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Analysis of Automatic Rice Disease Classification Using Image Processing Techniques

G. Jayanthi, K.S. Archana, A. Saritha

Abstract--- Agriculture is the most important sector in today's life. Based on the detailed study the agriculture is highly affected by number of diseases. So automatic analyze have to take attention to predict the rice disease from early symptoms. The manual consumption of farmer to monitor the field to decrease the growth of the yield, because once the disease occurs to any of the plant it gradually goes to another plant at last it destroyed the whole farm. So the automatic diseases identification is carried out before destroying the whole yield. This paper presents the detailed study of different image processing techniques to detect the disease in rice plant. Primary colours are RGB image used to spot the disease in segmentation. In Such techniques used to identify the disease from the early symptom of the yield loss. This manuscript would help the researchers to understand rice disease identification using computer vision. At last, this paper has the discussion of different researcher's pros and cons of all studies related to plant disease identification. In digital image processing techniques, they are used for enhancement of the image. GLCM and SURF features are used for feature extraction. Edge detection and FCM is used for segmentation. ANN is used for classification.

Keywords--- Image Acquisition, Edge Detection-Fuzzy C-means, Gray Level Concurrence Matrix, Speeded Up Robust Feature, Artificial Neural Network.

I. INTRODUCTION

In agriculture research, to the development of automated system for identifying and classifying different types in rice diseases of the Contaminated plants are emerged as researching area in precision agriculture. We can minimize the loss in agricultural fields by identifying the rice diseases to prevent the quantitative loss of agricultural yields. Nowadays Agriculture are considering as much more than feeding the population of the world ever-growing. Agriculture provides food and raw materials for industry so it is called as backbone of our Indian economy.

Plants are not only the source for food production but they are also important for providing the source of rich in energy, minerals, compounds, vitamins. The production of large scale industries are exhibited and reaching the world widely by specific for the importance of citrus in the agriculture. In today's world the production for food source feeding is much more than the land mass of agriculture.

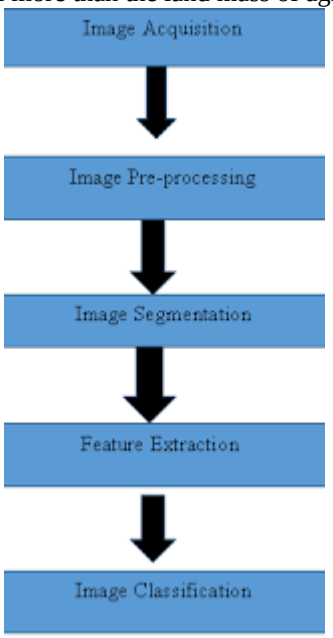

Fig. 1: Architecture of diseases identification

In India, we are highly dependent in agricultural productivity for our economic growth. In today's modern world the detection of rice diseases in plants play the important role in agricultural fields. Detection of rice diseases in plants at initial stage other than this we can detect by automatic techniques are more beneficial in today's modern world shown in fig.1.In India rice is one of the major crop production due to infection in rice plants it losses the production and it badly affect our economy growth for our country.

Detecting the diseases in plants by manually is very difficult and it is not accurate, so we can go through new technology implementations. In agricultural field by using the technology we can create the technique of image processing it will help in detection of diseases accurately and in time, so the manual detection will be minimised. Digital image processing is a new technique to diagnose the proposed method for classifying the rice disease in plants.

The rice disease prediction identified by using image processing techniques for the following applications:

1. Input image from camera or benchmark database.
2. To remove unwanted noise pre-processing techniques are used.
3. To detect the infected region by segmentation process.

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* Correspondence Author (s)
G. Jayanthi, PG Student, Department of Computer Science and Engineering, Vels University, Chennai.
K.S. Archana, Assistant Professor, Department of Computer Science and Engineering, Vels University, Chennai.
A. Saritha, Assistant Professor, Department of Computer Science and Engineering, Vels University, Chennai.

4. Some parameters are used to detect the features from the leaf by using feature extraction
5. At last, classification techniques used to differentiate the classes of disease which are affected.

