K-Means Clustering Technique to Increase Production in Floriculture Farming using IoT

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Abstract— Floriculture has become an important commercial activity in agriculture sector in the post globalization era. Floriculture activity has marked as a viable and profitable trade area with a potential to activate self-employment among low and middle income farmers, and earn the very essential foreign exchange in the developing countries such as India. The production and export of floricultural products have received a considerable interest in recent decades from the researchers, policy makers, agricultural and horticultural experts. Increasing the productivity is an important factor. To do this we analyze the climate conditions and the soil situation about the water level in the soil is an important factor for producing more yield of flower. This paper proposes the Random Tree method to deal with both classification and regression problems for flower production and used K-means clustering for a given soil data the soil physical factors are grouped using this algorithm and find out the result. Dataset were collected with the help of the IOT using random generation of result of dataset to find in various time of the climate change and provide a result for jasmine flower yield.

Key words: Floriculture, IoT, Jasmine Flower, Random Tree & K- Means Cluster

I. INTRODUCTION

Manufacturing plays an important role in economic development and is still considered crucial to economic growth in the globalization era. It has a positive impact on the growth of both developed and developing countries. We live in a world where everything can be controlled and operated automatically, but there are still a few important sectors in our country where automation has not been adopted or not been put to a full-fledged use, perhaps because of several reasons one such reason is cost. One such field is that of floriculture. Agriculture has been one of the primary occupations of man since early civilizations and even today manual interventions in farming are inevitable. Floriculture monitoring form an important part of the agriculture and horticulture sectors in our country as they can be used to grow plants under controlled climatic conditions for optimum produce [1]. Automating a plant monitoring and controlling of the climatic parameters which directly or indirectly govern the plant growth and hence their produce. Floriculture monitoring system technology to provide feedback to the user through smart phone [2]. The automated system will reduce the need of man power hence reducing the error for a large scale area of floriculture, it is quite impossible for a farmer to monitor the efficiency of the system by implementing this technology, the farmers can easily monitor the system using their smart. The floriculture is a rising industry in this region. Farmers of the district are very innovative and progressive farming is widely spread in this region. The entrepreneur approach in people of the villages here and dedicated efforts by the local leaders of this sector are proving profitable for the marginal farmers. During season between Octobers to December the demand curve reaches to peak and cut flower prices remain in higher range with maximum returns to the farmers [3]. A farmer has earned 20 lacs rupees from its 3 hectare land in year 2016. Lack of labour, packing technique, market linkage programs and market intelligence are the challenges to the industry. The district has been upcoming on map of Indian film shooting spots due to its heritage and geographical features. These developments are supportive and favorable for the cut flower farmers of the district. The demands from cosmetics producers and event organizers in Delhi and Jaipur are making the cut flower farming a high profit earning practice. Rose, marigold, jasmine, tulip etc. are main flower crops of the district [4, 5]. Farmers are cultivating cut flowers in both open and green house conditions. The yield and profit margin are 4 to 10 times more from green house production in comparison with the open farming. Recent technologies such as IoT, sensors, big data, and machine learning can be utilized for monitoring and can play important roles in predicting and improving production, reducing cost, providing an early warning system, and facilitating better decision making for management. This IoT monitoring system checks some environment parameters like: temperature, humidity, light intensity and soil moisture.

II. LITERATURE REVIEW

Kawale Jayashri [6]: In the iot based smart plant monitoring system we can monitor and controlusing iot. It is very difficult to control scattered without a remote environment monitoring system. In recent years, there appeared a canopy remote monitoring system based on Ethernet. In this project we use different modules such as IOT, arduino as controller, Temperature sensor, Moisture sensor, Humidity sensor. This project uses sensors such as A humidity sensor is also given to know about the atmospheric humidity of that place. By having knowledge of all these one can take action accordingly. Moisture sensor sense the soil is dry or wet. If soil is dry automatically water pump will get ON. And the sensor values are given to ADC to get processed by arduiono controller. The temperature sensor LM35 senses the temperature and converts it into an electrical (analog) signal, which is applied to the micro controller through ADC. The analog signal is converted into digital format by the analog-to-digital converter (ADC). If temp increases more than set threshold value. Automatically fan will be ON. In this project we are using dry/wet sensor, humidity sensor and Temperature sensor. In an industry during certain hazards is will be very difficult to monitor the parameter through wires and analog devices such as transducers. To overcome this problem we use wireless device to monitor the parameters so

that we can take certain steps even in worst case. Few years back the use of wireless device was very less, but due the rapid development is technology now-a-days we use maximum of our data transfer through wireless like Wi-Fi, Bluetooth, WI-Max, etc. This project is designed as a plant monitoring system based on IOT. The condition of soil and the temperature maintained are being displayed on LCD and the same values are updated in the internet through IOT module interfaced to the controller.

