NOVATEUR PUBLICATIONS
INTERNATIONAL JOURNAL OF INNOVATIONS IN ENGINEERING RESEARCH AND TECHNOLOGY
[IJIERT] ISSN: 2394-3696 Website: ijiert.org
VOLUME 8, ISSUE 8, Aug. -2021

LEAF DISEASE DETECTION USING IMAGE PROCESSING BY CNN

Mrs. Kavita Krishnat Patil
Department of E&TC, DBATU University /
Ashokrao Mane Group of Institutions, Wathar, India
patilkavita318@gmail.com

ABSTRACT

The disease identification on the plant by the old method of checking and observing diseases in plants is through only visualization which is not so suitable in detecting the diseases associated with plants. This identification of the disease is done by manual observation and pathogen detection which is more time consuming and somehow costly with a lower accuracy. The aim is to identify and classify the disease accurately from the leaf images. The steps required in the process are Image Pre- processing, Segmentation, Feature Extraction and Identification. The disease considered are bacterial, viral fungal or disease by insects and by weather. Here, we are going to detect the disease of plant leaf. So there is a better option which is fast and accurate detection by using image processing techniques which can be more reliable than some other old traditional techniques.

INTRODUCTION

In this modern age a new concept of smart farming has been introduced where the field conditions are controlled and monitored using the self-operating systems instead of using the traditional methods such as different image processing techniques. By using these techniques information about the Disease occurrence could be quickly and accurately provided to the farmers, researchers and experts. This in turn reduces the monitoring of large field by human being as this may be less accurate and more time consuming.

In Disease recognition from image the steps are to extract the characteristic feature of the diseased region. The features may vary according to the Disease of plant Leaf. The features that are extracted from the image are color, shape, position, edges, texture and the regions. Identification of the diseases is very important in any field to preventing the losses. For sustainable agriculture health monitoring and disease detection on plant is very critical.

The studies of the leaf diseases mean the studies of visually observable patterns seen on the leaf. Leaf Disease detection requires huge amount of work, knowledge in the plant diseases, and also require the more processing time. Now a day's in all fields technology plays vital role but till today we are using some old methodologies in agriculture. If diseaseis wrongly detected it will leads to a loss of yield, time, production and money. For identification of diseases we can use Image Processing techniques for more accuracy, less time requirement and better performance.

LITERATURE REVIEW

1. Plant Leaf Disease Detection Using CNN and Raspberry Pi

Author: G. Rama Mohan Reddy, Nettam Sai Sumanth, N. Sai Preetham Kumar

In this paper author uses Raspberry pi for identification of the diseases. Here they have used the convolutional neural networks for processing of images. They have used CNN for various focal points to identify the diseases in the plants. In research purposes it is very useful because they identify diseases of leaf correctly using the CNN algorithm.

In the proposed system uses the CNN algorithm for the plant leaf disease detection because by using the CNN it can achieve the maximum accuracy if the dataset is the good. In this proposed system it capture the image by using the raspberry pi with the camera module and them process it and get the prediction whether leaf is diseased or not and the name of the disease. here dataset is taken and the data is preprocessed before training and then the data is trained here the images of the diseased plants are in separate folder because we can easily train the model and predict the model if it is in this type and the trained data is separated into two ways one for validation and another for verification that is into training and testing data that to in the 80:20 ratio. After the data is trained a model is generated and then it use the

raspberry pi to capture the picture of the image and then we use the CNN algorithm and the given trained model for the prediction of disease. It can achieve the 90 percent accuracy by this CNN.
Here they have concluded that plant leaf disease detection is done successfully with the help of the CNN and the open CV through the raspberry pi. It can achieve with in in very less time. Work will be reduced when we use drone across the field to identify the leaf diseases. For any other handling we can use the server. The core goal of the given project is to detect the plant leaf diseases and display it on the device and accurately identify the diseases and yield more output and prevent plants from the diseases.

