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FPGA Implementation for Detection Disease on Cotton Plants Using Advanced Image Processing Algorithm

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ABSTRACT: The foremost difficulties facing by the agricultural crops in India are due to pests disturbing their roots and leaves. Plant diseases cause significant damage and economic losses in crops. The improvement is necessary consequently for the reduction in plant diseases by early diagnosis, results for the production to improve. Huge crop get wasted every year, because of rapid infestation by pests and other insects. Diagnosis is really difficult for infected cotton plants, reason is variety of symptoms for the diseases. In this research, we have used a new technique to identify the pest & type of disease in cotton plants. Images of leaves affected with some disease will be done first with pre-processing. Images are then subject find Edge detection. Edge detected images will be given to Advanced fuzzy K-means clustering for the segmentation. Then, the feature extraction will be done for the color features, correlation, entropy, texture features such as energy, contrast, edges are extracted from the leaf image, then compared with normal cotton leaf image. Finally decision of exact disease will be shown. So, it is very easy for the diagnosis. The proposed technique is very advanced and is compared with existing techniques, the time taken to analyze has decreased by 40% if we compare with C-means, 52% if we compare with the K-means clustering. Code is written Matlab and simulated in Matlab IDE.

KEY WORDS: Cotton Plants, Segmentation, the K-means clustering, C-means clustering, Matlab.

I. INTRODUCTION

This process is an important technique in maximum image signaling algorithms. If you look at these different areas, the picture is digitally divided. Many image signaling techniques are developed by researchers who develop those photos, and are formed as easy to judge by Swash. Parallel algorithms in these serial processors have trouble with the approach. It's a new paper literature review of the main image signaling techniques link algorithms on hardware devices and want to continue.

Tracking and linking cells [1], it's clear that the discussion of the tracks is based on the Viterbi algorithm, is in [2]. Different cell signaling techniques discussed [3]-[5]. Can use the time lapse microscopy value and extract [6], to quantify many different aspects of cell behavior such as [7] [8], (cell division) and Mitosis Apoptosis (cell death), and the migration is important in the study of cancer Morfalwaji [12] [13]], Ambreognisas [14], [15], stem cell [16]–[18], and many other aspects of cell and developmental biology. [9] In the opening works [14] The cell broadcast microscopy, and the pictures were seen in the appropriate spaces, taking advantage of hand sketch or situations in which the main unit of interest in a plane taped record properties was continually in the same place. Today, a wide number of available supporting microscope strategy is required, as these phones may identify an opportunity for the cors and four fluorescent proteins or color, plus skkisance for the use of 2-D or 3-D images of the-camera to record the indent A chance. The manual can be done by test run and can be used by the big most difficult, must reproduce, even as often as these discoveries are the appeal by the representative who can make these four subjective wishes. For these reasons, the surgery will be conducted on a large scale or on the Robotheid semi Robotheid system of interest. In the survey of different algorithms [19] explicitly stated.Medical surveillance, search, authorization, a process image area,

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machine-driven business review and a number of areas with plenty of our daily life, like the ever growing tide of applications and dynamic location. It is also recognized as a completely different image and objects for the request. In this way, a common purpose applications are run on a PC that is often simple, however, due to subsequent constraints on different memory and blond prefer devices, the time is not validated.

Agricultural lands are the most important sources for human sustenance and security. It is very important to food consumption and human existence, but also an important role in the economy of the country does not only a big plays. But it tended to get agricultural products can be created in both the quantity and quality of plant diseases in a dilemma as is. Many important problems to get better production cause of rapid change in climate and insects, to get better production, the level of insect insects need to reduce unexpected level farmers today. Around the world, millions of dollars in crops, agricultural production and good, healthy production [20] to protect are spent. A bio-insect pests and crops, such as wrongdoers, which otherwise widespread damage and lead to the loss of crops is concerned to protect. Such as India, nearly 18 percent of the crop production each year due to the attacks of insects is a country situated in lost approximately Rs. 90,000 million [21] value. Traditionally, manual techniques, the insects are used to monitor black light traps, sticky traps monitor and insects to find forms. Manual monitoring techniques and the use of time for insects to find the availability of a human are subjective to the expert. In many cases, is seen on the trunks of plant diseases or insects, or address. Thus, the plant, the leaves and insects or diseases get out of search, or insects or insects disease incident, attacks, the proportion of symptoms plays a key role in the successful cultivation of crops. In General, factors which can bring death and destruction to there are two types of plants. Living (biotic) and nonalawang (abaotek) agent [22]. Identify methods of different diseases have been discussed [in 23-28].

