

Computing Amount of Disease in Crop using Artificial Intelligence



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Abstract: Rural creation is stricken by the disease of moribific operators inside the different yields, to upgrade profitability for profiting developing populace. Early assignment and the board of sicknesses abuse in vogue innovation become vital. A Crop that is stricken by various infections explicitly variety *Cercospora leaf spot, basic rust, scourge, and so on.* The sicknesses inside the harvest are known by perceiving the symptomatic examples on the leaves and picture process procedures are wide utilized for grouping such side effects, to achieve the undertaking, were acquired yield datasets from the open access Plant Village picture data. The photos are prepared to get connected math bar graph essentially based textural choices. The order of infections with the got alternatives is finished abuse multiclass encourage vector machine and counterfeit neural system. This examination also investigated dim level co-event framework essentially based textural choices for the grouping of illnesses underneath the shifted arrangement of the half breed module multiclass support vector machine and ANN. Characterization abuse the extra scope of highlight to yielding partner degree exactness of ninety eight credited explanation behind increment or diminishing in precision of recognizable proof of explicit sickness sort and sound leaf were furthermore offered.

Keywords: *k-mean Clustering, feature extraction, Multi SVM, ANN*

I. INTRODUCTION

The outside look is that the most noteworthy quality characteristic of agribusiness item, this external look enormously influences their motivation of offer cost and shopper's looking for conduct. Along these lines, the standard reviewing and evaluating frameworks square measure fundamental in rural field to develop brilliant sound harvest. Agribusiness yields are helpless to irritations and maladies which influence its development and generation. Plant illnesses likewise represent a risk to the pay of little holder ranchers and determination of sicknesses by ranchers is mistake inclined which results in the misclassification of Contaminations. Bogus conclusion of infections brings about the utilization of unseemly pesticides that outcome in further debasement of harvests and ecological contamination.

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The proposed framework concentrates just on rural harvests developed on an enormous scale for the motivations behind benefit and it can likewise be utilized by little scale cultivators of these plants. Every one of the illnesses are distinguished dependent on the picture of a solitary leaf of the influenced plant, while some of harvest plants have natural product that demonstrate the Disease also, so our point is to recognize the sickness at a prior stage before it influences the entire plant to diminish misfortunes. The proposed framework depends on Artificial Neural Networks (ANNs) and Multi SVM a prominent profound learning strategy utilized especially for picture characterization. This hybrid technique yield good accuracy with texture and grey level co-occurrence method for easy to identify disease with amount of affected region in leaf to take precaution of major damage to plant that reduces loss in agriculture. The main contributions of this paper are

- Model has five components: 1) pre-processing 2) segmentation and 3) Classification 4) Identification and amount of diseases affected in crop.
- In Pre-processing, crop leaf images are captured by using high definition camera. Images are converted into standard size for reducing resolution of image.
- Proposed method can ensure good accuracy and finding amount of disease in crop for further management of affected crop.
- In this work we have used hybrid model of Multi SVM and ANN technique for classification and identification of disease in crop is more accuracy compared to earlier work.

The remainder of this paper is composed as pursues.

In Section II, it describes the related work carried out. Sections III describe the proposed system model

and amount of disease. In section IV result and discussion, finally the conclusion on the proposed scheme in section V

II. Related Works

Various approaches had been talked about by different specialists in distinguishing and recognizing plant ailments. Smita Naikwadi [1]. The work proposes programming that assesses answer for programmed discovery and grouping of plant leaf infections. The accompanying two stages are included progressively after the division stage. In the initial step they distinguish the green shading pixels. Next, these pixels are veiled dependent on explicit limit esteems that are processed utilizing Otsu's strategy, at that point those green pixels are covered. The other extra advance is that the pixels with zeros red, green and blue qualities and the pixels on the limits of the contaminated bunch were totally evacuated.

