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Deep Learning Regarding Virus Diagnosis Through Modified Segmentation Technique

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Abstract: A deep learning technique is used for plant virus diagnosis and it is a process of artificial neural network that consists of overall 3 layer. Plant disease detection is discussed using models from AI and ML. These traditional ML techniques have been used in the field of detection of plant virus widely. The proposed system is efficient computationally due to the use of mostly statically image processing through modified segmentation with modified watershed algorithm and its deep learning model. Many parts of the world are still facing problems in agriculture. One of the major problem arise in agriculture is disease detection. To overcome this problem, many researches were done on this concept using the advantages of various learning Techniques. Though these researches were resulted with limitations in early identification of plant diseases. So, this proposed CNN model via WUDHOA and modified segmentation approach with severity estimation procedure was efficiently worked on tomato plant disease classification. The proposed CNN model via WUDHOA and modified segmentation approach with severity estimation procedure was not only identify the diseases but also focused on the estimation of tomato plant disease severity.

Key Words: Disease Detection, Severity, CNN, Modified watershed algorithm ,WUDHOA

1. Introduction

Deep learning is used in any medical field for several virus diagnoses extensively and it is a powerful tool that has aided doctors and physicians in many domains including skin lesion detection and their identification. As stated by Yusuf (2020) CNN guided DL model is proposed regarding the accurate segmentation related plant virus. In addition, 88,000 RGB images were used to train the model. Identifying types of plant virus is vital and considered a crucial problem. Early diagnosis of daises, paves the way for better decision – making in managing any agriculture production (Alzubaidi, 2020). Identifying virus for plants can require expertise and a workforce and determining the type of infection of them that is objective and more time intense.

Typically, deep learning techniques require thousands of data points to generalize the forecasts correctly, however, only the tiny datasets of plant diseases are publicly accessible. The consistency of image recognition and object identification has markedly increased with the exponential advancement of optimization based deep learning, as it can accurately classify the disease better than the humans. Thus, this research work is indented to design an efficient approach for tomato plant disease identification with severity estimation process. fff

The potential of machine learning techniques to identify the existence of plant diseases via deep convolutional neural network techniques has been demonstrated by experiments with recognizable features imaged by traditional RGB cameras.