2. Detection of unhealthy region of plant leaves and classification of plant leaf diseases using texture features

Author: S. Arivazhagan, R. Newlin Shebiah, S. Ananthi, S. Vishnu Varthini

In this paper author developed system is a software solution for automatic detection and classification of plant leaf diseases. The RGB images of leaves are converted into HSI color space representation. The purpose of the color space is to facilitate the specification of colors in some standard, generally accepted way. After that, based on specified threshold value that is computed for these pixels, the mostly green pixels are masked. Removing the masked cells is helful as it is gives more accurate disease classification and significantly reduces the processing time. Then the infected portion of the leaf is extracted. The infected region is then segmented into a number of patches of equal size. patch size of 32×32pixels is taken. The next step is to extract the useful segments. Not all segments contain significant amount of information. So the patches which are having more than fifty percent of the information are taken into account for the further analysis.
Then the color co-occurrence texture analysis method is developed through the SGDM. The SGDM's are represented by the function P(i, j, d, θ) where i represent the gray level of the location (x, y), and j represents the gray level of the pixel at a distance d from location (x, y) at an orientation angle of θ. SGDM's are generated for H image.
Then, Texture features like Contrast, Energy, Local homogeneity, Cluster shade and cluster prominence are computed for the H image. Then the classification done using Minimum distance criterion. The classification is first done using the Minimum Distance Criterion is 86.77% . The detection accuracy is improved to 94.74% by SVM classifier. Next is Support vector machines (SVMs) method used for classification and regression. From the results it seen that the detection accuracy is enhanced with SVM classifier.

3. Classification of grapefruit peel diseases using color texture feature analysis

Author: Dae Gwan Kim, Thomas F. Burks, Jianwei Qin, Duke M. Bulanon

In this paper author developed technologies that can efficiently identify citrus diseases would assure fruit quality and safety and minimize losses for citrus industry. This research was aimed to investigate the potential of using color texture features for detecting citrus peel diseases. A color imaging system was developed to acquire RGB images from grapefruits with normal and five common diseased peel conditions (i.e., canker, copper burn, greasy spot, melanose, and wind scar). A total of 39 image texture features were determined from the transformed hue (H), saturation (S), and intensity (I) region-of-interest images using the color co-occurrence method for each fruit sample. Algorithms for selecting useful texture features were developed based on a stepwise discriminant analysis, and 14, 9, and 11 texture features were selected for three color combinations of HSI, HS, and I, respectively. Classification models were constructed using the reduced texture feature sets through a discriminant function based on a measure of the generalized squared distance. The model using 14 selected HSI texture features achieved the best classification accuracy (96.7%), which suggested that it would be best to use a reduced hue, saturation and intensity texture feature set to differentiate citrus peel diseases. Average classification accuracy and standard deviation were 96.0% and 2.3%, respectively, for a stability test of the classification model, indicating that the model is robust for classifying new fruit samples according to their peel conditions. This research demonstrated that color imaging and texture feature analysis could be used for classifying citrus peel diseases under the controlled laboratory lighting conditions.

4. Detection and Classification of Plant Leaf Diseases by using Deep Learning Algorithm
Author: M. Akila, P. Deepan

The counseled device in this paper had a specialized deep gaining knowledge of version, this gadget is based on a specific convolutional neural community, for leaf disease detection. The facts set pix had been captured from diverse cameras and resources. According to analyze, Pests, and disorder are not a hassle in agriculture, seeing that healthy and plant life developing in rich soil are succesful to face up to pest/ailment. They had used detectors along with Faster Region-Based Convolutional Neural Network(Faster R-CNN), Region-Based Fully Convolutional Network(R-FCN), and Single Shot Detector(SSD). To execute the experiment the dataset had been divided into three units i.E. Validation set, education set, and trying out set. The first assessment is carried out at the validation set, after that education of the neural community is carried out at the education set and very last evaluation is executed at the testing set. They use education and validation units to execute the training system and trying out set for evaluating effects on uncooked statistics.

5. A Deep Learning-based Approach for Banana Leaf Diseases Classification
Author: Jihen Amara, Bassem Bouaziz, Alsayed Algergawy

This paper proposed the convolutional neural community to perceive and classify banana sickness. The proposed version can assist farmers to locate illnesses in a banana plant. The farmer can take an image of the leaf with the signs and so the gadget can determine the form of the ailment. The writer used deep neural networks to be aware terrific banana diseases that location unit banana Sigatoka and banana speckle within the actual scene and below tough situations like illumination, complex ancient beyond, absolutely exclusive snap shots resolution, length, purpose, and orientation. As soon as many experimentations device grow to be able to notice clever type consequences. This has proven that the projected method will considerably guide Associate in Nursing accurate detection of leaf sicknesses with little or no manner strive. In this paper, they used a deep-mastering-based definitely method to categorise and perceive banana leaves disorder. The machine framework includes two components i.e. Picture processing and deep mastering-based totally type.