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The created calculation productivity can effectively recognize and characterize the inspected illnesses with an exactness somewhere in the range of 83% and 94%, and can accomplish 20% speedup. Abdullah et al. [2] attempts to segregate a given infection (corynespora) from different pathologies that influence elastic tree leaves. The calculation does not utilize any sort of division. Rather, Principal Component Analysis is connected legitimately to the RGB estimations of the pixels of a low goals (15×15 pixels) picture of the leaves. The initial two head parts are then nourished to a Multilayer Perception (MLP) Neural Network with one concealed layer, whose yield uncovers if the example is tainted by the malady of intrigue or not. Lloret et al. [3] proposed a framework to screen the soundness of vineyards. The pictures were caught by methods for webcams dissipated all through the field. The principle goal was to identify and evaluate ailing leaves. Their framework has five phases: 1) leaf size estimation, which is essential because of the variety of the separation between the cameras and the plants. 2) Thresholding, which isolates ailing leaves and ground from sound leaves utilizing both the RGB and HSV shading portrayals of the picture; 3) a lot of morphological activities, meaning to lessen clamor without wiping out valuable highlights; 4) an identification step, which intends to segregate among ground and genuine infected leaves; 5) computation of the proportion of sick leaves. Contingent upon the estimation of this proportion, the framework radiates a notice that the plant requires some consideration. Contreras-Medina et al. [4]. The proposed a framework to evaluate five distinct kinds of indications in plant leaves. Their framework is really made out of five free modules; 1) chlorosis calculation, which joins the red and green parts of the picture so as to decide the yellowness of the leaf, which shows the seriousness of the chlorosis : 2) rot calculation, which uses the blue segment to separate leaves from foundation, and the green segment to recognize and evaluate the necrotic locales; 3) leaf twisting calculation, which uses the blue segment to section the leaf and ascertains the sphericity of the leaf as a measure for its disfigurement; 4) white spots calculation, which applies a thresholding to the blue segment of the picture to gauge the zone involved by those spots; 5) mosaic calculation, which uses the blue channel, various morphological tasks and the Canny edge finder to distinguish and measure the venations present in the leaf.

III. BLOCK DIAGRAM

The chart comprises of Image securing, pre-handling, division, highlight extraction and characterization methods which are utilized to recognizable proof and finding the measure of malady in harvest the design model is as appeared in figure

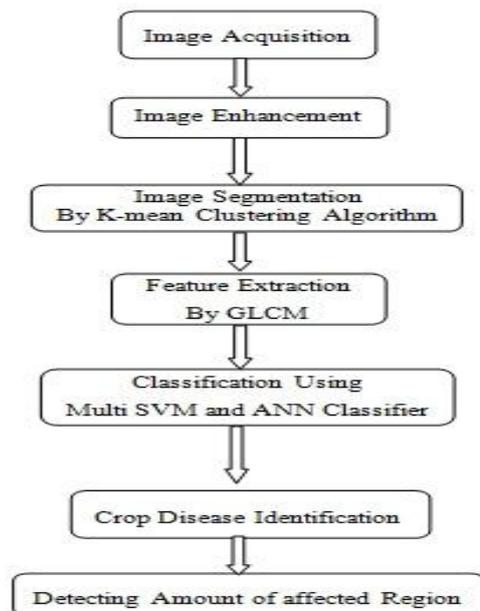


Fig 1: Block Diagram representation

Block diagram consists of six stages 1) Image acquisition 2) pre-processing 3) segmentation 4) feature extraction 5) classification 6) identification and amount of disease in crop for further treatment of crop based on amount of disease found in crop.

Image Acquisition: In this progression the disease leaf pictures of different yields gathered from computerized top quality camera in all around lit up lighting condition with appropriate separation is kept up to get great precision for picture preparing activities.

Image pre-processing: The fundamental Purpose of picture pre-preparing is to support the picture data contained undesirable twisting style of upgrade some picture alternatives for extra handling. Pre-preparing procedure utilizes various systems like unique picture size and structure, separating of commotion, picture change, improving picture and morphological activities. During this work, we tend to utilized various MATLAB code to resize picture, to fortify qualification and RGB to dim scale transformation for extra tasks like making bunches in division.

Image segmentation: The system for transformation of computerized picture into numerous sections and rendering of an image into one thing for simpler examination. Exploitation picture division is utilized for finding the articles and jumping line of that picture. In division, we tend to utilized K-implies grouping strategy for separating of pictures into bunches during which at least one a piece of group contain picture with real space of unfortunate part. The k-implies bunch algorithmic standard is connected to order the items into K assortment of classifications with regards to set of alternatives. During this investigation we tend to utilized division strategies information picture is isolated into three bunches for all time division result.

Feature extraction: Desired element vectors like shading, surface, and morphology and structure square measure extricated. include extraction is strategy for including scope of assets expected to clarify a larger than average arrangement of data precisely.

Connected math surface alternatives square measure acquired by dark level co-event grid (GLCM) equation for surface investigation and surface choices square measure determined from dispersion of learned power blends at the required position in respect to other people. Quantities of dark levels square measure important in GLCM moreover insights square measure classified into request of first, second& higher for scope of power focuses in each mix. Totally extraordinary connected math surface alternatives of GLCM square measure vitality .absolute entropy covariance arrangement of estimation of relationship, power focuses, entropy, qualification and opposite differentiation and differentiation entropy.