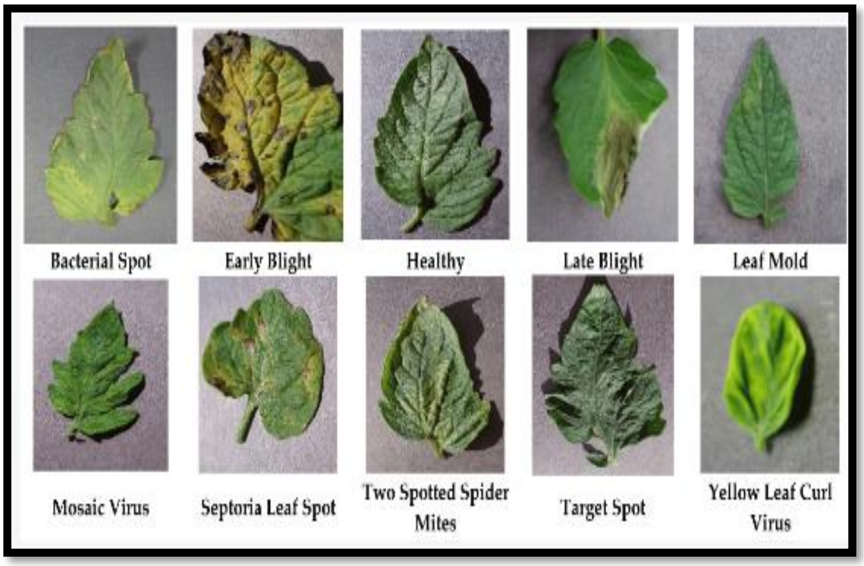

Figure 1: Deep Learning for virus diagnosis

The above mentioned figure 1 shows the impaction contaminated plants that's that have obvious marks on leaves, fruits and stems. Especially, each infection and the conditions of the leaves unique patterns can be used to diagnose any kind of abnormalities. By using ML and DL algorithms, the progress made in plant virus recognition has represented a enormous burst through in research. This research has completed for classifying and identifying its feature to expose the actual individuality of this image. As argued by Modical(2020), the accessibility of datasets, software and hardware units, supporting multifaceted DL structures with inferior difficulty have created it possible to control from any conventional methods to a DL implication. CNN helps to gain wide concentrations for their identification and segmentation of abilities that can work through extracting lower-level language coding for identifying different images. Hence , In order to get better rating or results, CNN is preferred in place of older approaches for automated plant virus recognition (Galvan etal 2020).

This research aims to identify the proper issues of plant virus diagnosis which is indeed a various process that can require essential care constantly during the developing session and is responsible regarding for a substantial fraction of the overall level of production. As stated by Saville(2021), the cost involved in plant virus detection restricts the outbreak explorations towards an infrequent scale of indications at the early period of the virus. Molecular processing, examination of volatile compounds and spectroscopy have been utilized in this research study of the mechanical detection process(Zanella, 2020). The potential of deep learning techniques on this plant virus diagnosis to identify the overall existence of it through deep convolution neural network models has been confirmed by experiments with recognizable features captured by traditional media, cameras and molecular techniques.

2. Literature Survey

As stated by Almadhor et al (2021), mentioned plant virus and detection is vital to research content in machine vision and it is a technology that uses machine vision equipment to obtain images to judge where another virus in composed of plant images. Without accurate identification of this plant virus, control measures can be a waste of money and time and additionally plant losses. As stated by Navathe et al (2020) accurate plant virus diagnosis is vital and pathologists have relied on the above symptoms regarding the identification of plant virus issues. As an example Powdery mildew spreads through 3 various types of airborne fungi and spore differs according to sunlight temperature but high humidity rates increase virus occurrences. Yellow spots can appear on tomato leaves turing to whitish powdery lesions covering the overall leaf and appearing on top of stems. For these issues, the fruits cannot develop powdery mildew but the defoliation leads to crop hammering and sunscald. For plant virus, various kinds of common symptoms are shown on plants like dead, Injured and discoloured tissues have distinct usually margins and spot that appear on fruits and leaves. These be come collapse, browning, yellowing or entire plant or stems.

As per views of annapoorani(2019)has developed a novel system regarding DA through GANs for plant diesis identification to boost the recognition accuracy of plant virus In this research article , a few new systems of accurate information augmentation through GANs was premeditatedto develop the recognition accuracy of plant virus. This model has achieved average recognition accuracy of 91.03% resulting in starting generated images augmented by DCGAN at Google Net Input. By this computational method the result has founded as most of the common virus are caused by various kinds of fungus favour certain weather changes, excessive rain during warm and cold periods makes an ideal environment. When adverse developing conditions persist, treating the tomato plants gives agriculture a head start on issues that can spread to eradicate once they emerge.

As observed by Awuchi et al (2021) have conducted a new hypothesis consisting of some social networks such as input networks position networks and LFC-Net categorization networks. They have introduced a self-supervision system simultaneously and it can detect efficiently detailed plant virus diagnosis regions without any necessity for instruction manual annotation. In addition, they have improved the deep learning approach that focused on allowing for continuity among groups as well as directness. This model's position structure recognizes the insightful regions all through the plant virus image and underneath the supervision of the criticism network was optimized.

As stated by Buja(2021) has suggested an enhanced RCNN intending to diagnose stable plant leaves and some virus. The technique is suggested to develop the model's exactitude for plant virus leaves identification and its situation of infected leaves localization. Secondly, in the alternative of VGG16 regarding extracting features, the author has used a depth network to able to acquire deeper plant virus features. The experimental research result has demonstrated that the enhanced system has achieved better precisions and stages of detection than faster RCNN to detect plant plant virus.

As observed by Chowdhury (2021) has improved new approach for green GHG plants using a real time decision support system for identifying the monitoring situations, and detecting climate sensor mistakes the control stage maintains climate variables and a strategic stage that can identify plant- affecting virus to adjust climate variables to mitigate any harmful conditions accordingly. Experimental finding has notified the framework has developed the use of climate circulation in that way ensuring resources to eliminate the complex virus plants.