6. Plant Disease Detection and its Solution Using Image Classification
Author: Saradhambal.G, Dhivya.R, Latha.S, R.Rajesh

The writer of this paper had applied an progressive concept to identify the affected leaf. By using the ok-approach clustering set of rules, the diseased part is then segmented and analyzed. Then this information turned into fed to an software for identity of disorder. The system proposed here reduced clustering time and vicinity of infected vicinity. There become also an embedded voice navigation gadget that assists customers at some point of the system. The technique used on this paper is to predict disease using the ok-suggest clustering algorithm. This includes the subsequent steps.

Image Acquisition – This is an initial process where we collect raw images from various sources. These raw images then are given to the system as input for further processing. These images can be of any format.

Image Preprocessing – This process will remove the extra noise from the images acquired from various sources. The raw images may contain particles, dust, and other types of digital noises that should be removed before further processing.

Image Segmentation – This is the process of partitioning an image into various segments. The main aim of this process is to represent an image into some meaningful and easy to analyze data. The segmented image is then used to train and test the system.

Feature extraction – It is the most important part to predict the infected part in the leaf. The shape and features of the leaf image are analyzed and prediction is made accordingly. The features like Color, length, texture, homogeneity, contrast, etc. helps in successfully determine the health of the leaf.

The initial process is to select the image. Using image preprocessing technology, the leaf would have to be diagnosed whether it was affected or unaffected. The image should then be segmented and the disease name identified. The project provides a solution to overcome leaf diseases and it also analyzes the overall percentage of the affected leaf and its surrounding area.

7. Application of Image Processing Techniques in Plant Disease Recognition
Author: K. Renugambal, B. Senthilraja

In this paper, the Author used digital images of sugarcane flora that show signs of a particular ailment. These diseased regions have been recognized and finished with the assist of method algorithms. GLCM features had been extracted from every segmented area and used as enter to a classifier. Because no longer all attributes were supposed to offer the identical information about the target, they used move-popularity to pick out those that included the quality classification version. First, texture measurements can be used as a useful differentiator for these styles of photos. Secondly, SVM system gaining knowledge of systems can be used to discover the visible signs and symptoms of plant sicknesses and can be of a specific software to crop producers in the subject of farming. An extension of this paintings will focus on developing fuzzy optimization algorithms to growth the popularity fee of the class manner.

8. Leaf Disease Detection on Cucumber Leaves Using Multiclass Support Vector Machine
Author: P. Krithika and S. Veni

In this paper, a method become proposed that makes use of the 1AA method of multiscale SVM to classify many diseases present in cucumber leaves. Diseases including leaf spot sickness, leaf minor and CMV of cucumber leaves are taken into consideration for evaluation. After preprocessing these photos, clusters with the diseased a part of the leaf are decided on the use of the ok-means clustering algorithm.

SVM is a supervised type approach. Monitored type techniques create training facts with labels based on the collected pattern picture. In this paintings, every ailment is considered a separate category and categorized hence. This education refers to a series of records examples used to create a database for the getting to know procedure. The supervised type analyses every schooling set and generates the corresponding output. If take a look at statistics is certain, the take a look at name must be assigned the class call. SVMs are powerful and correct, despite the fact that the training styles are small. Previous work has also proven that SVM offers higher results for classification than neural networks. Therefore, SVM is used in this work to carry out a supervised category. SVMs are binary classifiers however can be created to address more than one classifications. Two methods to those multiple classifications are the One-Against-One (1A1) and One-Against-All (1AAA) strategies.

Feature Extraction using GLCM

The foremost motive of function extraction is to decrease the assets required to nicely display a big amount of records. The class algorithm is horrific whilst big variables are considered. Some unique and inherent homes may be decided through studying this texture. Statistical texture capabilities are calculated using the Grayscale Coexistence Matrix (GLCM). The four key capabilities of GLCM for photograph analysis are comparison, correlation, energy, and symmetry. In addition, different statistical features such as mean, wellknown deviation, entropy, RMS, variance, smoothness, kurtosis, and skewness are also derived from the picture. The choice of a statistical parameter relies upon on the necessities within the output image. Consider p (i, j) as an detail of the co-incidence matrix. This represents the likelihood of transferring from grayscale i pixel to grayscale pixel.

