Classification of Rice Leaf Spot Disease using Local Binary Patterns

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Abstract*: The fundamental objective of this work is to develop an image processing framework that can perceive a proper methodology for ContentBasedImageRetrieval(CBIR) in Leaf Inadequacy. The salient point selection concept is utilized by selecting the Salient points from the edgy image and the concept of inter-plane relationship method is imposed, LocalBinaryPatterns (LBPs) are computed with respect to the center pixel of the salient point. The research work consists primarily of three sections, namely representation of the leaf image, extraction of features and classifying. During the extraction process of the application the most important and special features of the image are retrieved. The image is contrasted with the data base images in the classification phase. The surface of the plant leaf is divided into smaller regions using which the LBP is obtained and the combination of them produces a single feature vector. An accurate model is constructed by this feature vector which is used to measure differences between flawed and healthy plant images.

Keywords: Edgy Salient points Local Binary Patterns (LBPs), Content-Based image retrieval (CBIR); Leaf Deficiency (LD);

I. INTRODUCTION

In agricultural products, pathogens are the main cause of reduction nor decline in both agricultural product quality and output production. So early-stage disease diagnosis is incredibly important to cure and control. Farmers put a great deal of effort into picking the best plant seeds and also provide the right environment for plant expansion, although there are many diseases that affect plant end in disease. In agriculture, it is important to get the batches of plant disease in the initial stage of development so that allows us to mitigate the damage, decrease costs and improve income.At occasions, the human eye alone is not that successful in detecting the appropriate plant sickness.

In ancient days, farmers tended to pursue unpredictable perception by specialists of tests on influenced unhealthy plants or experts continued to inspect the farm and farmers made the remedial step to resolve the diseases of the plants based on their proposals..

Revised Manuscript Received on April 30, 2020.
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Searching for trust worthy expert is very challenging in this process, and the strategy doesn't work well for the major fields either, the technique requires a while.Perhaps the approach is also a costly way, because it requires constant professional supervision.

Agriculture is that the heart of any country's economy, and then proper and timely recognition of diseases of agricultural products,is incredibly important. So, we would like some automated, quick, reliable and less costly methods of disease detection.Current technical development in the area of digitalimage analysis and can assist farmers as regards pesticide cost reduction. In agriculture products, there are mainly two kinds of factors that cause diseases; living and non-living agents.

CBIR method is now proven as most useful approach to identify the unhealthy leaf in the initial diagnosis of plant diseases. The image effected obtained from collection of different kind of plants are very apt and approriately useful data used by image processing techniques to identify plant diseases. The CBIR cycle mainly consists of two phases. First phase is the extraction of features and second is the matching of queries. Features such as image color, form, and textures are extracted in feature extraction and 52.40 generation of Feature Vector takes place. Feature vector is a structured and complex image. Query matching is the second method in CBIR based on the calculation of resemblance that uses the query distance to each image in the repository to find the image closest to it.

II. LITERATURE REVIEW

Rupali S.Zambre[1] suggested a technical strategy framework of Cotton Leaf Spot symptoms that are captured using a mobile and categorizing the unhealthy plant leaf diseases using support vector machines. The classifier is being trained to achieve smart farming including early disease detection in the groves, selective application of fungicides, etc. This envisaged analysis is based on Segmentation Tech-niques in which, the collected images are synthesized for enrichment. Extraction techniques for texture and color function are then used to extract features such as boundary, form, color and te xture to distinguish disease spots.

Wang et al.[4] developed a new predictive thresholding algorithm for real-time classification of a single leaf obtained from a video system;Morphological and conceptual operators have been used to derive the leaf edge form recognition algorithm. The edges cut out were clear and precise.

Fuzzy selection functionality approaches fuzzy curves (FC) and surfaces (FS)-it is designed to select aspects of the cotton disease model of the leaves.

A significant percentage of autonomous notable features is defined using the fuzzy collection method to get the best knowledge for the diagnosis and detection. [3]Identification and classifications of the rice disease including RBLB, RSB, and RB. Spots of rice disease were effectively segmented.
According to spots of disease color and outline.The spot of disease was derived from four shape characteristics (rectangularity, robustness, deformation and roundness) and texture characteristics (juxtaposition, homogeneity, instability, reversible difference and repetitiveness correlation)[2].
Lietal.[5] suggested a realistic solution to the treatment of veins using an IndependentComponentAnalysis (ICA) with which Using ICA, a set of features or linear leaf-dependent functions has been extracted from clusters of leaf images.The resulting linear basis parameters were used as sequence maps in leaf vein extraction. Ayane et al.[6] wrote an algorithm for calculating the area of cotton leaves. In this leaf area algorithm calculating number of pixels was determined. As a calibration point, a one rupee coinwith known area was used to convert the pixel count into area.
Ajay Gurjar & et al. (et al.)[7]. The Red Zones, Leaf Deform and White Zones were identified in this paper using the regularization and ex-traction techniques of the Own features.They are capable of achieving 90 percent accuracy in detection of Red Spot (Fungal Disease) with the suggested algorithm. SachinDKhirade&etal[8]. In this article, authors highlighted various stages of disease detection such as image creation, pre-processing and image segmentation, extraction and feature classification.In addition, they explored the various methods used to identify plant diseases using photographs of the leaves.

The application of image processing has been broadly used in agriculture in recent years. Li Ming[9] used the improved dynamic threshold segmentation approach in image processing to extract the wheat leaf area in the image and measure the index of the leaf area, the absolute difference with the true area value was less than 0.1, and the effect was good;To acquire the diseased region of the cucumber leaf, Wang Shuwen[10] used image processing and the BP neural network to identify the diseases. The overall accuracy of the identification was 95.31 percent. Zhang Nannan [11] utilized image processing to identify the fragments of mildewed corn and the right detection rate of over 87.5 percent; By image processing, WuLulu[12] extracted rice blast lesion, the detection rate was 90.26 percent, the result was better.