II. LITERATURE SURVEY

Santanu Phadikar , Jaya Sil , Asit Kumar Das 2012 Elsevier B.V. In this paper to isolate the image background by classifying the Rice diseases, Fermi energy, Feature extraction, Rough set theory, Rule base classifier, Genetic algorithm. Fermi energy is based on segmentation method. The rice diseases are classified by using the features like colour, size, shape and position of the infected region and they are extracted by developing the novel algorithms. We can minimize the loss by using the rough set theory concept and the features are generated by all reduction.

Savita N. Ghaiwat et al . Review of ANN, SVM, PNN, SELF ORG MAPS AND FUZZY LOGIC. The layers are typically organized in neural networks. To receive the signal from the neurons in input layer, the neurons in neural network are in hidden layer. The biases represented by weights and constants are strength of the detection signal, they are calculated through the training phase. Back propagation is a neural network learning algorithm. Structure of the neural network is difficult to understand and to determine the optimal parameters when the training data are separable and non linear.

S. Arivazhagan et al (2013). SVM Classifier by Colour co-occurrence method in image processing. To detect and classify the rice disease identification, the training image samples are given as input for the condition, they can be increased in shape, colour, and optimal features.

Kholis Majid et.al. has added to a portable application for paddy plant. To identifying the classification of plant leaf disease keep on running with android versatile's framework, the malady identification framework utilizing fuzzy entropy and Probabilistic neural system. It includes for sorts of maladies in particular brown spot, leaf blast, tungro and bacterial leaf blight. The distinguishing the sickness proof exactly 91.46%.

Piyush Chaudhary et al , Color Transform Based Approach for Disease Spot Detection on Plant Leaf (2012). In image processing Median filter is used for image smoothening and threshold of plant leaf disease are calculated by applying Otsu method. The assessment of loss in agriculture crop using texture feature can be computed the diseases in spot area. The Dimensions of disease spot are classified by calculating Disease.

Smita Naikwadi et al, described the Spatial Gray-level Dependence Matrices are used to develop the colour co-occurrence texture analysis. Advanced feature of colour extraction with large database are to be obtained to get better result in image processing. For training process the layer separation techniques are used to includes with training samples. In plants, disease appears on leaf therefore the histogram matching is done on the basis of edge detection technique and colour feature.

III. MATERIALS AND METHODS

2.1 Proposed System

The system receives, enhances and stores image at enormous rates of speed. Image compression tool is an application, which works with BMP gray scale images. The user will send images and according to the specified angle. Resembling is used to increase the size of each pixel by a certain factor. To identifying and classifying the rice disease are used for development of proposed system. Classifying the different types of rice disease are emerged as researching process in precious agriculture field. By using this automated method we can minimize the quantitative and qualitative loss in agricultural field. This process of minimizing the loss can be implemented by using the automated image processing techniques in farming field. different diseases in plants is an emerging research area in farming land. This automatic detecting technique in image processing creates the accurate and efficiency in finding the diseases in rice plant . By using this technique we can minimize the human vision and more over manual method takes long period of time to analyse the disease and it will not be accurate.

The time consumption is minimized by automated system. First the leaf image is Pre processed in the proposed system. The Fuzzy C-means Algorithm is used in Diseased part of segments for detecting the edges. Feature Extraction includes Texture and SURF techniques. All the extracted features have been combined as per the disease, diseases have been classified using Artificial Neural Network. And appropriate fertilizers are recommended for respective diseases.

Proposed System Advantages

1). The main advantage of fuzzy c – means clustering it allows the gradual membership of data points into clusters, it approach for image segmentation because of its robust characteristic are measured as degrees.

2). This is easy to understand, since the membership functions partition the data space properly. It gives the flexibility to express that data points belong to more than one cluster.

3). In artificial neural network the output is produced even with incomplete information. So performance of the system may not degrade due missing data.

IV. MODULES DESCRIPTION

4.1 Image Acquisition

Image acquisition is a process of getting an input signal for the process of Rice leaf disease classification using Digital Image processing. In image processing data collection is the main aspect for detecting the diseases in rice plant. The collected data may be taken from various sources or from automatic studies or scanned images. The data's for image processing are available in world wide source. The image acquisition is required to collect the actual source image.

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The process of measuring the signal strength in digitization it measures the amplitude and analog waveform for valuing the given input. The samples as numerical values for input as digital data showed in fig 2.