As per views, Coker et. al (2019) have introduced distinct thoughtful mechanism towards the formative form of plant virus diagnosis. To learn any kind of essential characteristics of grouping first structural applies residual mechanism.

As argued by Furbank et al. (2020) have suggested a new structure to identify the plant virus and its sensitivity. The authors have suggested this structural framework for identifying the overall virus of plant and their sensitivity. Using KSW plant leaves are isolated from the backbone with ABCK. After that, this framework of it was used for recognizing the overall frames.

Views of Hasan et al (2023), have improved new methods to identify the plant's sensitivity to light situations due to signals, especially photoreceptors that accurate growth , physiological improvement and metabolism. The roots of the plants emerge for being more sensitive to brightness and the crescograph was used to record the sensitivity of this plant virus diagnosis.

3. Methodology

In this research, plant virus prediction will be introduction by following some major phases

1. Pre-processing
2. Segmentation
3. Classification
4. Feature Extraction
5. Severity Estimation

The collected figure will be de-noised in its pre-processing condition and after that, these pre-processed images will be segmented through a modified watershed algorithm. Here, the common methods for plant virus diagnosis include the visual plant virus estimation by microscopic evaluation and human refers of morphology features for getting identification as well microbiological, serological and diagnostic techniques. In this research, the data has been collected by using modern methods of plant virus diagnosis like axenic culture, nucleic acid probes, RNA analysis and DNA amplification. The structure optimizes overall methods of identification of the issues that can build characteristics extractors that do not get a proper description of this feature nearby to this objects usual attribute. The CNN model can perform accrual time judgments but not only save for resource or any time. However, this judgment has become more effective only for small datasets while coming regarding large datasets. At that time, it has become inappropriate to envisage the results. This overall scenario is due to lagging of accurate data as the system feeds with appropriate information and it influences for virus formation of the plant.

4. Image Segmentation- Modified Watershed Algorithm

After the process of preprocessing the input plant image, the outcome of image P^C is proceeded to image segmentation phase using a modified watershed algorithm [11]. It is a renowned morphological approach for image segmentation. This algorithm evaluates each region of the plant image rapidly. It has several improvisations over conventional watershed algorithm and are improved double sigmoid normalization, erosion operation, adaptive masking operation, image smoothing by convolution function, local minimum information and so on. The steps followed in this modified watershed algorithm is diagrammatically represented in the below flow diagram, named as Fig. 2.

Stage 1: The preprocessed input plant image P^C in RGB color code is separated as red, green and blue color channels. Each and every color channel is normalized 0 to 1. Conventionally, the normalization process in watershed algorithm. proposed work is implemented by an improved double sigmoid normalization [12].

Stage 2: A dynamic threshold selection method is utilized to find the adaptive threshold which is basically worked on the function called gray-threshold function.

Stage 3: To perform n-dimensional convolution function, a n-dimensional grid space is created. The obtained solution from improved double sigmoid normalization is applied with n-dimensional grid into the n-dimensional convolution function. This task aids the edge-preserving smoothing filter in a simple and non-repetitive way and also smoothen the image on three color channels. Whereas, the n-dimensional convolution function for n channel is denoted by con_n.

Stage 4: The adaptive masking operation on color channels is partially divided into two halves as (i) cell making and (ii) nucleus making

Stage 5: Normally, an image is provided with a single global minima or maxima but has various regional minima or maxima. Here, the process is entangled with impose minima in conventional algorithm while the proposed deep learning technique is improved by the operation of erosion [30] for the generation of new minima in the respective image at specific location.

Stage 6: The modified watershed algorithm is employed with morphological image processing on color channels.

Stage 7: After the employment of watershed algorithm, the process of pixel labeling is get started on R, G and B color channels. The 2D binary plant image on each color channel is connected with the objects in the label.

Stage 8: The post processing operation is done to visualize the labeled regions in the image. The transformation of R, G and B labels into RGB image.