Former scholars have begun researching the existence of a diagnosis of rice potassium feeding in recent years [13-15]. For the comprehensive diagnosis of leaf potassium, Shi Yuanyuan[13-14] used the image processing to achieve the rice leaves shape, colour and texture characteristics. The third fully enlarged leaf was found to be higher than the first fully expanded leaf, and the accuracy was tested using the matrix method of error analysis. The cumulative accuracy of the identification was 96 per cent, and the result was higher. ChenLisu[15] conducted a potted rice research, obtained the spectral, spatial, and shape character of rice leaves through image processing and developed rice potassium nutrition diagnostic model.

III. METHODOLOGY

Our latest CBIR approach for LD pictures has twophases of image handling in the initial section, splitting R-G-B picture planes and implementing edge recognition method on each plane,selecting one of the planes as a center plane in the second part and discovering the emphasis on theplane where edge occurs. After assortment of each such level, we maneuver to stay two planes thinking about the current scheme as base areas of focus. The areas are linked to two certain planes being focussed on the base code. Using all the pixels contained as center pixels, we extricate 3x3 pixel grids. At this stage, we identify LBP from those channels and create a feature vector. We used sobel edge retrieval technique on endoscopic plant images.The sobel operator conducts a 2-D calculation of the spatial gradient on an image, highlighting regions of high spatial frequency corresponding to the edges.Ojala et al.[16] suggested that the LBP be graded in texture. We used that term for plant leaf image function calculations. For such a specified center pixel gray color, the LBP intensity value is calculated by comparing it to its nearest neighbours, as seen in Eq. 1.

$$LBP_{p,q} = \sum_{i=1}^{p} 2^{(i-1)} \times f_1(g_i - g_c)$$

Where,

$$f_1(x) = \begin{cases} 1 & x \geq 0 \\ 0 & else \end{cases} \quad (1)$$

In which the gray value of center pixel is gc, gi is the neighborhood's gray value, P is the neighborhood size, and R is the neighborhood distance.

Key-point selection approach is implemented, we consider a multi-plane interaction between the three planes of the fundus image using this method. The edge detection method is implemented to G-Plane. Estimation of histogram after pattern estimation is performed using Eq. 2. This LBP map histogram is stored to the image as a feature vector.

$$Hist(l) = \sum_{i \in M} \sum_{j \in N} f_3(LBP(i,j), l) \qquad l \in [0, 255]$$

Where,

$$f_3(a,b) = \begin{cases} 1 & if\ a = b \\ 0 & else \end{cases} \quad (2)$$

Our main purpose is to select the right images near to the questionnaire image. This strategy involves selecting n top matching images by measuring the gap between the sample image and the rest of the repository images. To suit the photos we used a distance metric of 1 d similarity, measured using Eq. 3

$$D(Q, DB) = \sum_{q=1}^{N} \left| \frac{f_{DB_{p,q}} - f_{Q_q}}{1 + f_{DB_{p,q}} + f_{Q_q}} \right| \quad (3)$$

IV. IMPLEMENTATION DETAILS

Recognition of plant leaf deficiency is not a simple problem, as an unfamiliar plant,the picture shown during the extraction process cycle is typically different from the picture of the plant shown during the classification method.

Although local binary patterns have been derived from the plant object for deficiency recognition, there are many uses of the plant image in the database compared with the source field picture. The picture of the plant relies on the external light and on the ambient conditions.The problems should be solved in the research work which is scalable and effective.

The feature vector is essentially a facial description on three separate locality levels: the labels give us information on pixel-level patterns; the regions in which the various labels are summed up contain information on a small regional level, and the concatenated histograms provide a global definition of the plant leaf. The methodology of local binary patterns to integrate plant leaf deficiency detection is used to introduce the analysis of plant leaf deficiency in this work. Local Binary Pattern works on local features using LBP operator that specifies a face image's local particular structure LBP is characterized as a set of instructions for binary pixel intensity differences between both the centered points and the 8 margins around them.

Input: source plant leaf image collection Series

Output:The Value and classification attributes derived with the help of the plant image and compared with centered point of healthy leaf image.

1. Initiate the value of the variable Temp_Val=0 .
2. Start the cycle-ForLoop for every image s in the source training file.
3. Initialize the sequence of histograms, and assign value to the variable hist=0
4. Select All centered pixel points with Ts Є s
5. Optimize ts, LBP (1)-Pattern Label
6. Corresponding bin increment is performed by 1
7. End of the FORLOOP
8. Take the most elevated LBP trait for growing Image plant and combine it into an unified standard vector.
9. Equate it with the sample image of a healthy plant and classify it as healthy and unhealthful

V. CONCLUSION

The envisaged method is solely based on the edgy images which are selected and computed based on the salient point selection theory and LBP attribute calculations using inter-plane interaction methodology, further coupled with original picture color characteristics. We're choosing n best images near to the query item. This method involves selecting N top in terms-related images by calculating the database distance amoung the sample image and the object image. This consists mainly of three sections, namely representation of the plant, extraction and classification of features. The most useful and specific plant image features are extracted during the extraction process of the application. The deficient plant image is compared with the healthy database images in the classification phase and returned. There is potential for progress in total performance inthe future scope. We were unable to enforce certain goals because of time constraints which should have made the study work a better proposition.

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