Classification: Support vector machine is anticipated on boosting the base good ways from the isolating hyper plane to the closest model. Solely paired grouping is upheld in fundamental SVM yet anyway augmentation multi class arrangement cases are potential. In these augmentations, extra limitations and parameters are square measure incidental to improvement issues for taking care of these segment of different the categories.SVM could be parallel classifier that importance the classification marks exclusively takes 2 qualities ±1.To get M-class classifiers, set of paired classifiers square measure made during this methodology f1, f2,..., fM and each square measure prepared for isolating one class from update. The gj(x) work restores the marked genuine worth that might be comprehended as good ways from partition of hyper plane to reason to x. Worth might be comprehended as a certainty worth. The bigger the value the extra guaranteed one is that the reason x have a place with the positive classification. Henceforth, dole out reason x to the classification whose certainty worth is biggest for the present. We have propensity to utilized every K-implies grouping and Multi SVM strategy for characterization and acknowledgment of leaf and stem malady. For making database, picture is non heritable and progressively settled pre-preparing, division; highlights extraction then ailment name is picked for given leaf or stem and keep going learning hang on in database.

Computing amount of disease

The segmental yield picture demonstrates the part of the leaves tormented by a chose infection. at that point the general influenced spaces are frequently determined by numeration the no of picture component esteems inside the yield picture the leaf cover produced is an image that explicitly isolates the leaf divide and consequently the whole foundation abuse the estimations of the immersion plane .this leaf veil may be utilized for finding the general leaf space of a chose leaf here a cost is determined that is named as measure of infection is

$$\text{Amount of disease} = \frac{\text{No of pixel output}}{\text{Total pixel in leaf}} * 100$$

On the off chance that the influenced worth is going to a particular limit worth, at that point an examination is made on the amount of room loaded with the infections. On the off chance that the value of influenced space is a littler sum than some limit, say 5 rates or less at that point it's famous that leaf or that particular plant is a littler sum loaded with the illness and more assignment is given and furthermore the un-wellness is nullified before. On the off chance that the

DR worth is bigger, at that point it's guaranteed that leaf is over as far as possible and furthermore the unwellness influenced become extreme. At that point that particular plant is supplanted from the arrangement of plants. During this methodology the sound plants is extricated out from a farm.

IV. RESULT AND DISCUSSION

We selected a different set of crop image for training, In pre-processing image is enhanced to increase brightness and contrast of a image, then input RGB image is converted into L*a*b* of color space L* Luminosity and Chromocity a*,b* image all color information will be in a*,b*.

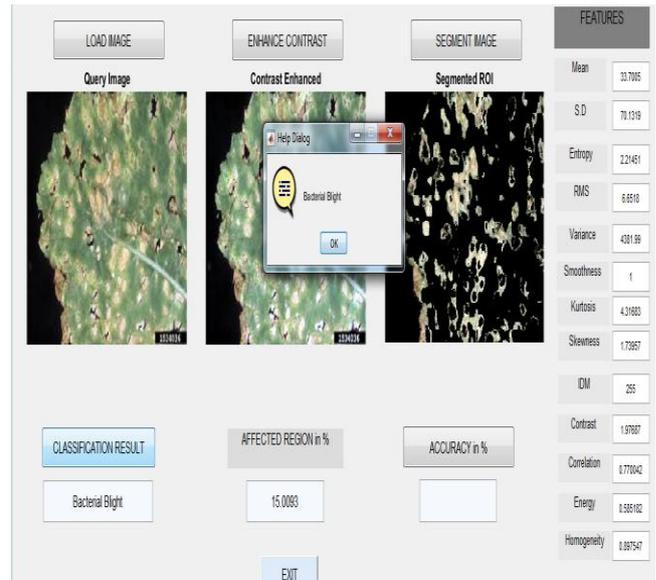


Fig 2.Crop disease identification and amount of affected region.

