

Smart Farming Prediction Using Machine Learning

S.R.Rajeswari , Parth Khunteta, Subham Kumar, Amrit Raj Singh, Vaibhav Pandey

Abstract: Agriculture is one of the major game changer and a major revenue producing sector in India. Different seasons, market and Biological Patterns influence the crop production ,but because of changes in these patterns result in an excellent loss to farmers .This factors can be minimized by using a suitable approach related to the knowledge of soil types ,pressure ,suitable weather, crop type. whereas, weather and crop types and be predicated using useful dataset that can aid to farmers by predicting the maximized profitable crops to grow. These paper mainly focus on the algorithms used to predict crop yield ,crop cost prediction. With the help of all these features smart farming can be achieved.

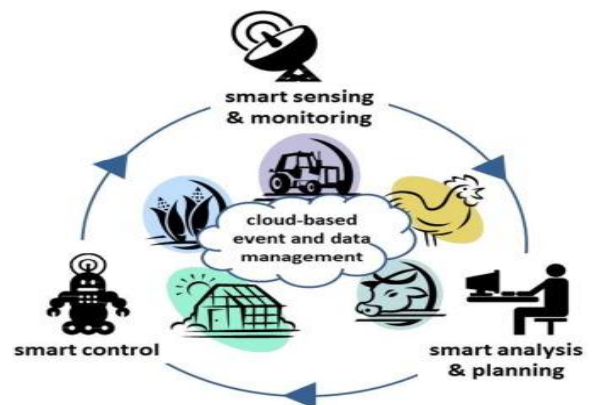
Index Terms: Smart Farming, Big data , Neural network ,Dataset, Clustering, Farmbots, Farm drones, Machine Learning in Agriculture.

I. INTRODUCTION

Cultivating is one of the real division for developing yields or keeping creatures by individuals for sustenance and crude materials. Cultivating is a piece of farming. India is the world's third biggest economy worth \$ 2.1 trillion after the US and China. Second biggest maker of rice, wheat, sugarcane, groundnut, vegetables, foods grown from the ground. These are a portion of the stunning actualities about India. **1.**Decrease in Agriculture GDP. The GDP of farming in India diminished to 4759.48 INR Billion in the main quarter of 2018 from 5666.82 INR Billion in the final quarter of 2017. Food grain creation has likewise demonstrated an expansion from 217.28 million tons in 2006– 07 to 257.44 million tons in 2011– 12. **2.**Organic Agricultural Export Market drives Greening of Agriculture. This advertise is one of the real drivers of greening of farming in India. **3.** Pesticide Use Increased More than 100%. A real subtleties for Indian agribusiness is utilization of different pesticides, similar to bug sprays, weedicides, fungicides, rodenticides and so forth. As the editing design is ending up progressively thorough utilization of these pesticides is additionally extending. **4.**Bio-manure Production is the Future. For year 2000, propound creation focus for bio-manure was 39,165 Mt, which was just 4.8% of the absolute evaluate request. In any case, the legitimate creation and the appropriation of bio manures are under cautiousness of government. Notwithstanding the unremarkable development rate of over 200% underway limit and around 300% development rate .**5** Increased Warehousing Capacity. Private segment enthusiasm for warehousing industry got after the

"Provincial Godown Scheme" was under National Bank for Agriculture and Rural Development (NABARD) and National Cooperative Development Corporation (NCDC). Savvy cultivating and accuracy agribusiness include the joining of trend setting innovations into existing cultivating rehearses so as to build generation productivity and the nature of horticultural items. . As an additional advantage, they likewise improve the personal satisfaction for homestead specialists by lessening substantial work and monotonous undertakings. AI is a standout amongst the most advancing advances alongside enormous information innovations and quick figuring gadgets. They are developing in each part to make new chances to comprehend the different information forms identified with the ecological capacities. AI can be characterized as logical strategy that will enable the machines to see every issue and to unravel it without the assistance of programming gadgets The interest for keen advances, for example, Big Data, cloud-based administrations, GPS, and the Machine learning is picking up pace in the agribusiness business. Every one of these advancements can help the horticulture part to support the items by gathering the information from the field which will improve high exactness crop investigation, mechanized cultivating methods, in this way

Fig1.1 Smart Farming



making the agribusiness shrewd. These keen innovations high caliber and bigger amount of harvests. Because of extensive interest of nourishment items because of the quick development of populace worldwide is boosting the need of brilliant and proficient cultivating In the new era smart farming is going to create a new impact on the agricultural sector by opening between small and large businesses. The trend is not only focus by developed countries , developing countries such as china have also perceive its immense importance as well .In countries such as

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Parth Khunteta, CSE, SRM University, Chennai, India.

