Data Analysis And Prediction On Cloud Computing For Enhancing Productivity In Agriculture

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Abstract: Introducing a concept to increase productivity and predict the crops from the diseases. To find the leaf characteristics using image processing to detect the diseases and pests that are present in leaves. In agriculture the main important aspect is to take proper steps to increase the production, which means to know the state of leaves condition in the field. In this undertaking the programmed system recognizes the qualities of the leaves. The programmed leaf attributes recognition is basic one in observing extensive fields of yields, and to naturally distinguish indications of leaf attributes when they show up on takes off. The basic leadership framework uses the picture portrayal and managed classifier of Neural Network. Picture preparing procedures for this sort of choice examination includes preprocessing, highlight extraction and characterization organize. In this procedure, the picture is taken and that can be resized if required the locale of intrigue choice can be performed. Here, shading and surface highlights are extricated from a contribution for organize preparing and grouping. Shading highlights like mean, standard deviation of HSV shading space and surface highlights like vitality, differentiation, homogeneity and connection. The framework will be utilized to order the test pictures naturally to choose leaf attributes. For this approach, programmed classifier Neural Network (NN) is utilized for grouping in light of learning with some preparation tests of that same classification. This system utilizes digression sigmoid capacity as portion work. At long last, the mimicked result demonstrates that utilized system classifier gives least blunder amid preparing and better exactness in order. This helps to read the classifier (Characteristics difference of the input image). By using the Threshold values we can detect the pests/diseases and also helps to give the required data about the diseases, details of pesticides and other like required quantity of the pesticides and displays the present market prices for the selected crop.

Keywords:- Image processing, K-means clustering, Neural Network, GLCM, Preprocessing, Image classifications , Gaussian image, Gray image, Bilateral filtered image, Extracted Regions, Segmented image, Regions detected image.

1. Introduction

From past few generations we are aware that farmers are facing lots of problems in their agriculture field. The basic concept of this project is to find the diseases/pests which causes major damage to the fields. That makes them to get less profit or sometimes they even get the whole crop to be infected by the disease. That causes the farmer to earn less.

So, here by using the image processing and IOT concepts we can get the data of the plants and fields which are affected. In the image processing a picture can be taken through the camera. The
image captured was the back side of the leaves. Because, the veins can be showed clearly. At first the image is taken and the image classification takes places to perform the clustering methods which helps to get the required components in one place to get the characteristic values for the detection of diseases/pests. There consists of two datasets one is the input image and the other is the saved images. At first the input leaf. The image GLCM classification like gaussian image, segmented image, region detected, bilateral filtered image, gray image and extracted region which helps to form the perfect structure of the leaf without any noise. This filtering method helps to know the disease part in a very clear pattern based on color, texture and features can be applied for the effective implementation.

In this process it takes the feature extraction, NN training. After taking these steps the trained network classifies the input leaf image and saved image which helps to know the diseases and other damages that reduces the production rate. By using the above process we can increase their production. At last it displays the characteristic values that help to get the data about disease name and the pesticides that can help us to cure the diseases.

Not only image processing helps but IOT plays a vital role for not getting diseases. Because many diseases can be caused due to water content present in their soil, temperature and humidity. Using sensors we can get the data. By collecting the data from the fields we can reduce the disease rate. Soil moisture sensor, humidity sensor and temperature sensor takes place in the IOT process. And not only collecting data about the fields from sensors but also gives the market price for the selected crop.

2. Related Work

To increase the productivity in farming land we are combining both Image Processing and IOT. In Image Processing we will take the picture of a leaf and it will check whether the disease is present in that leaf or not. Before displaying the disease name, it undergoes a back ground process. The back ground process is it will perform the k-means clustering, Preprocessing, Bilateral filtering, segmentation and it will train the network. It will display images separately for every classification, in each and every step one classification technique will be done. It displays a gray scale image, bilateral filtered image, regions detected image, extracted regions image, segmented image and gaussian image. It will display the disease name and the pesticides which can be used to cure the disease which occurs for that particular crop. By giving the pesticides name the farmer will know more about the disease and how to cure it. After this process we will use IOT, using IOT we are going to find the humidity, moisture and temperature that are present in the soil by using humidity sensor, soil moisture sensor and temperature sensor. It will display all the values and the current market price for that particular selected crop.

The dataset that helps to store the images of the leaf that are effected and non-effected leaf. The dataset images undergo the same image characteristics process which helps to get the required details to detect the input image is effected or not effected. The data from both the input image and dataset by using comparison.

By comparing both the complete data and the input image with their characteristic values. If the values are compared and characteristic values are same then by that we can detect the disease is present in the leaf or not and by getting the disease name we give the details about the pesticides that helps to reduce the disease rate in the leaf.
By using these pictures and required algorithms we can detect the diseases/pests that cause damage to the crop. The algorithms are GLCM, K-means clustering, Segmentation and Neural Network and an understandable scripting language "PYTHON" is used.

Second part is about the IOT process. If the crop have excess water or less water that damages the farming land and effects the production rate. IOT helps farmers to know the basic knowledge about their own field. To collect details the IOT can be used in effective manner. Here the sensors plays an vital role for collecting data. The data is about temperature, humidity and soil moisture.

