Research Article

Detection Of Disease On Plant Leaves Using Novel Structure Algorithm

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Abstract: The production of Indian crops is affected with pests in large, which enters at the root level and on leaves as well. Plant diseases cause huge damage to crops in turn creates economic losses for the country. Through early diagnosis, identification of disease helps the production to improve remarkably. Large crops are damaged and left over every year due to the rapid infestation of insects. Performing early diagnosis is bit difficult on infected plant leaf and it is due to the symptoms of several resemblance diseases. New novel technique is proposed here to identify the types of diseases in plant leaves due to pests. Images of leaves affected by certain diseases are taken as samples for preprocessing based on the structured algorithm. The image is detected based on the looking edges and further it has been enhanced. Images detected by the edges will be taken in to advanced fuzzy k-means clustering for segmentation. Subsequently, the color features are extracted, then the processing of correlation, entropy, texture features such as energy, contrast, edges, etc are also performed. Then, the image features are compared with the ordinary leaf image. Finally, the exact disease detection and medical related diagnosis will be finalized based on the novel algorithm. The way of detection of disease on plant leaf is purely based on the advanced technique which is adopted here, when compared with previous techniques. The algorithm is framed and simulated in MATLAB.

Keywords: Plant leaf, Segmentation, the K-means clustering, C-means clustering, Matlab.

1. Introduction

The important process in implementation of this technique is effective creation of image signaling algorithms. With consideration of different domains, the image is digitally divided. Many image-signaling techniques are developed by researchers at various stages to analyze the pictures and take decision based on the information extracted. The parallel algorithms of these serial processors are struggling with the traditional approach. The novel approach to be presented here is one of the prominent image signaling techniques linking algorithms on hardware devices for effective compilation process.

Tracking and binding cells are elaborated here[1], discussion of tracks is based on the Viterbi algorithm, is presented in [2]. Different cellular signaling techniques discussed in [3]-[5]. Using the time-lapse microscopy value and extraction of image [6], to quantify many different aspects of cellular behavior such as [7] [8], (cell division) and Mitosis Apoptosis (cell death), and migration is important in cancer study [12] [13], Ambreognisas [14], [15], stem cells [16]-[18], and many other aspects of cell and developmental biology. In the Opening works [9] [14] Cell scattering microscopy, and images were seen in appropriate spaces, taking advantage of hand sketches or situations in which the main unit of interest in a registered properties check-in was continuously in the same place. Today, a large number of support microscope strategy available in needed, as these cells can identify an opportunity for the horns and four fluorescent or color proteins, is a plus for the use of 2-D or 3-D images of Camera to record the picture. The manual operation can be done by making a test and can be used by most difficulty, it must reproduce, even as often as these discoveries are called by the representative who can make these four subjective wishes. For these reasons, the surgery will be carried out on a large scale. In the survey of different algorithms [19] are explicitly done. Medical surveillance, Research domain, authorization, processing of particular image area, machine-driven review and a number of areas to be optimized on the leaf with much importance depends on applications and dynamic location. It is also recognized as a completely different image and objects for demand. In this way, common purpose applications are run on a computer that is often simple, however, due to subsequent constraints on different processing memory prefer devices with time constraint. Farmland is the most important source of human livelihood and security for economic growth of a nation. It is very important for food consumption and human existence, but also an important role in the economy of the country is to do trade with other countries. It is essential to get agricultural products to be produced in both the quantity and quality irrespective of diseases affective plants. More specific problem in affecting production is due to rapid change in climate and in turn insects' formation. To reach the goal of better production, the raise of insects on the field must be reduced by farmers today. Around the world, millions of dollars are invested in agricultural production, crops and providing good healthy products [20] to serve the common people. Bio-harmful insects will affect the crops and gives extensive damage and lead to the loss of crops, this should be avoided.