Subham Kumar, CSE, SRM University, Chennai, India..

Amrit Raj Singh, CSE, SRM University, Chennai, India.

Vaibhav Pandey, CSE, SRM University, Chennai, India.

MrsS.R.Rajeswari, CSE,AP,ME, SRM University, Chennai, India..

US and Japan, wide-scale use of smartphones and internet of things (IOT) systems have led to increase the growth of precision agriculture solutions. The main bodies of several countries have also understood the need for Smart systems, and the advantages of these technologies, and thus, their initiatives to promote smart farming techniques are to drive the growth of the market further. Savvy Farming applications don't will in general target just extensive, traditional cultivating, however could likewise to redesign other normal or developing patterns in rural areas, for example, family cultivating natural cultivating. Brilliant Farming can likewise give incredible outcomes regarding natural worry, for instance, min water use, or give infection free harvests.

Keen cultivating procedures equipped with dataset accuracy agribusiness, will empower ranchers to decrease crop costs just as amplify crop generation and benefits. For trial reason, the measurable information or datasets identified with horticulture is gathered. Different calculations, for example, SVM and Random backwoods calculation can be utilized. Bolster vector machine (SVM) is a sort of auxiliary hazard minimization calculations. As a prevalent AI algorithm, SVM has been generally utilized in numerous fields for data gathering. Arbitrary Forest is an adaptable, simple to utilize AI calculation that produces, even without hyper-parameter tuning, an incredible outcome more often than not. Irregular timberland settles on choice trees that frames different yields and consolidates them to shape a precise and stable forecast.

II. LITERATURE SURVEY

Climate Smart agriculture system is an method to check the weather of the the area and to grow essential products as the climate of that area .This will help farmers to grow correct amount of crops in the required land and to know the precipitation max temp,min temp of that area.[1]

This paper focus on the prediction of the most profitable crop that can be grown in the agricultural land using machine learning techniques. These paper includes the use of an android system that will give the real time crop analysis using various weather station reports and soil quality. Thus farmers can grown the most profitable crop in the best suitable months.[2]

Remote Sensor Network is an innovation new to India where it tends to be utilized in Agriculture Sector in India for expanding crop yield by giving forecast of plant maladies and pest. This should be possible by stepping through examination information from field where WSN arrange is introduce and with suitable AI calculations for this information to get anticipated yield. This paper gives us the possibility of the harvest investigation utilizing WSN systems and to keep from the nuisances and to utilize pesticides that would not hurt the yields wellbeing.[3]

In the paper a product instrument named 'Harvest Advisor Tool' has been utilized as a site page for anticipating the fundamental climatic parameters on the yield yields.C4.5 calculation is utilized ie created by ross quinlan to discover the essential climatic qualities on the yields results of chosen

crops in chosen regions of MP. These product gives us the sign of different atmosphere changes that can impact he crop development in a territory.[4]

Internet Things (IoT) one of the new era of computation is used to advance the need of agriculture sector .Using the IOT features smart farming can be archive in these paper we are using a Bluetooth device and a wide area network to get the details of the surrounding such as soil water level, pesticide detection etc. These will give farmers automation in the field of farming as all the details will be connected to a device use by the farmers .Every details of the farm can be updated in the application using the IOT modules.[5]

III. MODULES

A. Dataset

A dataset is a wide variety of data most commonly a single database table that corresponds to particular variable. Take an input dataset such as maize and rice apply Random Forest Algorithm for the selection of features such as how much water is needed by crops, Min Temp, Max Temp using the classification of these features we can identify the factors that are most important for productivity .The dataset list values can be such as height and weight of the object. According to the need of the data the datasets can be corresponds to digits such as (0,1,2,3,4).For implementing a predicting model we require a set of 3000 datasets and apply a high accuracy algorithm

B. Clustering

Clustering is also known as cluster analysis is the grouping of objects so that the object in the same group is similar to each other then to others group. When data is unlabeled and not in continuous form this technique is used for grouping the data into categories. For this present problem of the agricultural data this clustering technique gave us one of the best result as the correlation of the data.so when it comes to datasets such as maximum temperature and minimum temperature we can group this clustering algorithm so that our prediction model will be more accurate than the trained data. Based on the attributes the techniques can be applied two types i.e two dimensional clustering and three dimensional clustering.

