Smart Farming through Improvised Fertilizer and Machine Learning Approach

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Abstract

India could be a cultivated country and concerning seventieth of percentage of people depends on the agriculture related works and cultivating the food to fulfill the needs. Farmers have variety of options to cultivate crops in their field and searching for the respective insecticide for plants. Condition of plants ends up in the many reduce in each the standard and amount of agricultural merchandise. The studies on disease ask the studies of visually noticeable patterns on the plants. Agriculture is simply not restricted to Greenhouses, it's abundantly beyond it. These comes contend with varied tasks like assembling varied detector information to storing them in memory for additional use. GPS based mostly chase for domestic animals or a GPS hunter for vehicles used on the farm. Use of non-conventional energy is increasing in farms, there- fore star hunter is proving terribly useful for agricultural. The Farmers or human acting on farming comes will get SMS based mostly alerts or they'll even arrangement varied devices in farms by simply causing an SMS to those comes. Liquid level observance comes aren't restricted solely water level menstruation. They'll monitor the amount of liquid fertilizers employed in agricultural fields. The proposed work measures the prices and abstracts of those to recommend the feasible fertilizer for the given crops.

1. Introduction

Farming in India is finished victimization the mundane ways that the actual fact that the majority of our farmers lack correct data makes it even a lot of erratic. An out sized portion of farming and agricultural activities area unit supported the predictions, that every now and then fail. Farmers need to bear large losses and every now and then they find you committing suicide. Since we all know the advantages of correct soil wetness and its quality, air quality and irrigation, within the growth of crops, such parameters cannot be unheeded [1].

We, therefore, have return a brand new plan of reap observance good cultivation victimization Internet of Things. We tend to trust thought are going to be a bench-mark within the factory farm because its independent and remote observance. Our plan try to digitalize farm and farming things of the agriculturalist will examine the growth of the plants. This idea can sure as shooting speed-up their cultivation to achieve even be a lot of moneymaking. To implementing in our proposed system for the most part based on the attention among agriculturalist, that's to believe are going to simply generate because of its varied benefits. It aims in victimization numerous sensors like wetness, humid, temperature device for decisive climatically factors connected to the processor Arduino UNO and storing the

info in UART module for future use. Arduino UNO may be a Micro controller board support the AT- mega328. it's fourteen digital input and output pins, vi cognate inputs, a sixteen-megacycle quartz, a USB port affiliation, and the jack used to support the ICSP header and a push button. The module contains the complete functionality to support the microcontroller.

2. Literature Survey

Title-A Semi-Automatic technique For The Discrimination of unhealthy Regions In Detached Leaf pictures mistreatment Fuzzy C-Means bunch

Author: JoannaSekulska-Nalewajko1, Jaroslaw Goclawski , This paper describes the segmentation technique of stained leaf pictures for the aim of the detection of leaf regions with anti-pathogen reaction color merchandise. The segmentation consist within the image conversion to HSV color area and fuzzy c-means cluster in hue-saturation area to tell apart many pixels categories[3].

The another paper which help us to understand how to analyze the infected leaf and asses the different parameters using Threshold values and k- Means Clustering, Authored b**y** Mrunalini R. Badnakhe * Prashant R. Deshmukh et.al. The Leaf diseases area unit considered for the disease analysis and its features are extracted by using appropriate algorithm. The machine learning approach used to find the exact type of disease affected by the crop. The Images and its features extracted from the plant playing a vital role in this process of analysis in the paper. The extracted feature can progress to facilitate to seek out the diseases. Through this analysis the system will support the farmer in the process of finding the right chemical to avoid infection in the plants. This automation of machine learning based analysis in the field of agricultural scrutiny; Farmer will improve the productivity and the business [2].

3. Proposed Work

In this projected system image method techniques area unit accustomed sight and take away noises in each and every constituent therefore making the filtration technique effective and used for feature extraction. The proposed work make use of the support vector machine to find the right a hyper plane which classifies the data according to the list of parameters in the data set. The hyper- planes in Artificial Neural networks provides high or wide range of dimensionality, which could be used for the purpose of classification, regression etc., The Artificial Network provide the appropriate separation between the class of data set in terms of hyper plane that has the important distance parameter to the highest coaching information purpose of any class (so known as helpful mar- gin), the maximum margin and the lower the generalization error of the classifier. The first drawback is also explicit in an extremely limited importance house, it usually happened that the sets to differentiate don't seem