Soil moisture sensor will display whether the soil moisture is sufficient for the crop or not. If required how much amount of water should be added. By displaying the details about the humidity, temperature and soil moisture which are collected from the sensors. To run the sensors Raspberry pi can be used and other devices like bread board, connectors etc., can be used. The details of the required Soil moisture quantity can be given. It displays the current market price for the selected crop

3. **Leaf Image Partitioning**

Leaf images are in different types of colors. Collecting large amount of data set can be used in this method. By using gray scale and other models it makes easy to run the entire process in an effective manner.

3.1. **K-Means Clustering:**

Grouping similar data together. One of the best example is search engine. Basically, to collect the similar data the centroids are introduced (at any place of the data). After initializing the centroids, the centroids attracts the near data. To get the exact similar data, the boundary line is drawn between the centroids. It helps to collect the similar data. If the data is not in the correct format the iteration helps to get the data to which it belongs.

3.2. **GLCM:**

It is also known as Gray Level Dependence Matrix. It is used for reading the values of the features like colour, texture.

3.3. **Threshold Algorithm:**

It consists of settings exactly those pixels to white whose value is above the threshold value it can be displayed in black colour.

**Probabilistic Neural Network**

It is a bolster forward neural system. It was gotten from the Bayesian system. At the point when an information is available, the principal layer processes the separation from the information vector to the preparation input vectors. This delivers a vector where its components show how shut the info is to the preparation input. The second layer entireties the commitment for each class of sources of info and produces its net yield as a vector of probabilities. At long last, a contend exchange work on the yield of the second layer picks the most extreme of these probabilities, and produces a 1 (positive distinguishing proof) for that class and a 0 (negative recognizable proof) for non-focused on classes.

4. **Results And Discussions**
Fig 1: Input Image:
The taken picture is a data picture. Isolating procedure finds the leaf is affected or not. Filtering is a method for changing and enhancing a photo.

Fig 2: Gaussian image:
The photo that channels the clatter and makes the photo clear, can be generally called Gaussian smoothing. (In picture taking care of, a Gaussian darken (generally called Gaussian smoothing) is the delayed consequence of clouding a photo by a Gaussian limit. It is a comprehensively used effect in outlines programming, typically to diminish picture confusion and abatement detail.)

Fig 3: Bilateral Filtered image:
The photo that channels the clatter and makes the photo clear. (A particular channel is a non-straight, edge-sparing, and disturbance decreasing smoothing channel for pictures. It replaces the power of
each pixel with a weighted ordinary of energy regards from near to pixels. This weight can be established on a Gaussian transport.

**Fig 4: Gray Scale image:**

This photo is of only two tints very differentiating. It recognizes the mischief easily by using parallel as 0 and 1. As addressed 0 as dull and 1 as white. As, showed up in picture underneath the disease parts will be in dull shading and strong part with white shading.

**Fig 5: Segmented image:**

In PC vision, picture division is the path toward isolating a mechanized picture into various areas. The goal of division is to revise and also change the depiction of a photo into something that is more critical and less requesting to look at.

**Fig 6: Regions detected:**

By recognizing the districts it makes easy to decrease or discard the establishment. It lessens the multifaceted idea of the photo taking care of to find the required material.

**Fig 7: Extracted Region:**

The evacuated picture urges or makes easy to enhance the proficiency or life of the item.

### Table 1. Characteristic Values

| SNO | Characteristics       | Values            |
|-----|-----------------------|-------------------|
| 1   | Gaussian Filtering    | 6.68093517e+01   |
| 2   | Bilateral Filtering   | 9.5553209e-01    |
| 3   | Gray Scale            | 7.51696284e+00   |
| 4   | Segmentation           | 8.48471389e-01   |
| 5   | Regions detected      | 3.05843487e+01   |
| 6   | Extracted Regions     | 2.93997579e+03   |
Data set values:

1. 
[5.50062383e-01 6.68093517e+01 9.55553209e-01 7.51696284e+02
8.48471389e-01 3.05843487e+01 2.93997579e+03
3.33728211e+00 3.18052731e-03 1.41783243e+00 -5.58955058e-01
9.6142670e-01]

2. 
[[15.36545562] [27.4565894]]
256.1343746606766

3. 
[4.80208581e-01 9.72510577e+01 9.31168461e-01 7.06569428e+02
8.10466606e-01 3.33920265e+01 2.72902665e+03 2.92388761e+00
3.91374357e+00 2.94800005e-03 1.78313247e+00 -4.83092086e-01
9.57298984e-01]

4. 
[[16.78591207] [26.61387879]]
241.3972478286338

5. 
[4.12256980e-01 2.82531189e+00 8.79025553e-01 1.16769166e+01
9.31246979e-01 4.71034105e+00 4.38823544e+01 2.16143247e+00
2.49454244e+00 8.95526997e-03 7.24667226e-01 -7.19294476e-01
9.68931484e-01]

5. 
[[2.36752185] [3.41941342]]
5.116241538330417

From the above data analysis, Fig 1 characteristic values are similar to the third set from the dataset. Combination of image processing and IOT makes an easy way to increase the production means reducing the diseases and pests by giving the information of the particular disease required pesticides and also the required quantity(approximately) which is very useful for farmers in their Agriculture field.

5. Conclusion

We are using many image classifications and IOT to make it effective and also using some of the algorithms to detect the diseases/pests. By taking these into considerations the clustering plays the major role to detect. Comparing the data plays a major role. The process has to be done automatically with more efficiency and flexibility. By using it we can increase the production rate and also pesticides can be used as per the required quantity. IOT helps us to get the details of the farmer’s field. By combining both the data in the process we can easily grow the crops in an effective way. That helps the production rate.

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