Ganjar Alfian [7] with the increase in the amount of data captured during the manufacturing process, monitoring systems are becoming important factors in decision making for management. Current technologies such as Internet of Things (IoT)-based sensors can be considered a solution to provide efficient monitoring of the manufacturing process. In this study, a real-time monitoring system that utilizes IoT-based sensors, big data processing, and a hybrid prediction model is proposed. Firstly, an IoT-based sensor that collects temperature, humidity, accelerometer, and gyroscope data was developed. The characteristics of IoT-generated sensor data from the manufacturing process are: real-time, large amounts, and unstructured type. The proposed big data processing platform utilizes Apache Kafka as a message queue, Apache Storm as a real-time processing engine and MongoDB to store the sensor data from the manufacturing process. Secondly, for the proposed hybrid prediction model, Density-Based Spatial Clustering of Applications with Noise (DBSCAN)-based outlier detection and Random Forest classification were used to remove outlier sensor data and provide fault detection during the manufacturing process, respectively. The proposed model was evaluated and tested at an automotive manufacturing assembly line in Korea. The results showed that IoT-based sensors and the proposed big data processing system are sufficiently efficient to monitor the manufacturing process. Furthermore, the proposed hybrid prediction model has better fault prediction accuracy than other models given the sensor data as input. The proposed system is expected to support management by improving decision-making and will help prevent unexpected losses caused by faults during the manufacturing process.

Puneeth S, [8]:In India agriculture has major value and there is much importance given to it as we are being the world's largest producer of wheat and rice. India has a word to say for farmers that "Farmers are the backbone of our country". As India is basically dependent on agriculture we have adopted the vintage level methods in cultivating the crops so in this report we can find the smart technologies present in agriculture that one can adopt to get the best results in the crops and to earn profit in larger quantity. This paper we are using some technologies like cloud storage, Internet of things and image processing. The cultivators have to start doing plantation after that robot is let into the fields and checks for the growth of crops. This is a movable robot where it moves around the farm and finds the infected plant, take a picture of it and send it to the owner and perform some required action to keep it healthier by supplying essential nutrients. All the data which is obtained while doing inspection are stored in cloud for later purposes. Internet is main medium which keeps contact with robot, sensors and cloud data storage. Camera is used in the robot to take pictures of infected plants and normal plants and also helps in informing the owner of actions taken to improve the plants health which leads in getting better yield and better profit to the farmers.

III. PROBLEM DEFINITION

In existing work the problem is decreasing cultivation of jasmine were found, and seeking for an effective way to create a seasonal trend of flowers which could capture the heart of customers. Expenditure per household for jasmine has been decreasing gradually. It is very difficult to control scattered without a remote environment monitoring system. There is a strong demand from the retailers for advices on the item selection in purchasing process but less in production will cause the price increase. And also didn't provide a exact growth, some flower are small and some were large. In recent years, there appeared a canopy remote monitoring system based on internet. In this project we use different modules such as IOT, arduino as controller, Temperature sensor, Moisture sensor, Humidity sensor. A humidity sensor is also given to know about the atmospheric humidity of that place. By having knowledge of all these one can take action accordingly. Moisture sensor sense the soil is dry or wet. If soil is dry automatically water pump will get ON. Its need more sensor tracking tools and very expensive. The developed system was used to monitor citrus soil moisture and nutrients for fertilization. Case study-based results showed that the proposed system helped farmers make better decisions, improve citrus production, and reduce labor costs as well as the pollution caused by chemical fertilizers [9]. An IoT-based sensor consists of a sensor device and a client program to retrieve sensor data and send them to a cloud server. From the cloud server we get the field information through smart phone.