to be linearly divisible therein house[4].
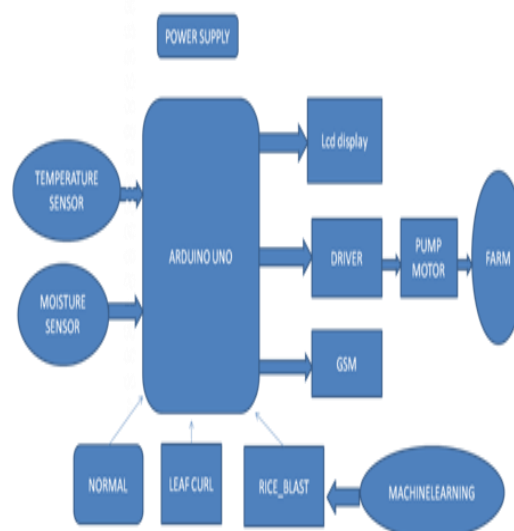
Architecture Diagram

Figure 1: Proposed Architecture diagram

For this reason, it absolutely was planned that the initial limited immersion house be mapped into a way higher dimensional house, superlative creating the disconnection easier there in house [8].

4. Proposed Methodology

To keep the process freight cheap, the mapped utilized by SVM schemes square measure plan to correct that dot product could also be calculate just a expression of the variables within the real area, by process them in expression of a kernel that can be represented using function K(x,y) which identified the distance between the hyper planes in the process. The hyper planes within the high-dimensional area square measure out- lined because the set of points where the function performs the inner product using the given vector and fixes the given area is constant[6].

5. Implementation Work

The image features and its parameters are used to identify the maximum-margin between the hyper plane and square measure calculated for the optimization. There are number of algorithms are available for calculating the values of QP but its from SVM, largely hoping on heuristics for diving into small and manageable chunks[14].

One more approach is to use an inside purpose methodology that uses New-ton-like iterations to search out an answer of the Karush Kuhn Tucker conditions of the primal and twin issues. Rather than determination a sequence of softened issues, this approach directly solves the matter altogether. To avoid determination a linear system introduces the big kernel matrix, an occasional rank approximation to the matrix is

usually employed in the kernel trick[13].

Another common methodology is Platt serial token optimist (SMO) rule, that divides the problem further into 2-dimensional sub-problems that square measure resolved analytically, avoiding the requirement for numerical optimization rule and matrix storage. This rule is conceptually straight for- ward, simple to implement, typically quicker, and has higher scaling properties for troublesome SVM issues[7].

A. Grey Level Co-occurrence Matrix (GLCM)

The Grey Level Matrix uses the Image Features extracted from the plants are used for the data matrix representation with rich of set of data. The activity analysis of difficult information one in all the most important problems stems from the number of variables involved. Analysis with huge volume of variables usually results into an excellent deal of memory and computation power or a classification formula that not fits the process of sample and generalizes low quality to new samples. Image Feature extraction involves the several functionalities to construct various types of variables to resolve the issues related to the problem by retaining same information with good accuracy[9].

The image Texture strength and visual characteristic of a surface in Texture analysis process aims to finding a different set of underlying characteristics of textures and represent them in simpler way. The distinctive sort, so as that it will be used for efficient, correct classification of image segmentation. The image texture plays vital role in the process of image analysis and pattern recognition, exclusively a number of architectures implement image feature extraction. In this paper, gray level co-occurrence matrix is developed to ac- definite quantity applied math texture choices. The texture choices is additionally extracted from the GLCM. Exclusively four second order choices significantly angular momentum, correlation, inverse distinction moment, and entropy unit of measurement computed. [5]

B. Image Texture Analysis Using Gray-Level Co-Occurrence Matrix

The statistics procedure of finding touch that contemplate the abstraction relationship of pixels is that the grey level co-occurrence matrix (GLCM), additionally referred to as the gray level abstraction dependence matrix[10].

The GLCM functions characterize the feel of a picture by calculating however typically pairs of picture element with specific values and during a abstraction relation-ship occur in a picture, making a GLCM, then extracting applied math measures from this matrix[14]. (The texture filter functions, represented in Texture Analysis cannot offer in concerning form, i.e. the abstraction relationships of pixels in a picture.)After you produce the GLCM, you'll be able to derive many statistics from the optimization on the grey props perform. These statistics offer data concerning the feel of a picture in the subsequent table lists the statistics [11].