9. Neural Network Application on Foliage Plant Identification
Author: P. Krithika and S. Veni

In some researches for leaf recognition, color is not used as a feature. The first reason is the fact that only green colored leaves are used. But for plants with leaves having interesting shapes and patterns color and texture properties should be included in recognition. As for instance, Epipremnum pinnatum "Aureum" and Epipremnum pinnatum "Marble Queen", they almost have the same as texture, same shape, but their color is different from each other. Mixture of shape, texture, color characteristics should be included in the recognition for better results. For example in, three kinds of geometric and Fourier

Transform characteristics were used to capture shape characteristic. Texture characteristics are removed from GLCMs, skewness was used to display color characteristics, and vein characteristics were addedl to make better identification. The identification system utilized Probabilistic Neural Network (PNN) as a classifier.

10. Early Detection of Pests on Leaves
Author: MANOJA M., RAJALAKSHMI J

Different image processing methods were used to spot and extract the pests in the captured image by early detection and extraction system. It's describing a camera filter that identifies pest species. The system then clarifies efficient methods to eradicate the threat. The procedures was used to take out of the detected things from the captured image is easy way with using shapeless similar segmentation. After that on processed image variant texture and color features are extracted. In the end, the characteristic values are fed as input to aid Vector Machine classifier, and then permit us to truly identify the insects and leaves. This is first step an important to identification of insects to find the corresponding to solution problem, in the next time to detect the different kinds of insects a single advanced method

CONCLUSION

To detect and classify diseases of various plants, an accurate and successful method should be used and this can be done with the help of image processing and neural network approach. This paper reviewed various techniques which has been already used. These techniques are related to segmentation, feature extraction and classification. From these methods, identification and classification of various plant diseases has been accurately done. But there are still some chances for the improvements in the existing techniques. So there is a better option which is fast and accurate detection by using image processing techniques using CNN.

REFERENCES

1) G. Rama Mohan Reddy, Nettam Sai Sumanth, N. Sai Preetham Kumar, "Plant Leaf Disease Detection Using CNN and Raspberry Pi" International Journal of Advance Scientific Research and Engineering Trends, Volume 2, Issue 2, Feb 2020.
2) S. Arivazhagan, R. Newlin Shebiah, S. Ananthi, S. Vishnu Varthini, "Detection of unhealthy region of plant leaves and classification of plant leaf diseases using texture features" Agric Engg. Int CIGR Journal, Volume 15, No.1, 212,March, 2013.
3) Dae Gwan Kim, Thomas F. Burks, Jianwei Qin, Duke M. Bulanon, "Classification of grapefruit peel diseases using color texture feature analysis" Int J Argic & Biol Egg. Volume 2, No.3, 41, Sept, 2019.
4) M. Akila, P. Deepan, "Detection and Classification of Plant Leaf Diseases by using Deep Learning Algorithm", International Journal of Engineering Research & Technology (IJERT), ISSN: 2278-0181, 2018.
5) Jihen Amara, Bassem Bouaziz, Alsayed Algergawy, "A Deep Learning-based Approach for Banana Leaf Diseases Classification", B. Mitschang et al. (Hrsg.): BTW 2017 – Workshopband, Lecture Notes in Informatics (LNI), Gesellschaft für Informatik, Bonn 2017
6) Saradhambal.G, Dhivya.R, Latha.S, R.Rajesh, "Plant Disease Detection and Its Solution Using Image Classification", International Journal of Pure and Applied Mathematics, Volume 119 No. 14 2018
7) K. Renugambal, B. Senthilraja, "Application of Image Processing Techniques in Plant Disease Recognition", International Journal of Engineering Research & Technology (IJERT),ISSN: 2278-0181, Vol. 4 Issue 03, March-2015
8) P. Krithika and S. Veni, "Leaf Disease Detection on Cucumber Leave Using Multiclass Support Vector Machine", IEEE WiSPNET 2017 conference.
9) Identification, International Journal of Computer Applications, Vol. 29, No 9 2011, 15-20.
10) MANOJA M., RAJALAKSHMI J., Early Detection of Pests on Leaves Using Support Vector Machine, International Journal of Electronics Research Applications, Vol 2, No 4 2014, 187-193.