Country like India, almost 18 percent of agricultural production is affected every year, due to insect attacks and leads to loss of about Rs. 90,000 million [21] value. In the olden days, manual techniques are vastly used like insects are monitored by using black light traps, monitor sticky traps and find shapes of insects. Manual monitoring techniques and the usage of time to find insects are depends on the availability of human being, these are all subjective for the expert. In many cases, it is seen on the trunks of plant diseases or depends on insects. Thus, the plant, leaves, insects or diseases are the proportion of symptoms which plays a key role in the successful cultivation of crops. In general, the factors that can lead to death and destruction of plant disease are of two types, as discussed in [22]. Various methods of identifying different diseases were discussed in [23-28].

2. K-Means Algorithm

Description of basic structure of K-means clustering is discussed here, Let $A=\{ai|\ i=1,\ldots,f\}$ be attributes of *f*-dimensional vectors and $X=\{xi \mid i=1,\ldots,N\}$ be each data of *A*. K-means clusters which indicates X is SK = {Si | I 1, b..., = k} where M is mi εx = {M = 1, n (SI), the... J |} SI members, where *n*(*si*) is number of members for *si*. Each cluster has cluster center of $C=\{ci \mid i=1,\ldots,k\}$. The following steps will be involved in the K-means clustering algorithm [29-31]

1. Generate the random starting points with centroids C.
2. By utilizing the Euclidean separation, discover the separation 'd' between X to C.
3. Ascertain the base d (xi,C) from the partition of xi for i=1...N into.
4. Ascertain the new centre ci for i=1...k characterized as:

$$Ci=\frac{1}{ni}\sum_{j=1}^{(si)} mij \in si \qquad (1)$$

5. Rehash the procedure stage 2, until the point that all centroids are concurrent.

The centroids here, if they do not change its position, it will be said as converged in a particular cycle. Additionally, it may stop in the t emphasis with a threshold ε if those positions have been refreshed by the separation underneath ε:

$$\left|\frac{c^t-c^{t-1}}{c^t}\right|<\varepsilon \qquad (2)$$

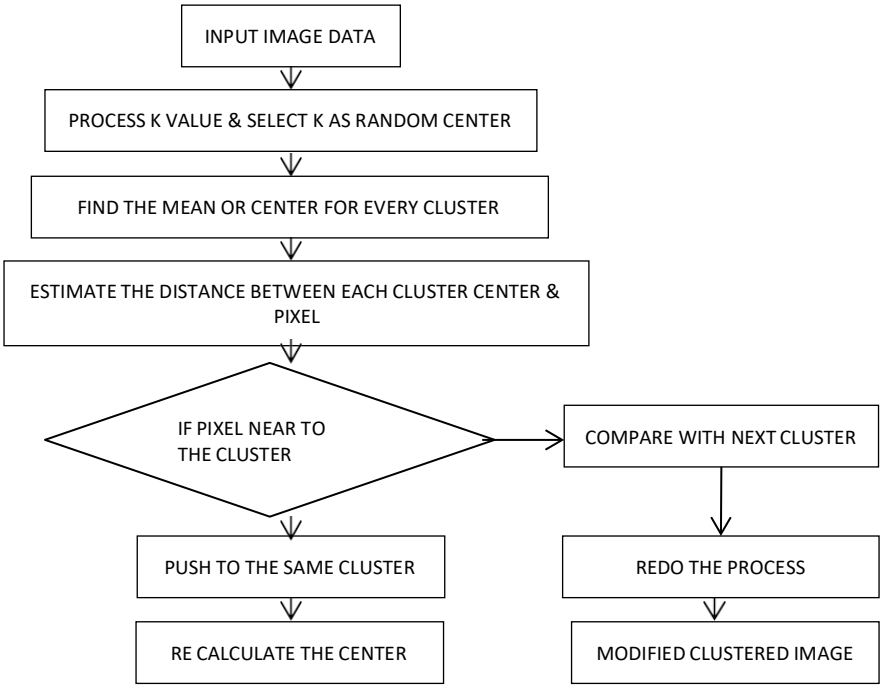
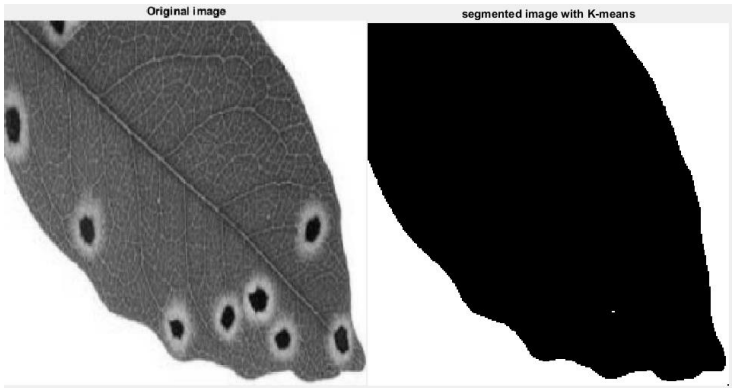