Table 1: Picture Data Description

Statistic	Description
Contrast	Measures the local variations in the gray-level co-occurrence matrix.
Correlation	Measures the joint probability occurrence of the specified pixel pairs.
Energy	Provides the sum of squared elements in the GLCM. Also known as uniformity or the angular second moment.
Homogeneity	Measures the closeness of the distribution of elements in the GLCM to the GLCM diagonal.

6. Results and Discussion

We using input images to collect data- base In this initially we give RGB images To trained classification. In this Process to convert RGB to grey scale conversation [15]. In this image We add salt and pepper noise Because noise could not visible In this study level we add noises Based on Noise We could not find proper noise in RGB So convert to Grayscale image.

In this Technical based on Frequency domain In this domain removing of noises. We using Filters lots of Filters is here We using Median filter because more accuracy to get other filter. Sometimes image will be Pixel size high So we should Re sized image based on Input images[12].
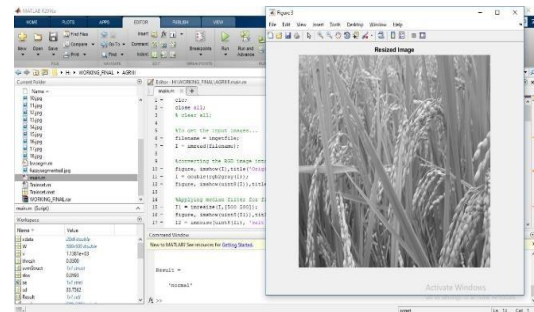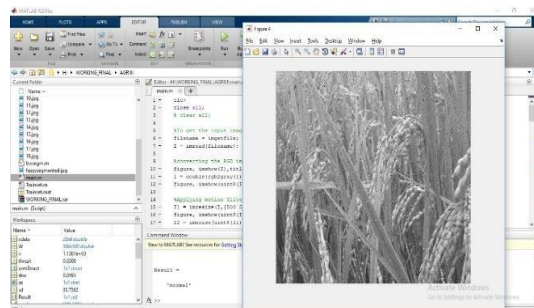
Sample Output images

Figure 2: Loading Image Data
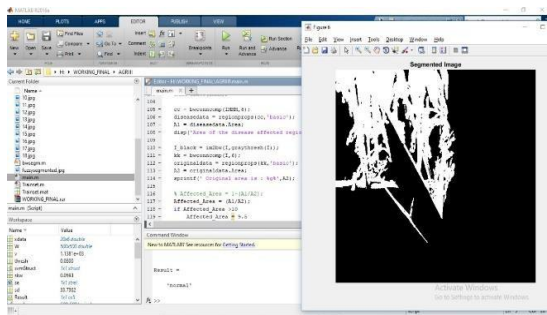

Figure 3: Application of Grey Scale Image

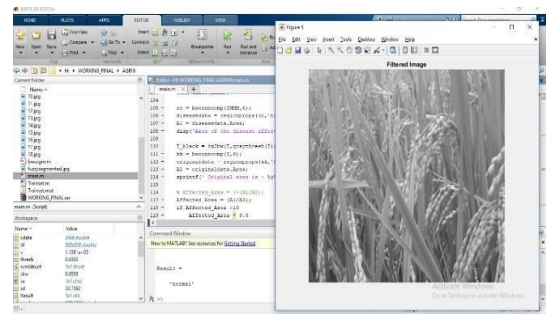Figure 4: Grey Scale Image Data

Figure 5: Grey Scale Image Data
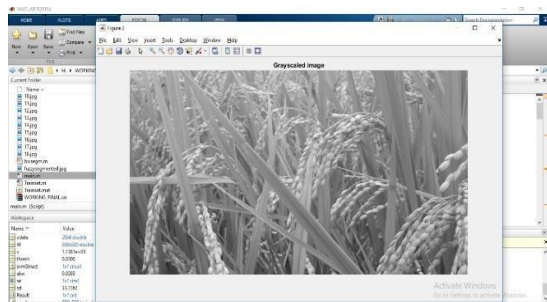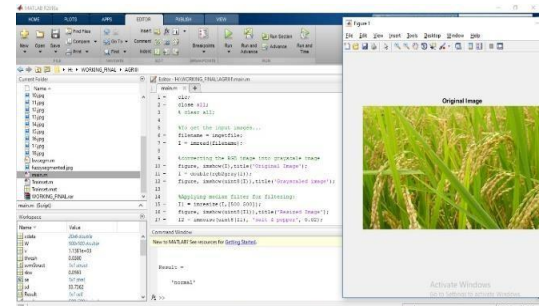

