cultivation. The interface provides a facility to decide on the region, associate choice to browse and opt for the info file the choice to opt for the month from that the arable statistics ought to be taken into consideration and unreal. Fig.6 Window interface shows the choice being created in the interface window. The interface consists of two windows that provide general info of agricultural statistics of Bangladesh. Additionally a variety window that consists of a change posture menu. The region is chosen from the list the unreal statistics area unit obtained on another pop-up window. The image method consists of 3 levels of filtering the viability of crops. The primary part would be elimination of non-cultivable crops supported soil sorts gift within the region selected. The second part involves filtering of crops per temperature statistics. The third part involves analyzing water handiness (taking into thought each precipitation statistics and reservoir outflow levels) and filtering the crops consequently. Whole information is obtained would bear the ultimate part that calculates the extent of drift of the obtainable info from the prescribed or needed values. A lot of the drift less is

likelihood .The higher than figure shows the analyzed results of water statistics as a bar chart image is showing the obtainable amount of water (in cms).and therefore be needed. Amount for cultivation of every crop. If the obtainable worth exceeds the specified worth then it indicates that the crop will grow viably.

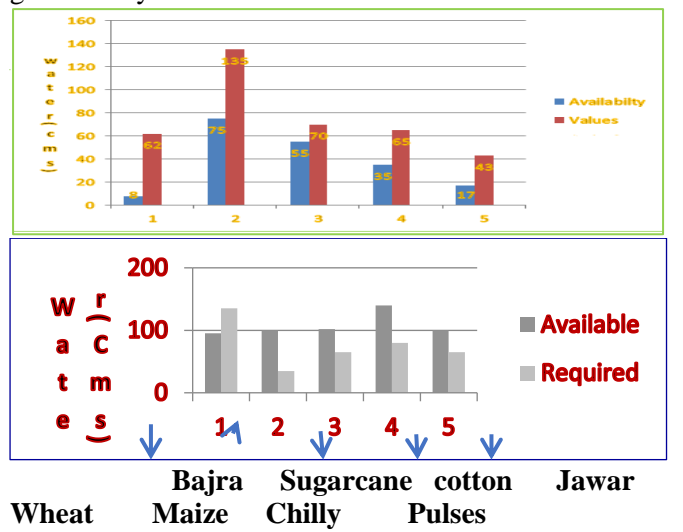


Figure 7. Quantity for cultivation of each growth for each crop

The higher than figure 7 shows the quantity for cultivation of each crop image supported the water readings at the side of the likelihood ratios for every crop. The input for the image is the region name selected from the change posture menu within the interface of the applying that here, is chosen .The worth nearest to the worth 1 represents the crop with the upper possibilities of property cultivation. The distinction between the need and handiness is seen as success rate of the crop. Fig .8 shows the probability of growth for each crop. Higher the distinction, then a lot of is likely hood of growth and country wise. Technologies to make well-designed graphics will facilitate data-users notice the data they need, and learn a lot of concerning the large image, and the story behind the information.

IV CONCLUSION:

This main aim of this system provides to promote good farming mechanisms by prescribing doable crops by incorporating applied statics and visualization. This would facilitate famers arrange their cultivation in a very viable manner supported the regional parameters. It promotes prescriptive crop cultivation supported good farming and digital analysis strategies. The key role of this paper is to push a lot of success rates of cultivation and forestall losses arising from unplanned cultivation whereas additionally benefiting farmer with business profits. So it helps in establishing a balance of growth and profit rates of crop cultivation. The charts and maps developed and bestowed during this paper were created employing a style of merchandise and programming languages. These programs and merchandise area unit all helpful technologies, are helpful to designers.

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Figure 8. Probability of growth for each crop

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