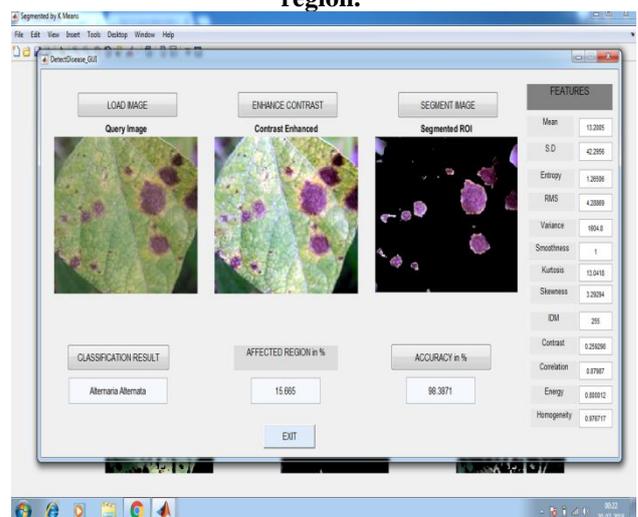


Fig 3.crop disease classification with feature extraction result

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In segmentation stage, increased result's is had the segmentation method ,in this stage it permit user to pick roi of three cluster .then selected cluster is applied k-means clustering these three color is split into three completely different cluster .If cluster in RGB kind that may be reborn into grey scale for to get GLCM matrix then grey value is employed for feature extraction consistent with options Multi SVM and ANN classifier are wont to show classification result then affected region can be calculated by enumeration variety of constituent of affected malady with space of crop .accuracy may be calculated with five hundred iteration of depth analysis to urge high accuracy.

Table1.Feature extraction result

S.No	Disease Crop Name	Mean	S.D	Entropy	RMS	Variance	Smoothness	Kurtosis	Skewness	IDM	Contrast	Correlation	Energy	Homogeneity	Accuracy (%)
1)		13.20	42.195	1.28806	4.2886	1604.8	1	13.0418	3.29294	255	0.2593	0.87987	0.80012	0.976717	98.387
2)		14.98	48.756	1.31056	4.9373	2262.46	1	13.7375	3.40321	255	1.33877	0.626291	0.76092	0.934336	96.742
3)		33.70	70.131	2.21451	6.6518	4381.99	1	4.31663	1.73957	255	1.97687	0.770042	0.58518	0.897547	96.7742
4)		75.77	84.311	4.85136	11.224	5643.43	1	1.7579	0.536913	259	0.918256	0.24908	0.91	0.91	97.423
5)		45.27	61.345	4.05368	10.350	3217.49	1	2.38513	0.959697	255	0.28782	0.957281	0.3632	0.95727	95.1613

V. CONCLUSION

A picture preparing calculation to discover the disease recognition and recognizable proof is proposed. The harvest leaves are taken as the arrangement of leaves in identifying leaf illnesses. The calculation creates better outcomes and sound and unfortunate harvest can be separated with the assistance of this calculation. With this picture examination strategy great sound yield can be separated out from a developing homestead which builds the efficiency and the nature of the plants likewise can be guaranteed. This calculation helps in distinguishing the nearness of illnesses by watching the visual side effects seen on the leaves of the plant.

work or suggest applications and extensions.

REFERENCES

1. Naikwadi Smita, amoda Niket. Advances in image processing for detection of plant diseases November 2013.
2. Garcia Jayme, Barbedo Arnal "Digital image processing techniques for detecting, quantifying and classifying plant diseases 2013
3. Davidson K., G. Ishitsuka, N. ; Mohri, N. Uratsuka S."Automatic rice-crop mapping using maximum likelihood SAR segmentation and Gaussian expectation maximization". IEEE 2002
4. R. Mrunalini, R Prashant: An Application of K-Mean Clustering and Artificial Intelligence in Pattern Recognition for Crop Diseases 2011.
5. Pang Jun, hong-yingBai, Shao-kun LiJun-chenLai,. Automatic segmentation of crop leaf spot disease images by integrating local threshold and seeded region growing Oct. 2011,
6. 15.Christine M. Onyango, J.A. Marchant. Segmentation
7. Zhou Yingfeng, Wang Yaming: Segmentation of rice disease spots based on 2010.
8. Nedeljkovic: Image classification based on fuzzy logic. The International Archives
9. of the Photogrammetry, Remote Sensing and Spatial Information Sciences.
10. Nithya A, Sundaram V, 2011: Identifying the Rice diseases using Classification and Biosensor techniques. H Tushar Jaware, D Ravindra, Badgujar and G Prashant Patil: Crop disease detection using image segmentation 2012,

11. Rashad M. Z. ,el-Desouky B.S , and S Manal .Khawasik : Plants Images Classification Based on Textural Features using Combined Classifier August 2011.
12. Gang Stephen Wu Forrest , Bao Sheng: A Leaf Recognition Algorithm for Plant Classification Using Probabilistic Neural Network.
13. 9. Robert Cannon,.Dave L, V Jitendra, J. Bezdek C:1986
14. Segmentation of a Thematic Mapper Image Using the fuzzy c-Means Clustering Algorithm.
15. Zang Jing Image Segmentation Using Possibilistic : C Means Based on Particles warm Optimization 2009.
16. Zang Jing, Bo Li : Image Segmentation using fast fuzzy c means based on particles warm optimization 2010.
17. Delfrate,SchiavonF,Borgeaud,.; Crop classification using Multiconfiguration
18. Solberg, , Taxt S, Jain T: Markov random field model for Classification of multisource satellite imagery.

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