IV. PROPOSED METHOD

This paper presents a proposal of a monitoring system using IOT to the flowers crop. The floriculture sector is one of the most important economic sectors in our country. Flower production in our country is mainly intended to export to many countries. In order that this sector continue with its steady growth, it is necessary to intensify the processes of innovation and development that should have monitoring systems of the different variables that can affect the flowers production systems. Increasing the productivity is an important factor. To do this we analyze the climate conditions and the soil situation about the water level in the soil is an important factor for producing more yield of flower. This paper proposes the Random Tree method to deal with both classification and regression problems of flower production. Random Forest is a popular classification method for solving classification problems. The Random Forest algorithm is constructed by combining multiple decision trees for more accurate and stable prediction method. Every tree inside a Random Forest is independently constructed by selecting a random subset area. Majority vote is a well-known method to obtain a better final prediction output [10]. Random Tree with uses of K-means clustering for a given soil data the soil physical factors are grouped using this algorithm and find out the result. Dataset were collected with the help of the IOT using random generation of result of dataset to find in various

time of the climate change and provide a result of jasmine flower yield.

A. Internet of Things

Internet of Things that rules the roost, precision agriculture (PA) is a fitting example of how diverse universes such as a farmland and software can be brought together through Random Tree. When it comes to farming, yield, productivity and cost of cultivation are as good as the decision a farmer takes with the given data on the field. Now, the farmer gets to see all the data from his field and also gets help to take a decision. This is can help achieve the much needed boost of productivity in the Indian farmlands. At the soil level, it measures the impedance rate of the soil, moisture, water retention, NPK values and nutrient migration. At the crop level, it measures chlorophyll, susceptibility, plant level temperature and humidity. And at above soil level, the technology is checking the weather conditions such as ambient temperature, humidity, dew point rainfall, etc [11]. The outcome of the solution is to record the different aforementioned critical attributes from the field and with the help of Big Data and Analytics predict, prescribe and warn the farmer of the inputs, diseases and weather conditions that help him take accurate mitigation or remediation, right when it is needed.

1) Soils

Soils of the district fall under three main categories, viz., medium black to deepblack soils; malran or lighter soils and red or laterite soils. we firstly check the Soil type and later the Soil Quality is to be tested using sensors. Here the quality of the soil can be decided by considering different soil tests like bulk density test, respiration test, moisture test. The results obtained by the tests are to be considered and according to the results we suggest the farmer which type of crop is suitable for that particular soil. Soil moisture test is to be performed first because it plays a key role in exchange of water and heat energy between the land surface and the atmosphere, through evaporation and plant transpiration. By considering the soil moisture test results we can perform the further tests like soil respiration test [12].

B. B. K Means Clustering

k-means is one of the simplest unsupervised learning algorithms that solve the well-known clustering problem. The procedure follows a simple and easy way to classify a given data set through a certain number of clusters (assume k clusters) fixed apriori [13].

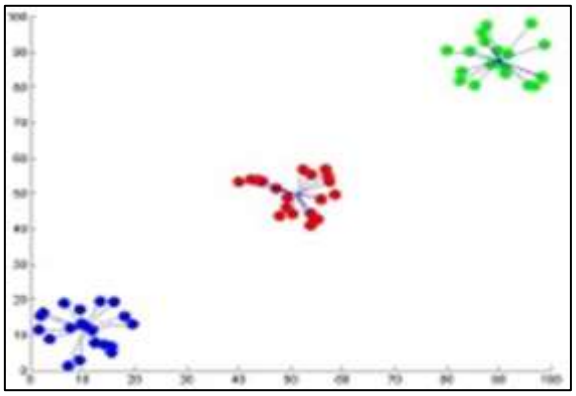
As, you can see, k-means algorithm is composed of 3 steps:

1) Step 1: Initialization

The first thing k-means does, is randomly choose K examples (data points) from the dataset (the 4 green points) as initial centroids and that's simply because it does not know yet where the center of each cluster is. (a centroid is the center of a cluster) .

2) Step 2: Cluster Assignment

Then, all the data points that are the closest (similar) to a centroid will create a cluster. If we're using the Euclidean distance between data points and every centroid, a straight line is drawn between two centroids, then a perpendicular bisector (boundary line) divides this line into two clusters.



