Identification of plant Syndrome using IPT

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Abstract: Agricultural productivity is something on which Indian economy highly depends. This is the one of the reasons that disease detection in plants plays a vital role in agriculture field, as having disease in plants are unavoidable. If proper care is not taken in this area, then it causes serious effects on plants and due to which the overall agriculture yield will be affected. For instance, a disease named little leaf disease is a hazardous disease found in pine trees in United States. Detection of plant disease through some automatic technique is beneficial as it reduces a large work of monitoring in big farms of crops, and at very early stage itself if detected properly by identifying the symptoms of diseases can result in increased productivity. This paper presents an algorithm for image segmentation technique which is used for automatic detection and classification of plant leaf diseases. It also covers diseases classification techniques that can be used for plant leaf disease detection. Image segmentation is one of the method which will segment the raw images in to two or more clusters and the programmed algorithm will work fine in analyzing these clusters for disease classification and prediction of type of disease that a plant leaf gets affected

Key words: Image processing, Detection, Identification of plant leaf diseases, Convolutional neural network

Introduction

The agricultural land mass is more than just being a feeding sourcing in today's world. Indian economy is highly dependent of agricultural productivity. Therefore, in field of agriculture, detection of disease in plants plays an important role. To detect a plant disease in very initial stage, use of automatic disease detection technique is beneficial. For instance, a disease named little leaf disease is a hazardous disease found in pine trees in United States.

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The agricultural land mass is more than just being a feeding sourcing in today's world. Indian economy is highly dependent of agricultural productivity. Therefore, in field of agriculture, detection of disease in plants plays an important role. To detect a plant disease in very initial stage, use of automatic disease detection technique is beneficial. For instance, a disease named little leaf disease is a hazardous disease found in pine trees in United States. The affected tree has a stunted growth and dies within 6 years. Its impact is found in labama, Georgia parts of Southern US. In such scenarios early detection could have been fruitful. A large team of experts as well as continuous monitoring of plant is required, which costs very high when we do with large farms [1-10]. At the same time, in some countries, farmers do not have proper facilities or even idea that they can contact to experts. Due to which consulting experts even cost high as well as time consuming too. It could be better if we have an efficient automated algorithm that could effectively identify these diseases in plants and provide the perfect diagnostics of diseased leaves. Image processing techniques will come in handy as an perfect solution for this problem. We can create an automated algorithm that could be trained with the diseased plants and make it to learn from it then can be used to identify and classify affected and unaffected plant parts [11-20].

Literature Survey

Fuzzy query over encrypted data is becoming a popular topic, since in practical scenarios, some query requests usually want to retrieve data with similar, rather than exactly same indexes. Fuzzy searchable encryption has been introduced for cloud computing in many literatures. These schemes deal with the issue that search keywords allows small-scaled distinction in character/numeric level. Specifically for numerical keywords, the query predicate can get numerical records within a range. Some schemes targeted at spatial query, especially knn which focus on the distance between the query vector and the data. They usually inquire about certain spatial objects (or several numerical attributes) related to the others within a certain distance. Range query has been proposed for that purpose. However, such existing range query schemes are not suitable for practical secure database due to high storage overhead to maintain the corresponding cipher text. Subsequently, order preserving encryption (OPE) has been introduced to provide numericrelated range query in structured database, such as Crypt DB. OPE preserves the order of values in encryption field, while hiding the actual values. Until now, OPE has been developed to increase both efficiency and security. OPE inherently exposes the order of data that can be utilized to reveal an amount of critical knowledge, although it is always expected to be private [21-30].

OBJECTIVE

The primary objective of this project is to develop an automated working algorithm for analyzing the plant diseases with the captured image samples of leaves which has to be tested. Image processing techniques such as attribute extraction, image segmentation and image classification must be applied for algorithm training and should produce the predicted result. It

should effectively identify the four types of diseases in plants based on the symptoms shown in image samples considered for diseased identification. The disease that took for identification is Alterneria Alternata, Anthracnose, Bacterial blight, Cercospora leaf spot.

SYSTEM ANALYSIS

System analysis is the overall analysis of the system before implementation and for arriving at a precise solution. Careful analysis of a system before implementation prevents post implementation problems that might arise due to bad analysis of the problem statement. Thus the necessity for systems analysis is justified. Analysis is the first crucial step, detailed study of the various operations performed by a system and their relationships within and outside of the system. Analysis is defining the boundaries of the system that will be followed by design and implementation.