Fig. 1. K –Means Clustering Algorithm



(a) **(b)**

(c)

Fig. 2. (a), (b), (c)Segmented leaves through K –means clustering algorithm

3. Fuzzy C-Means Clustering

Fuzzy logic starts to process the data through partial membership in reflection and it is a method of assigning each pixel value. Fuzzy membership in the set value and it lies in the range of 0 1. The fuzzy cluster basically allows a multi range logical values, such as the intermediate I. E., a member of the same member can be set in fuzzy sets of blurred picture. If any transfer occurs between Full memberships to Non-membership, it is the bad transfer. An image of a fussiness function is in the form of any figure and also has a membership in information part to define. The membership function that is involved always contains three main primary attributes. It has support and restrictions. The core member is set to be completely opaque. The main subscription is supported by a non-intermediate or partial subscription, and it is a border, which is set to value between 0 and 1 [31].

Unknown logic in fuzzy clusters is that the each cluster location, entirely defined as just one degree from a cluster. The cluster is on the periphery of the clusters, with fewer points that is related all points. Each point x is given as its status as those are in the kth cluster$u(x)$ digital head. The contribution coefficient for any given x1 is usually clear:

$$\square\, x\ (\sum_{k=1}^{num,cluster} x_k\ (x) = 1) \qquad (3)$$

Fuzzy C-means clustering which includes all points with a cluster of its degree of leverage over, it means:

$$center_k = \frac{\sum_x uk(x)^m\, x}{\sum_x\, uk(x)^m} \qquad (4)$$

The distance to the cluster center is related to the inverse state:

$$u_k\,(x) = \frac{1}{d(center_k,x)} \qquad (5)$$

Then coefficients are a true parameter to foisted distribution > 1, so there is 1.

$$u_k(x) = \frac{1}{\sum_j \left(\frac{d(center_k, x)}{d(center_j, x)}\right)^{2/(m-1)}} \quad (6)$$

The equivalent of (2 ms) for coefficients to equal their movement to 1 along a linear normalizing. Whenever 1 m is close and the cluster closest to the center at this point is much more weighted than others, and it is similar to the K-means algorithm.

Fuzzy C-means algorithm and K-means are similar with slight modification as follows:

Select the number of clusters.

Clusters assigned to go to each endpoint are Laky coefficients.

Repeat algorithm (that is, the change of the threshold of coefficients sensitivity between two positions is from others): • Calculate center for each cluster using the formula above.

Using the formula above, calculate their coefficients for each location in the clusters.

Intra-cluster analytics K-means is less than the Fuzzy C-means algorithm, however there are some problems raised. Like in the same way, there is at least one local minimum depending on weights and the initial selection of results. In a more orderly way, the statistics algorithms Mksmyazaon expect some of the following to be views: Partial membership in classes. The precedence is given to the properties and simple Fuzzy-C-means.