Stage 9: Finally, the final segmentation image is attained by combining the RGB color channels p^n.

Thus, the obtained outcome from the process of image segmentation via modified watershed algorithm is represented by p^n.

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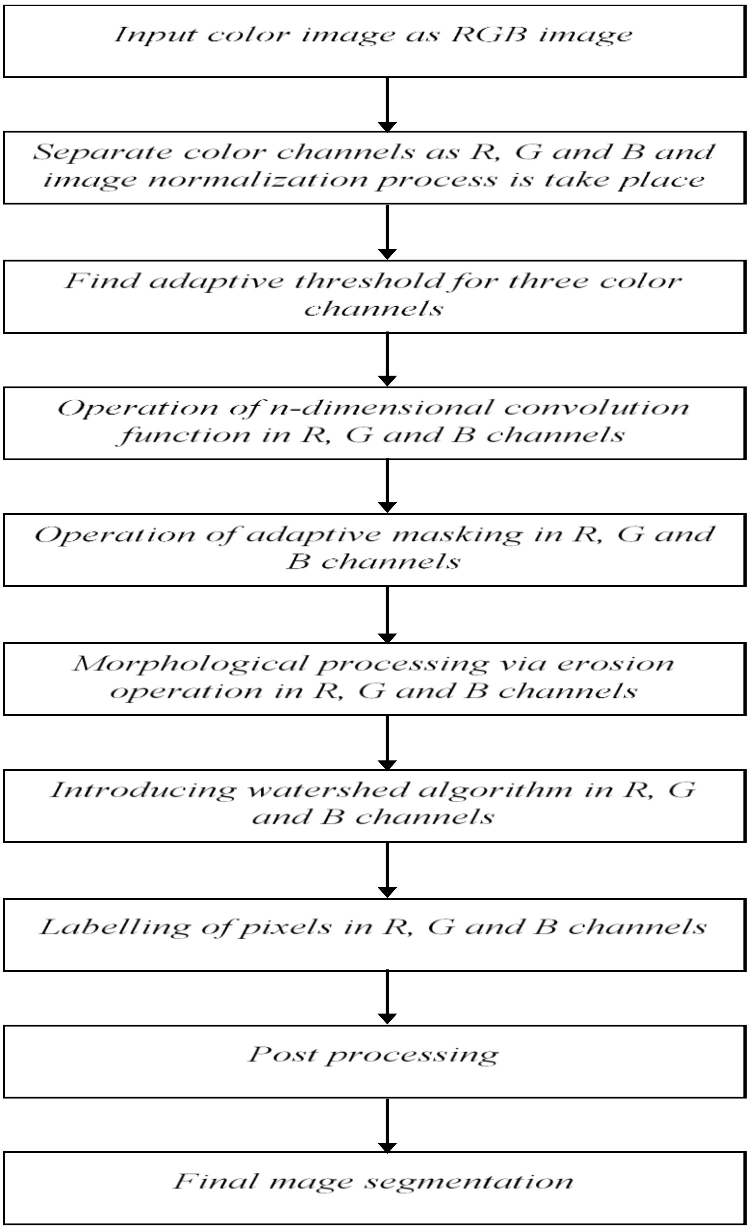

Fig.2. Diagrammatic flow of the proposed modified watershed algorithm

5. CONCLUSION

Tomato production is severely impaired by the outbreak of tomato diseases and pests in various areas. It can lead to yield loss or even crop failure if the monitoring is not timely. The solution to reduce the yield loss and decrease the application of pesticides is to grow pollution-free crops by avoiding diseases and pests. Early detection and elimination of outbreaks and pests is also quite significant. The conventional method of automated disease diagnosis and insect pests relies solely on the knowledge of the grower's assessment or asking for advice from experts. The proposed tomato disease prediction model through modified segmentation by using modified watershed algorithm and WDHOA optimization algorithm. Proposing a modified watershed algorithm in image segmentation phase with modifications provided in its steps by improved double sigmoid normalization and erosion operation. Proposing a novel hybrid training algorithm named WUDHOA, which is used as an weight optimizer of CNN classifier in classification model.

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