EXISTING SYSTEM

The existing method for plant disease detection is simply naked eye observation by experts through which identification and detection of plant diseases is done. For doing so, a large team of experts as well as continuous monitoring of plant is required, which costs very high when we do with large farms. At the same time, in some countries, farmers do not have proper facilities or even idea that they can contact to experts. Due to which consulting experts even cost high as well as time consuming too. In such conditions, the suggested technique proves to be beneficial in monitoring large fields of crops. Automatic detection of the diseases by just seeing the symptoms on the plant leaves makes it easier as well as cheaper. This also supports machine vision to provide image based automatic process control, inspection, and robot guidance. Plant disease identification by visual way is more laborious task and at the same time, less accurate and can be done only in limited areas. Whereas if automatic detection technique is used it will take less efforts, less time and become more accurate. In plants, some general diseases seen are brown and yellow spots, early and late scorch, and others are fungal, viral and bacterial diseases. Image processing is used for measuring affected area of disease and to determine the difference in the color of the affected area.

LIMITATION OF EXISTING WORK

- The implementation still lacks in accuracy of result in some cases. More optimization is needed.
- Priori information is needed for segmentation.
- Database extension is needed in order to reach the more accuracy.
- Very few diseases have been covered. So, work needs to be extended to cover more diseases.
- The possible reasons that can lead to misclassifications can be as follows: disease symptoms vary from one plant to another, features optimization is needed, and more training samples are needed in order to cover more cases and to predict the disease more accurately.

PROPOSED SYSTEM

Digital camera or similar devices are used to take images of leafs of different types, and then those are used to identify the affected area in leafs. Then different types of image processing techniques are applied on them, to process those images, to get different and useful features needed for the purpose of analyzing later. Algorithm written below illustrated the step-by-step approach for the proposed image recognition and segmentation processes:

1. Image acquisition is the very first step that requires capturing an image with the help of a digital camera.
2. Pre-processing of input image to improve the quality of image and to remove the undesired distortion from the image. Clipping of the leaf image is performed to get the interested image region, image smoothing is done using the smoothing filter.
3. Mostly green colored pixels, in this step, are masked. We computed a threshold value that is used for these pixels. If pixel intensity of the green component is less than the pre-computed threshold value, then zero value is assigned to the red, green and blue components in the infected clu clusters, inside the boundaries, remove the masked cells.

BACTERIAL DISEASES

A bacterial disease is generally referred as the “Bacterial leaf spot”. It is initiated as the small, yellow green lesions on young leaves which usually seen as deformed and twisted, or as dark, water-soaked, greasy-appearing lesions on older foliage.

VIRAL DISEASES

All viral disease presents some degree of reduction in production and the life of virus infected plants is usually short. The most available symptoms of virus-infected plants are frequently appear on the leaves, but some virus may cause on the leaves, fruits and roots. The Viral disease is very difficult to analyze. Leaves are seen as wrinkled, curled and growth may be undersized due to the virus.

FUNGAL DISEASES:

Fungal disease can influence the Contaminated seed, soil, yield, weeds and spread by wind and water. In the introductory organize it shows up on lower or more seasoned clears out as water-soaked, gray-green spots. Afterward these spots are obscure and at that point white fungal development spread on the undersides. In wool buildup yellow to white streak on the upper surfaces of more seasoned clears out happens. It spreads outward on the leaf surface causing it to turn yellow.

TRAINING:

In this step, training the deep Convolutional Neural Network (CNN) for making an image classification model will be done. Deep CNN architecture will be used and adjusted to support our different categories (classes). Rectified Linear Units (ReLU) will subsequently be used as

substitute for saturating nonlinearities. This activation function adaptively will learn the parameters of rectifiers and improve accuracy at negligible extra computational cost.