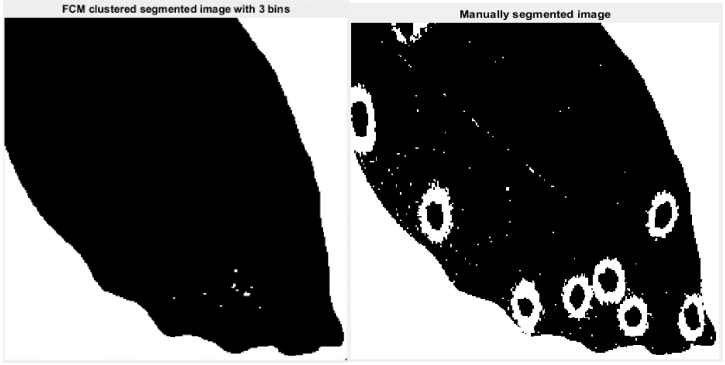


Fig. 3. Segmented leafs through C–means clustering algorithm

4. Proposed Segmentation Method

The proposed Novel structure algorithm starts with preprocessing of the image. At first, what is the average used for preprocessing should be removed from digital photos using filter noise and for enhancement of image quality, before that edges of the image will be detected first. The product of the first phase helps us to identify the margins of the image, and then its K- i.e. the segmented generation mines of the cluster image. Now, the fuzzy cluster signaling accuracy and precise detection of the cancer disease of the capsule will be applied to the product of leaf images with the improve K-roots. The algorithm that steps up for the proposed system is shown in the block diagram figure 4.

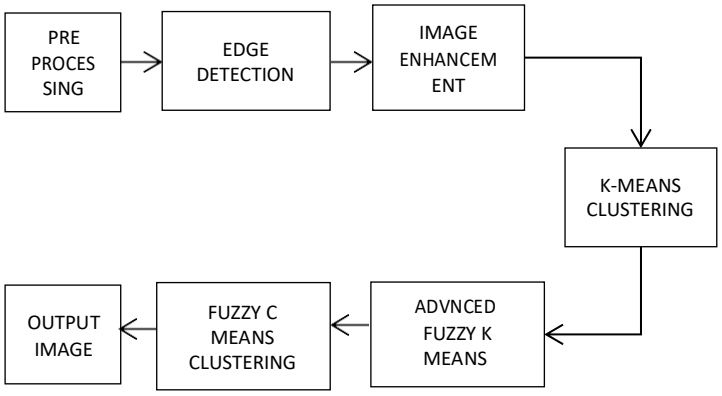


Fig. 4. Proposed system block diagram

5. Simulation Results

Like other systematic procedures, here also maintaining of a database for disease affected leafs is required. Identified plant disease using plant pathology (Phyto-pathological) is carried out and its experiments modules are developed using MATLAB R2014a. Two species of samples are taken for the experiment, whose digital images are obtained by a high definition camera. Fig. 5 to 6 shows the species type and numbers of leaves images for these species.