The chip fabric created around makes it problem. There are 10 types of hardware devices and a PC between design and display, according to Isak. 10 Dedicated laptop computer, C or the assembly code for best display, usually with this program. It is a very complex picture for the scientific discipline of nature, which is in the process of intensive tasks. Hardware design electronic retention, but less often than the will to learn that design curve of an alternate route is higher on a FPGA technology such as equality and pipelining such as hardware design techniques, which is the design of dedicated DSP capability Not. Image processing Rikonforabla on algorithms for the market value of hardware downtime, allowing faster and simpler debugging and verification of Potting complex. So the system implementing the real time image processing alternative is FPGAs.

II. METHODOLOGY

A. K-MEANS ALGORITHM

Here we discuss clearly about the basic structure of K-means clustering. 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 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:

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

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

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

$$\left|\frac{c^t - c^{t-1}}{c^t}\right| < \varepsilon$$

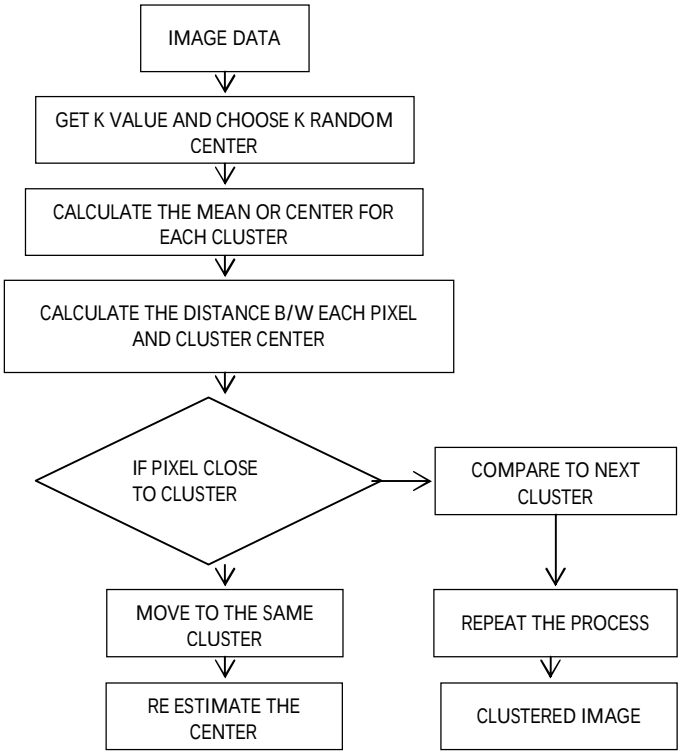

Fig. 1. K –means clustering algorithm

B. FUZZY C-MEANS CLUSTERING

Fuzzy logic to process data through partial membership in reflection is a method of each pixel value. Fuzzy membership in the set value is 0 1 ranges. The fuzzy cluster basically allows a multi-value logical values, such as the intermediate I. E., a member of the same member can be set in fuzzy sets blurred picture. Full membership, non-membership is between any bad transfer. An image of a fosaniss function, in the form of a Buddha-figure and also a membership in information to define. The membership function that is involved includes three main primary attributes. They have support, restrictions. The core member is set to be completely opaque. The subscription is supported by a non-intermediate or partial subscription, and is a border that is set to value between 0 and 1 [31].