TESTING:

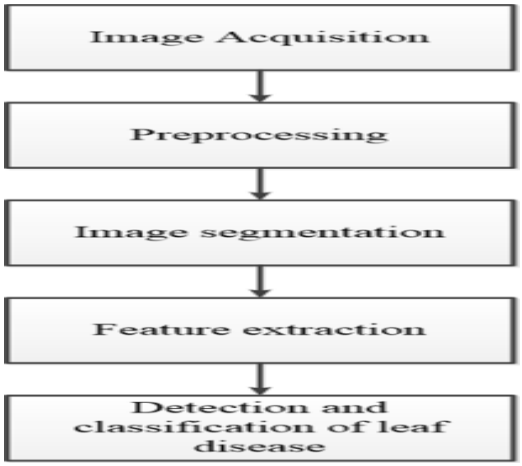
In this phase, the test set for prediction of leaf as healthy/Unhealthy with its disease name will be used to evaluate the performance of the classifier.

FINE-TUNING:

Fine-tuning helps to increase the accuracy of prediction by making small modifications to improve or optimize the outcome. The best suited model for plant disease detection will be achieved through the process of experimental adjustment of the parameters.

WORKING PRINCIPLE:

The working principle of this project lies in the technique of image processing technique. The two core techniques of this algorithm are attribute selection and clustering of image samples based on attribute selection. Initially a background study of symptoms of the plant disease is identified and these symptoms are considered as attributes for disease identification. A supervised learning algorithm will be created and that algorithm will be fed with training data sets in the form of captured images that are those real images captured through camera or any other photographic devices. Once these images are fed in to the algorithm the algorithm will be self-learning it. Once the algorithm reaches the expected outcome measure on accuracy the real time data sets will be taken and fed in to the algorithm. Now these algorithm will analysis and give you the output as whether the given image is an affected image or not.

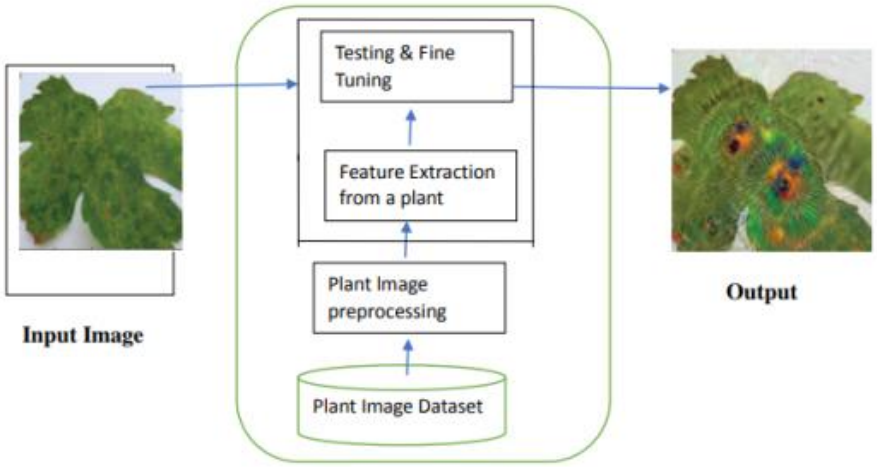


INPUT DESIGN:

The input design involves converting originated inputs into a system-based format. The aim of input design is to make the data entry easier, logical error free. The different types of

input data handled by the system are: They are the prime inputs to the system. The external input is what the user supplies types of external inputs in the 00S. User gives to the system.

SYSTEM ARCHITECTURE:



DATA COLLECTION:

Images can be downloaded from the Internet using the keywords plant and disease names. Subsequently, all the images can be classified into different groups.

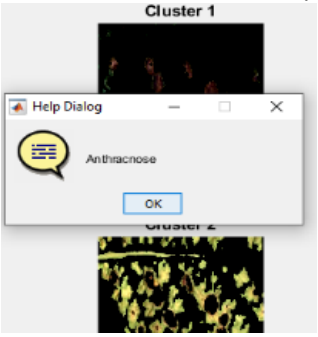
IMAGE PREPROCESSING:

Images in the dataset may be in different formats, quality and resolution. Hence, the images need to be preprocessed, for instance, images with smaller resolution and dimension

less than 500 px will not considered as valid images for the dataset. The rest will be resized to 256 × 256 in order to reduce the time for training.

LEAF DETECTION:

Statistical equations are applied on the dataset for analyzing and interpret the data set. aralick texture features are used in the experimentation. These are spatial features that indicate pixel relationship based on gray scale intensity and orientation. A total of 11 heraldic features are calculated using Gray Level Co-occurrence Matrix (GLCM).