C. Bayesian Network

A Bayesian network is a graphical model that represents a set of variable which can be used for Statistical analysis of the attribute in a given dataset. Bayesian networks are ideal for taking occurrences and predicting the several possible known causes was the contributing factor .Example can be like that Bayesian network can be used to represent the relationship between diseases and symptoms. In this model the data are represented in charts which are directed by nodes. the nodes represent the function and the edges represent the dependency of data. In This work we have not train a Bayesian network but a simple graph is presented that can be used for prediction model .one of the disadvantage of this network is that it cannot take large dataset.

D. Artificial Neural Network

Artificial neural Network is



one of the most used techniques for the prediction model. ANN is usually based on imitation of human brain. just like our brain it has neurons for transmitting one data to another .all the neurons are connected together in layers.The application of ANN is widely used in agriculture practices. It compares patterns nonlinear effect and underline concept of the relation between them and hence it is a kind of ML technique which has a vast meemory.one of the disadvantages of ANN is that where the dataset is significantly different compared to trained data set.Neural networks can be used inn language translation and picture recognition

IV. IMPLEMENTATION AND RESULT

The implementation includes the datasets taken from the koogle.com to feed the system with 3000 generic data of agriculture features .These includes temp ,soil quality,etc. To use the predictive system the machine learning algorithms requires two types of data - Trained data , Test data. Trained data is the survey data collected in the period of 12 months, Whereas test data is the current survey data. Both these data will be merge together also known as classification techniques (Random forest algorithm will be used).

A. Research Work

Research work is the first step to gather the data in machine level. For these we take only the train datasets and apply the pre –processing on it. It classifies the data into test part and train part. All he features of the required data such as soil type , temp ,humidity etc. is extracted.

B. Feature Extraction

Feature extraction is required as there is large number of the data to be processed .Feature extraction will take only the necessary data from the test part and train part (Around 25 features).These features will help the farming to boost at all levels .

C. Classification Technique

Classification technique is the most important part of the process as the implementation of the algorithm occurs here .Random forest algorithm is implemented in the process to give the through results of the the datasets. The algorithm takes 20% of the test data (Random data) as the size given to the system and remaining 80% train data is take. After applying the classification techniques we get two results, Algorithm result (accuracy of the datasets) ,Dataset results that will be in the form of a matrix such as truepostive ,true negative etc.). The predicted data can be judge from the matrix itself .In real time the values of the matrix is used to make a prediction of the land to grow the desirable crop in a given features of the month.

	Moisture	Rainfall	Average Humid	Mean Temp	Max Temp	Min Temp	alkaline	Sandy	Chalky	Clay	Millet yield
0	12.8016845	0.0123605	57	62	71	52	1	0	0	0	0
1	12.8516537	0.00417157	57	58	73	43	0	0	0	0	1
2	12.7767735	0	56	58	69	46	0	0	0	1	1
3	12.9420010	0.03174683	62	56	70	43	0	1	0	1	0
4	12.9846524	0	65	56	70	42	0	1	0	0	4
5	12.9644706	0.02719149	65	58	70	46	0	0	0	0	1
6	12.7379981	0.02682104	61	56	70	42	1	0	0	1	4
7	12.8193817	0.01028368	58	57	72	42	1	0	0	0	0
8	12.8839094	0.02046472	63	60	76	45	1	0	0	0	0
9	12.7845128	0.06005408	62	59	71	47	0	0	1	0	4
10	12.9688118	0.0841193	56	58	69	46	0	0	0	1	1

Fig4.2 Datasets

V. PROPOSED SYSTEM

Proposed System is portrayal of set of all components and elements which on giving a glimpse should give a person a basic outline and also interpret skeleton of the project .Davis Pro2 is an hardware system that will enabled the systems to take periodic data of the fields using its sensors and send the collected data to the cloud storage. Cloud storage will contained all the data of the fields and monitor the changes in the data .All these data will be converted into datasets as required. The Datasets will contained valued of the fields like min temp max temp soil types etc. Classification of the datasets will be done as required by the users Classification will take all the necessary data of the field and make the datasets into test data. Feature extraction is a important part as all the features of the soil or plant will be extracted from the test data and Train data around 10 features are extracted all together .Pre-processing will be done in these data in which around 20% of the test data and 80% of the trained data will be processed at random. Random Forest algorithm will be used to predict the crop percentage that will grow in the type of soil in a period of some months. Research work will be done after getting the predict data as in real time the predicted data is true or not .Crop will be judge by matrix format as true -positive true-negative.