Obscure logic, fuzzy clusters, in each cluster location entirely, just one degree from a cluster. The cluster is on the periphery of the cluster, with fewer points than points. Each point x is given status as we are in the kth cluster$uk(x)$ digital head. The contribution coefficient for any given x 1 is usually clear:

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$$\forall x \left(\sum_{k=1}^{\text{num. clusters}} u_k(x) = 1 \right).$$

Fuzzy c-means clustering, which kantroad all points with a cluster of his degree of leverage over it, means:

$$\text{center}_k = \frac{\sum_x u_k(x)^m x}{\sum_x u_k(x)^m}.$$

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

$$u_k(x) = \frac{1}{d(\text{center}_k, x)},$$

Then coefficients is a true parameter to fosifed distribution > 1 Sotheiris 1.

$$u_k(x) = \frac{1}{\sum_j \left(\frac{d(\text{center}_k, x)}{d(\text{center}_j, x)} \right)^{2/(m-1)}}.$$

The equivalent of 2 m for coefficients to equal their money to 1 along a linear normalizing. When 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 the algorithm K-means that is similar to the algorithm:

- Select the number of clusters.
- Clusters assigned to go to each endpoint are Lakki coefficients.
- Repeat algorithm (that is, the change of the threshold of coefficients sensitivity between two atratance is from someone else): • Calculate kanterwads 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 are less than the algorithm, however there are problems, in the same way that 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. They know they've given precedence to properties and simple fuzzy-C-means.

III. PROPOSED SEGMENTATION METHOD

Here in this section we proposed that our hybrid fuzzy K-means cluster acronym (AFKM). First, what the average used for preprocessing will be to remove from digital photos using filter noise and improve image quality. The product of the first phase will then be able to identify the margins of the image, and then it's K-i.e. the Segmented generated mines of the cluster: image. Now, the fuzzy cluster signaling accuracy and precise detection of the cancer of the capsule will be applied to the product of MR images with the improve K-roots. Size of the tumor will be detected. The algorithm that steps up for the proposed system is shown in the diagram of a block.

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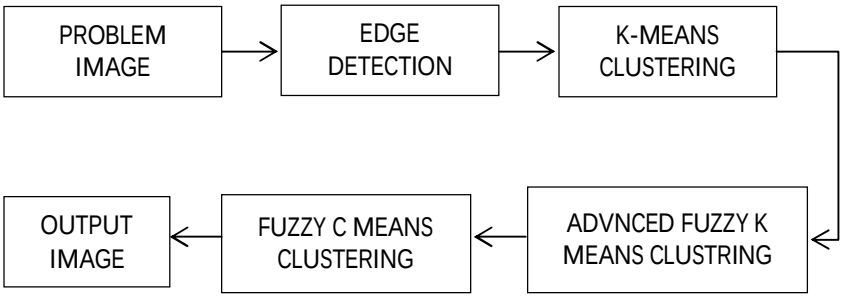

Fig. 2. Proposed system block diagram

IV. SIMULATION RESULTS

Unlike other systems we need to maintain a database for disease effected leafs. Identified Phyto-pathological problems experiments modules are developed using MATLAB R2014a, which runs in the environment Windows7, 8 and 10. Two species of samples are taken for the experiment, whose digital images are obtained by a camera. FIG 3 to 7 shows the species type and numbers of leaves images for these species.