CLASSIFICATION:

Deep Convolutional Neural Network (CNN) is used for making an image classification model will be done. Deep CNN architecture will be used and adjusted to support our different categories (classes). Rectified Linear Units (ReLU) will subsequently be used as substitute for saturating nonlinearities. This activation function adaptively will learn the parameters of rectifiers and improve accuracy at negligible extra computational cost. In this phase, the test set for prediction of leaf as healthy/Unhealthy with its disease name will be used to evaluate the performance of the classifier.

FUTURE ENHANCEMENT:

As future enhancement of the project is to develop the open multimedia about the diseases and provide the solution automatically once the disease is detected. Try to include more number of disease for plant identification along with the remedial suggestions and solution that could directly communicate with agriculturists through apps and internet media

CONCLUSION:

This work implements an innovative idea to identify the affected crops and provide remedy measures to the agricultural industry. The infected region of the leaf is detected and analyzed. The images are fed to our application for the identification of diseases. It provides a good choice for agriculture community particularly in remote villages. It acts as an efficient system in terms of reducing clustering time and the area of infected region. Feature extraction technique helps to extract the infected leaf and also to classify the plant diseases. DCT, DWT and Texture feature extraction techniques give good results in classification. The proposed approach of combining DCT+DWT features for classification with Support Vector Machine (SVM) gives maximum accuracy of 94.45%. Our proposed technique indicates more enriched results as compare to other techniques for Plant Disease Identification and Classification.

This system of “windmill parameter monitoring through internet” is very helpful because here we measure and control all the necessary parameters together manually and automatically through internet. The proposed system used for the monitoring of vibration, temperature, speed as well as lubrication level of the Wind Turbine using the developed methodology to avoid blasting hazard. It is possible to manage the setup from anywhere and anyone for a fraction of second. Due to this it is best method. The Nodemcu communication enables the remote controlling system of all these parameters from wind turbine to PC/computer. This is simple, convenient, time saving and high.

References

1. Konstantinos P. Ferentinos: Deep Learning models for plant disease detection and Diagnosis. Computers and electronics in ariculture(2018)
2. Vishal Mani Tiwari&Tarun Gupta “Plant Leaf Disease Analysis using Image Processing Technique with Modified SVM-CS Classifier”, 2017.
3. Pallavi.S. Marathe “Plant Disease Detection using Digital Image Processing and GSM” International Journal of Engineering Science and Computing, April 2017.
4. Xihai Zhang, (Member, Ieee), Yue Qiao, Fanfeng Meng, Chengguo Fan, And Mingming Zhang “Identification of Maize Leaf Diseases Using Improved Deep Convolutional Neural Networks” in proceedings of IEEE June 26, 2018.
5. M.N. Abu Bakar, A.H. Abdullah, N. Abdul Rahim, H. Yazid, S.N. Misman and M.J. Masnan” Rice Leaf Blast Disease Detection Using Multi-Level Color Image Thresholding” in proceedings of Research Gate, Article· August 2018.
6. Rajneet Kaur and Manjeet Kaur, “A Brief Review on Plant DiseaseDetection using in Image Processing”, IJCSMC, Vol. 6, Issue. 2, February 2017.