3) Step 3: Move the centroid

Now, we have new clusters that need centers. A centroid's new value is going to be the mean of all the examples in a cluster.

We'll keep repeating step 2 and 3 until the centroids stop moving, in other words, K-means algorithm is converged[14, 15].It provide up to data through IOT so the farmer easily know the analysis of climate condition in remote access. It increase the growth of the flower using k means cluster approach. It is being designed to provide all the information of the network, to simulate the area of monitoring and receiving all the node information in a manner that I can view it without the need to design the interface.

C. Proposed System Achieves

- Smart sensors to be embedded in the farmland soil. These can easily measure the level of moisture and it can help farmers to start sprinkling the right amount of water upon the soil.
- Upon integration with weather data it can give farmer the weather forecast.
- Set alert and alarm conditions related to temperature, humidity, and other conditions for agricultural storage.
- Track crop health
- Set up irrigation schedule by connecting various hydraulic valves, pumps.
- Remotely monitoring & controlling water pump operation at farmland.
- Track the movement and behaviour of livestock remotely
- Sensors for monitoring animal health, pregnancy detection & birthing time
- Drones & imagery are used to inspect farmland & generate data about their crops
- Dairy management is another sector that show high adoption rates of smart farming methods.

V. EXPERIMENTAL RESULT

Our experimental result shows the flower production quantity. Farmers having even 1acre of land can earn much more in floriculture produce in open condition and even the farmer having only 0.25acre land can earn his livelihood by adapting hi-tech cultivation. Farmers of the district are very innovative and progressive farming is widely spread in this region. The entrepreneur approach in people of the villages here and dedicated efforts by the local leaders of this sector are proving profitable for the marginal farmers. During season between Octobers to December the demand curve

reaches to peak and cut flower prices remain in higher range with maximum returns to the farmers. Some farmers are trying with American saffron as experimental project.

Input parameters	Low	Medium	High
Environment Data sensing	0-0.5	0.3-0.7	0.5-1
Environment Factor	0-0.5	0.3-0.7	0.5-1
Soil Condition	0-0.5	0.3-0.7	0.5-1
Weather condition	0-0.5	0.3-0.7	0.5-1
Water requirements	0-0.5	0.3-0.7	0.5-1

Table 1: Input Parameter

A. Inputs

There are 5 input parameters Environment Data Sensing, Environment factor, Soil Condition, Weather Condition and water Requirements.

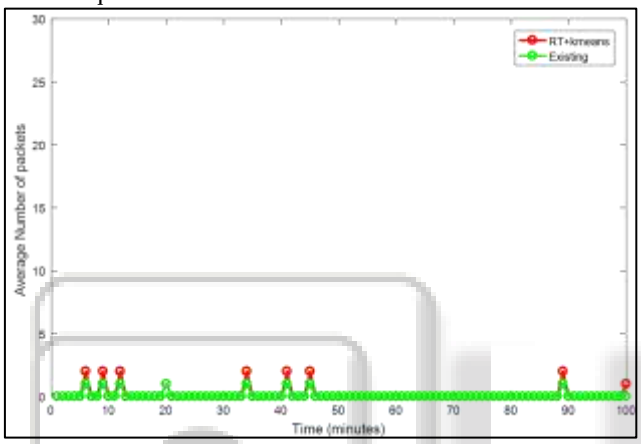


Fig. 1: Time Calculation for Packets Sent

The idea that better investments have higher internal rates of return is appropriate for comparing investments that have their costs first and their positive incomes later, and which have about the same initial costs. This is so in case of all the three flowers taken into consideration.