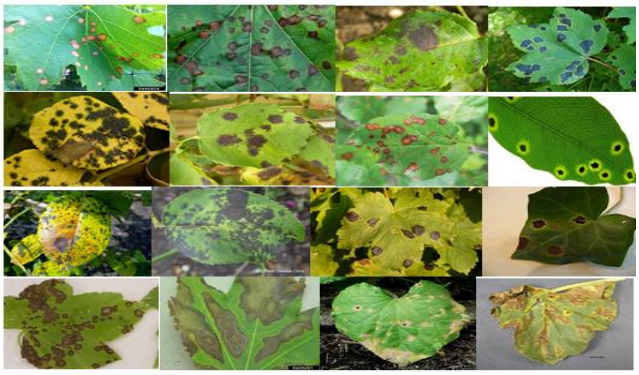

Fig.3 dataset used for disease identification

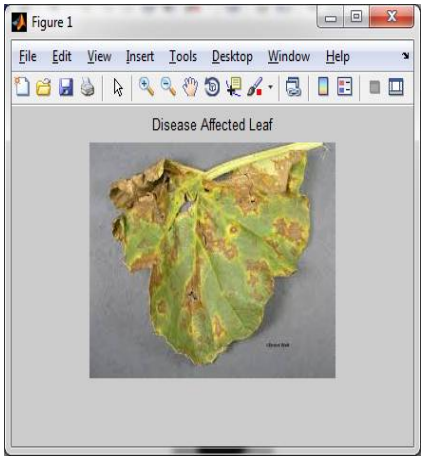

Fig.4 Disease affected leaf from the dataset

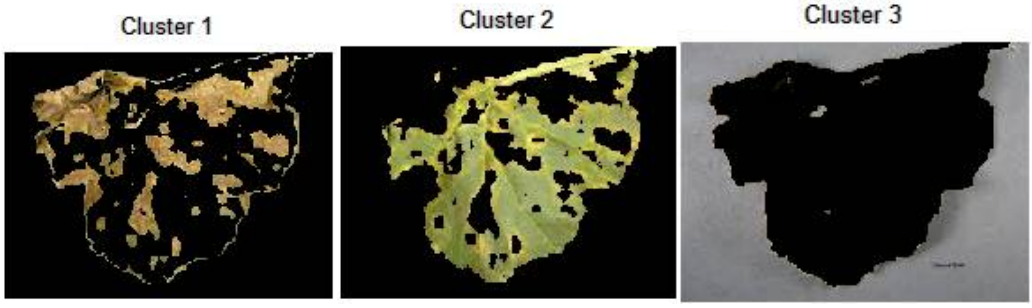

Fig.5 Cluster indexes after segmentation process

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Fig.6 Select the cluster index in which the disease is presented

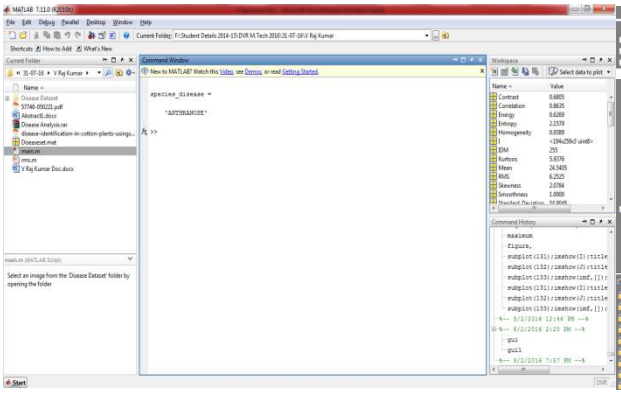

Fig. 6.Output wave forms in modelsim

Fig. 7. Snapshot of MATLAB environment after the execution of program

Table I represents the power results generated in the Xilinx. We use Spartan 3 as FPGA tool for the execution.

TABLE I

Design Parameters	**This work**
Process (μM)	0.18
Supply Voltage(V)	1.5
Maximum Frequency (GHz)	5
Power	0.060(μW)

V. CONCLUSION

In this paper, we described our work concerned with the discrimination between healthy and diseased to cotton crops using an advanced segmentation algorithm. In this paper, respectively, the applications of K-means clustering have been formulated for clustering and classification of diseases that affect on plant leaves. Identifying the disease is generally the drive of the proposed method. Thus, the proposed process was tested on 2 diseases which influence on the plants; they are: Leaf spot and Leaf miner. These features are very important for the color and morphology of the leaf spots and they provide critical information about its visual representation. By using segmentation technique it is easy for us to extract the features of disease leaf of the image. A new technique to detect first to detect the edges which is the

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proposed system shows better results than the existing techniques.For future study, different neural network architectures can be used for classification. We can extend this project to classify disease symptoms affected on fruits, vegetables, commercial crops etc.,we may work for better application like we develop a site where any person can upload their image they will find out there diseased and full detail about the disease. What they do for their fields and crops. What is the advantage and disadvantage of this disease and what should do to control it.

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