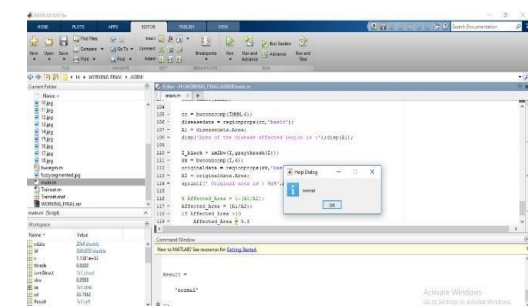Figure 6: Application of Filters

Figure 7: Feature extraction

Figure 8: Crop data prediction

7. Conclusion

In this Process using Haar wavelet transform method based on discrete method and defined process to get more accuracy to find segmented area that is very helpful to get this one1st process of image segmentation. In this segmentation method will be used so segment wise K means clustering method used In this Process Gray scale convert to Binary image that's means affected areas.

References

[1]   Sanjeev S Sannakki, Vijay S Raj- purohit, V B Nargund, Pallavi Kul- karni, "Diagnosis and Classificationof GrapeLeafDiseasesusingNeuralNet- works",IEEE proceedings of 4ICCCNT,2013

[2]   S.Arivazhagan,R.NewlinShebiah, S. Ananthi, S. Vishnu Varthini, "Detection of unhealthy region of plant leaves and classification of plant leaf diseases using texture features",CIGR Journal ,Vol. 15, No.1,2013.

[3]   Arti N. Rathod, Bhavesh Tanawal, Vatsal Shah, "Image Processing Techniques for Detection of Leaf Disease", Vol 3, Issue 11,2013.

[4]   Jayamala K. PatilBharti, "Advances in image processing for detec- tion of plant diseases", Journal of Advanced Bio informatics Applications and Research, Vol 2, Issue 2, pp 135- 141,2011.

[5]   Camargoa, J.S. Smith, "An image- processing based algorithm to automatically identify plant disease visual symptoms", Bio system Eng., Vol 102:9– 21,2009.

[6]   Ramamoorthy, Subramanian, and S. Rajalakshmi. "Optimized data analysis in cloud using BigData analytics techniques." In *2013 Fourth International Conference on Computing, Communications and Networking Technologies (ICCCNT)*, pp. 1-5. IEEE, 2013.

[7]   Ramamoorthy, S., and B. Baranidharan. "CloudBC-A Secure Cloud Data acess Management system." In *2019 3rd International Conference on Computing and Communications Technologies (ICCCT)*, pp. 217-220. IEEE, 2019.

[8]   Ramamoorthy, S., and S. Rajalakshmi. "A Preventive Method for Host Level Security in Cloud Infrastructure." In *Proceedings of the 3rd International Symposium on Big Data and Cloud Computing Challenges (ISBCC–16')*, pp. 3-12. Springer, Cham, 2016.

[9]   Vibhute, Anup, and Shrikant K. Bodhe. "Applications of image processing in agriculture: a survey." International Journal of Computer Applications 52, no. 2 (2012).

[10]   Kamilaris, Andreas, and Francesc X. Prenafeta-Boldú. "Deep learning in agriculture: A survey." Computers and electronics in agriculture 147 (2018): 70-90.

[11]   M Kowsigan, S Priyadharshini, N Sathish Kumar, C Vikramkumar-Volume No.118, Issue.18 -Security in Data and Dissemination of Distributed Data in Wireless Sensor Network, 2018.

[12]   M Kowsigan, M Rubasri, R Sujithra, H Sumaiya Banu-Volume No.7, Issue.3 Data Security and Data Dissemination of Distributed Data in Wireless Sensor Networks, 2017.

[13]   Duro, Dennis C., Steven E. Franklin, and Monique G. Dubé. "A comparison of pixel-based and object-based image analysis with selected machine learning algorithms for the classification of agricultural landscapes using SPOT-5 HRG imagery." Remote sensing of environment 118 (2012): 259-272.

[14]   Poorvadevi, R., and S. Rajalakshmi. "A cluster based signature evaluation mechanism for protecting the user data in cloud environment through fuzzy ordering approach." In 2015 International Conference on Computing and Communications Technologies (ICCCT), pp. 392-397. IEEE, 2015.

[15]   Poorvadevi, R., and S. Rajalakshmi. "A Scheme for Improving the Performance of User Authenticity Through Client Validation Process Using Fuzzy Associative Memory (FAM) in Cloud Computing." American Journal of Data Mining and Knowledge Discovery 1, no. 1 (2016): 1-6.