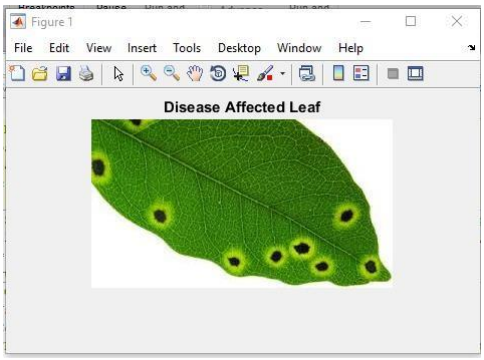


Fig. 5. Disease affected leaf from the dataset

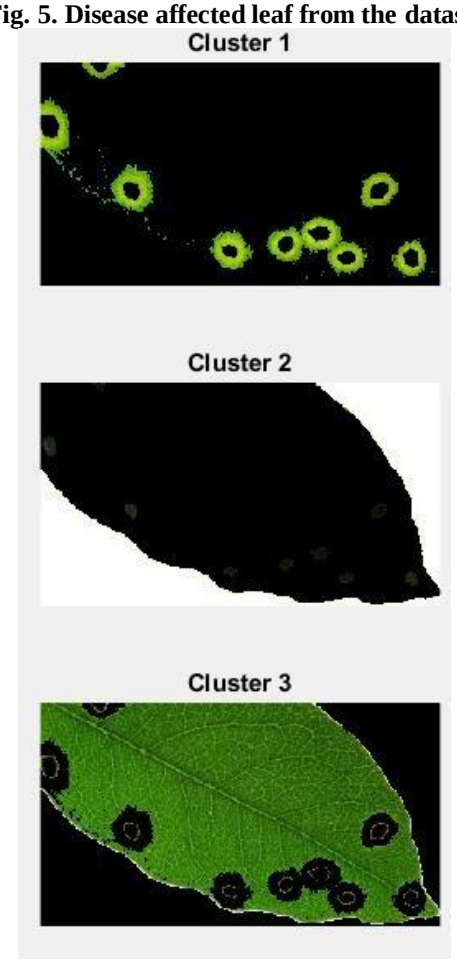


Fig. 6. Cluster indexes after segmentation process

Table 1 Comparison

S.NO.	SEGMENTATION METHOD	TIME(Sec)
1	K-MEANS CLUSTERING	3.625
2	FUZZY C-MEANS CLUSTERING	4.0625
3	NEW NOVEL STRUCTURE ALGORITHM	2.03

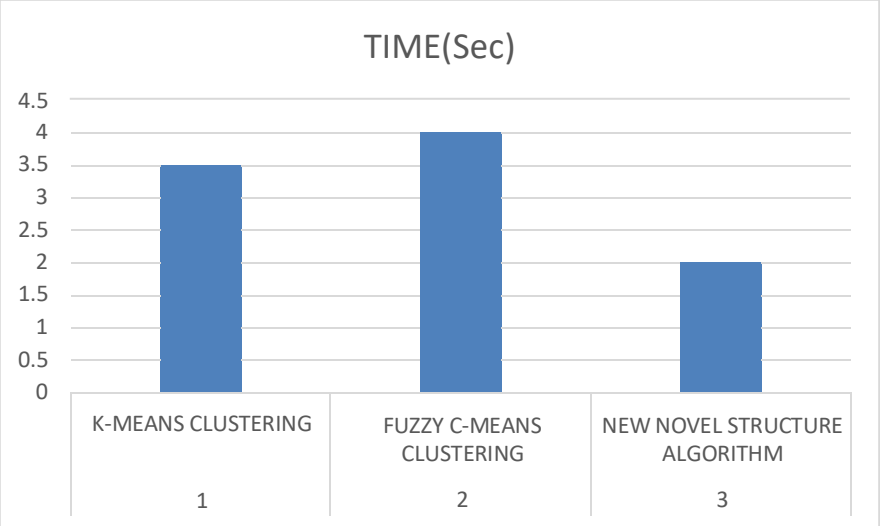


Figure 7. Comparison between the segmentation techniques

6. Conclusion

The proposed novel algorithm describes that the discrimination between healthy and diseased crops using an advanced segmentation algorithm is found. Respectively, the applications of k-means grouping are also formulated for the grouping and classification of diseases that affected the plant leaves. The identification of the disease is carried out in a systematic algorithmic way which is specified. Thus, the proposed algorithm has been tested on many diseases that influence plants generally, those are: Leaf stain and leaf minor etc.. These characteristics are very important for the color and morphology of leaf spots. And, it helps to provide critical information about its visual representation. Using the segmentation technique, it is easy to extract the characteristics of the disease leaf from the image.

A new technique which is discussed here to first detecting edges in the proposed system shows better results than existing techniques. For a future study, different neural network architectures can be used for classification. Also, extension of this project to classify the disease symptoms affected on fruits, vegetables, commercial crops, etc. also possible. Based on this research process, better application-oriented database can be maintained for the common people to have entire database of affected plant diseases. This way helps the people, where anyone can download the image in order to find sick and all the information about the disease. Based on this, judging of their fields and crops affected with what kind of disease is possible and accordingly remedial action could be done.

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