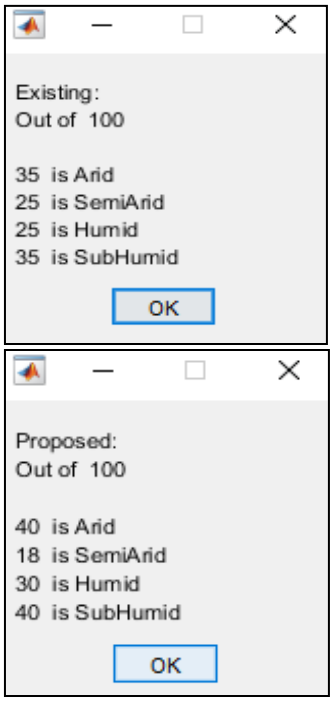


Fig. 2: Proposed & Existing Parameters

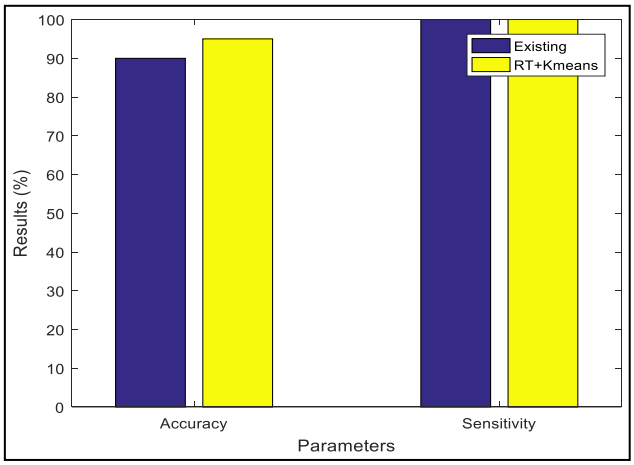


Fig. 3: Accuracy & Sensitivity

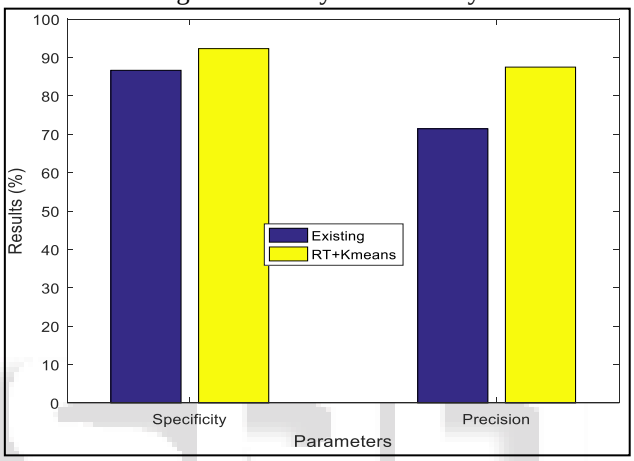


Fig. 4: Precision Parameters

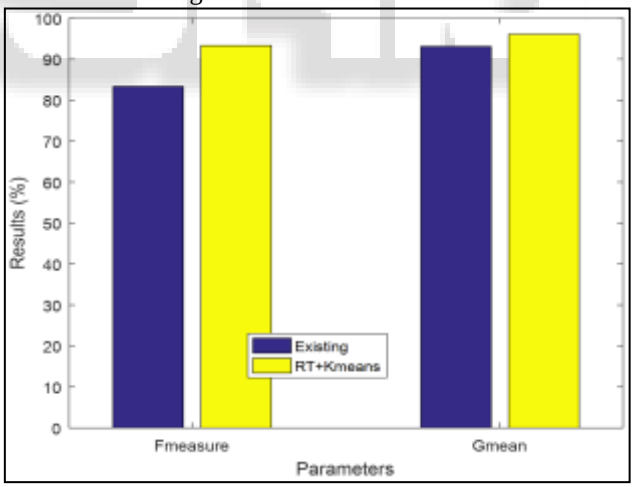


Fig. 5: F- Measure Calculation

Moreover, the incremental income excluding the imputed value of family labour increases the revenue further. However, as observed during the survey flower cultivation in different districts and for different types have different requirements. As compared to paddy cultivation the nature of requirement of labour by the flower growers is much less but has continuity.

VI. CONCLUSION

In ground water level is a major problem for the farmers of this region. Under these harsh and alarming situations the traditional farming has become hard. Low yield is another

problem that is being faced by the farmers of this district. This proposed work is made to help the farmers and make good harvesting. The experimental results showed that the system is scalable and can process a large amount of continuous sensor data more efficiently than traditional models. Furthermore, the performance of the IoT-based sensor was analyzed with various metrics such as the network delay, CPU, and memory usage. For all experimental scenarios, the IoT-based sensor provided an efficient solution as it successfully collected and transmitted the data within an acceptable time with low computational cost. By this work, the wastage of water and the consumption of power by motor can be reduced. This system provides complete monitoring action of sensors in fields that is very easy to control the field. It also provides huge security to the plants.

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