7. Sandesh Raut and Amit Fulsunge, "Plant Disease Detection in Image Processing Using MATLAB", IJIRSET Vol. 6, Issue 6, June 2017.
8. K. Elangovan and S. Nalini "Plant Disease Classification Using Image Segmentation and SVM Techniques", IJCIRV, Volume 13, Number 7, 2017.
9. Sonal P Patel and Arun Kumar Dewangan "A Comparative Study on Various Plant Leaf Diseases Detection and Classification" (IJSRET), Volume 6, Issue 3, March 2017.
10. R.Rajmohan and M.Pajany, "Smart paddy crop disease identification and management using deep convolution neural network & SVM classifier", International journal of pure and applied mathematics, vol 118, no 5, pp. 255-264, 2017.
11. Wenjiang Huang, Qingsong Guan, JuhuaLuo, Jingcheng Zhang, Jinling Zhao, Dong Liang, Linsheng Huang, and Dongyan Zhang, "New Optimized Spectral Indices for Identifying and Monitoring Winter Wheat Diseases", IEEE journal of selected topics in applied earth observation and remote sensing,Vol. 7, No. 6, June 2014
12. Karthick, R., et al. "Overcome the challenges in bio-medical instruments using IOT–A review." Materials Today: Proceedings (2020). https://doi.org/10.1016/j.matpr.2020.08.420
13. Karthick, R., et al. "A Geographical Review: Novel Coronavirus (COVID-19) Pandemic." A Geographical Review: Novel Coronavirus (COVID-19) Pandemic (October 16, 2020). Asian Journal of Applied Science and Technology (AJAST)(Quarterly International Journal) Volume 4 (2020): 44-50.
14. Sathiyanathan, N. "Medical Image Compression Using View Compensated Wavelet Transform." Journal of Global Research in Computer Science 9.9 (2018): 01-04.
15. Karthick, R., and M. Sundararajan. "SPIDER-based out-of-order execution scheme for Ht-MPSOC." International Journal of Advanced Intelligence paradigms 19.1 (2021): 28-41. https://doi.org/10.1504/IJAIP.2021.114581
16. Sabarish, P., et al. "An Energy Efficient Microwave Based Wireless Solar Power Transmission System." IOP Conference Series: Materials Science and Engineering. Vol. 937. No. 1. IOP Publishing, 2020. doi:10.1088/1757-899X/937/1/012013
17. Vijayalakshmi, S., et al. "Implementation of a new Bi-Directional Switch multilevel Inverter for the reduction of harmonics." IOP Conference Series: Materials Science and Engineering. Vol. 937. No. 1. IOP Publishing, 2020. doi:10.1088/1757-899X/937/1/012026
18. Karthick, R., and M. Sundararajan. "Hardware Evaluation of Second Round SHA-3 Candidates Using FPGA (April 2, 2014)." International Journal of Advanced Research in Computer Science & Technology (IJARCST 2014) 2.2.
19. Karthick, R., et al. "High resolution image scaling using fuzzy based FPGA implementation." Asian Journal of Applied Science and Technology (AJAST) 3.1 (2019): 215-221.

20. P. Sabarish, R. Karthick, A. Sindhu, N. Sathiyanathan, Investigation on performance of solar photovoltaic fed hybrid semi impedance source converters, Materials Today: Proceedings, 2020, https://doi.org/10.1016/j.matpr.2020.08.390
21. Karthick, R., A. Manoj Prabaharan, and P. Selvaprasanth. "Internet of things based high security border surveillance strategy." Asian Journal of Applied Science and Technology (AJAST) Volume 3 (2019): 94-100.
22. Karthick, R., and M. Sundararajan. "A novel 3-D-IC test architecture-a review." International Journal of Engineering and Technology (UAE) 7.1.1 (2018): 582-586.
23. Karthick, R., and M. Sundararajan. "Design and implementation of low power testing using advanced razor based processor." International Journal of Applied Engineering Research 12.17 (2017): 6384-6390.
24. Karthick, R., and M. Sundararajan. "A Reconfigurable Method for TimeCorrelatedMimo Channels with a Decision Feedback Receiver." International Journal of Applied Engineering Research 12.15 (2017): 5234-5241.
25. Karthick, R., and M. Sundararajan. "PSO based out-of-order (ooo) execution scheme for HT-MPSOC." Journal of Advanced Research in Dynamical and Control Systems 9 (2017): 1969.
26. Karthick, R. "Deep Learning For Age Group Classification System." International Journal Of Advances In Signal And Image Sciences 4.2 (2018): 16-22.
27. Karthick, R., and P. Meenalochini. "Implementation of data cache block (DCB) in shared processor using field-programmable gate array (FPGA)." Journal of the National Science Foundation of Sri Lanka 48.4 (2020). http://doi.org/10.4038/jnsfsr.v48i4.10340
28. Suresh, Helina Rajini, et al. "Suppression of four wave mixing effect in DWDM system." Materials Today: Proceedings (2021). https://doi.org/10.1016/j.matpr.2020.11.545
29. M. Sheik Dawood, S. Sakena Benazer, N. Nanthini, R. Devika, R. Karthick, Design of rectenna for wireless sensor networks, Materials Today: Proceedings, 2021. https://doi.org/10.1016/j.matpr.2020.11.905
30. M. Sheik Dawood, S. Sakena Benazer, R. Karthick, R. Senthil Ganesh, S. Sugirtha Mary, Performance analysis of efficient video transmission using EvalSVC, EvalVid-NT, EvalVid, Materials Today: Proceedings,2021. https://doi.org/10.1016/j.matpr.2021.02.287 .