Fig4.1 Implementation

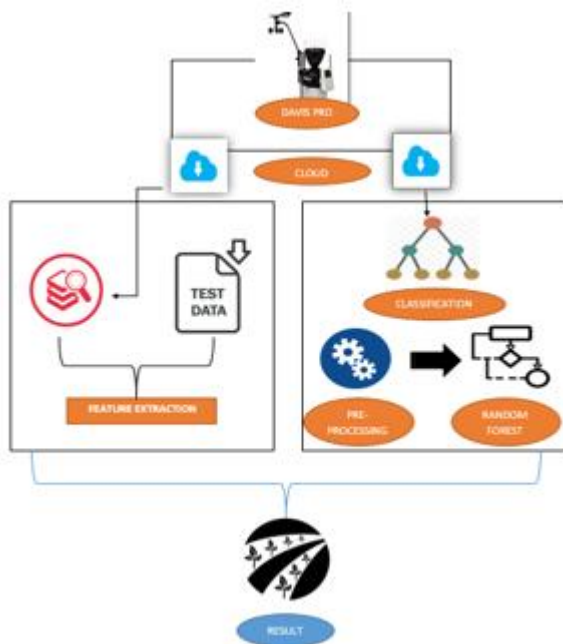


Fig 5.3 Architecture Diagram

VI. PROPOSED SYSTEM

The study presented in this work introduces to smart farming, practical, cheap and easy to develop task that are used to increase the productivity of agricultural products. The combination of Smart Irrigation and control To machine learning algorithms can stave off many issues of agriculture. In this machine learning project we have used two main things namely dataset and algorithms. In this we will do first Pre-processing from which the trained Data and the test data will get taken out. Then the Feature Extraction process has to be done in this we take that data or columns in which we want to apply algorithms to find out the accuracy and to form the graph by pointing the data on the graph. Then after the classification process has been applied to find out the accuracy of the particular algorithm. First we have to try three to four algorithm to find out which has highest accuracy. The dataset which we have given from it confusion matrix is made and then the confusion matrix is used to find the better accuracy of algorithm by taking the Y-test and Y-prediction values. Firstly the most important module which we are using is the dataset which is the main component in the machine learning and to find the result. In this we have approximately 3000 data from which we have to find the result. Then after that the clustering came in the story it help us to differentiate between the dataset and group the different data in their respective columns. Then after that the Bayesian network is used to form the Statistical analysis of the attribute in a given dataset. Then after the ANN is used to compares patterns nonlinear effect and underline concept of the relation between them and hence it is a kind of ML technique which has a vast memory.

Finally, smart systems that provide real-time suggestions and make long-term forecasts based on user choices and preferences must be studied and tested.

VII. FUTURE ENHANCEMENT

The project has a very vast scope in future. This project can be implemented on a large scale in future. Project can be upgrade in near future as and when requirement for the same arises, as it is very adaptable in terms of expansion. As the population is growing rapidly and many new technologies are emerging during the years it is important that the ,agricultural sector also should move forward in that direction .This project can be more implemented and can be connect to the mobile application so that farmer can do the work when they are not present at home. We can also implement the use of drones to collect real time data and to monitor the pace of the crops. It will be great to see innovation in the field of agriculture so that there will be ease to farmers and the generation to come.

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AUTHORS PROFILE



Parth Khunteta, Computer Science And Engineering, SRM IST, Ramapuram



Subham Kumar, Computer Science And Engineering, SRM IST, Ramapuram



Vaibhav Pandey, Computer Science And Engineering, SRM IST, Ramapuram



Amrit Raj Singh, Computer Science And Engineering, SRM IST, Ramapuram

Author-5 Photo

Mrs.S.R.Rajeswari Asst Professor,
Department of Computer Science and Engineering, SRM IST, Ramapuram