Fig. 2: Input image

4.2 Pre processing

The operation with which the image at the lowest level of abstraction is in both input and output is the input image is called by the common name called pre-processing. The improvement techniques of data that suppress undesired image data deformation or embellish the features of the image , is the important further processing. For the process of Automatic Detection of different rice leaf disease using digital Image processing, the rice leaf image is acquired showed in fig 2 a.

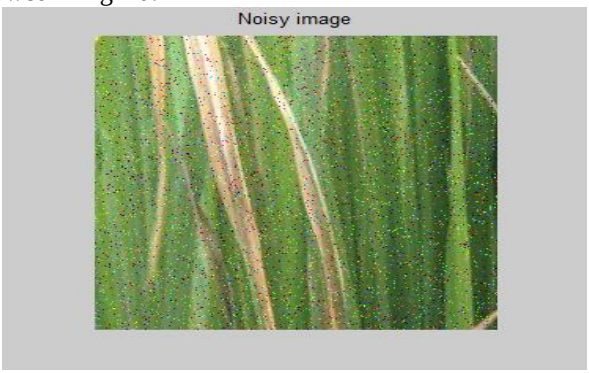


Fig. 3: A Noisy Image

b. Noise Removal image

- Further it will be pre processed for efficient classification of leaf diseases.
- In Pre processing the image will be obtained with some noises, in this process we have to remove the noise from the image by using the filter. Here we are familiar with Median filter. Noise Removal is done by using Median filter.
- In low signal level like shadow region or under exposed image the detection is most apparent to detection of rice disease.

4.2.1 Median Filter

It enclosed by the filter of gray levels in the image area. The numerical collection of half values are less than or equal to the median value.

The pixels are enclosed by the window and shorted in order to perform are moving the median filtering.

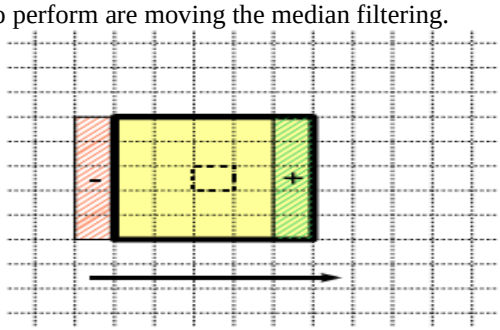
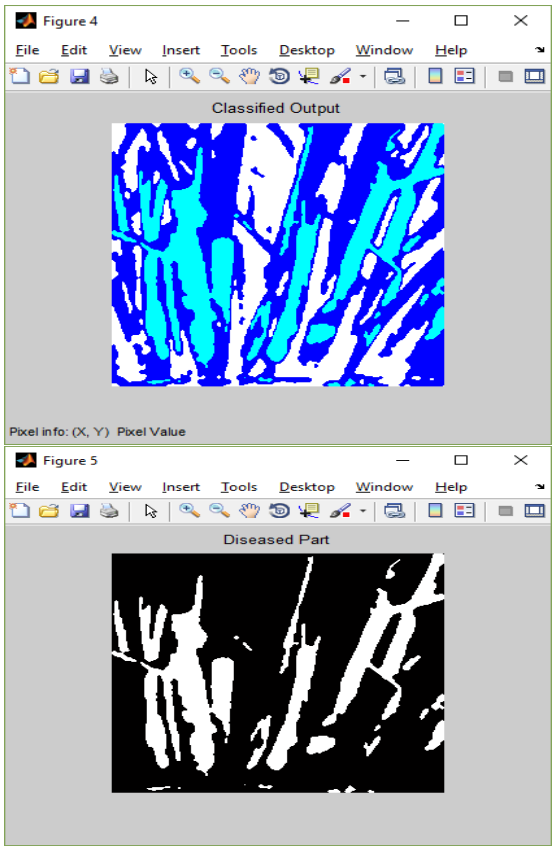


Fig. 4: Process of median filter

4.3 Segmentation

In Fuzzy clustering it allows more than one group by contrast belonging to data points. Therefore the fuzzy resulting in partition resulting. The each cluster which are associated with membership function and which the individual data points are expressed and belong to the cluster are shown in fig 4. The number of clusters are present in the data set are relies with the algorithm to user to specify the clustered. Given a number of clusters c, FCMC partitions the data X = {x1,x2,…,xn} into c fuzzy clusters by minimising the within group sum of squared error objective function.



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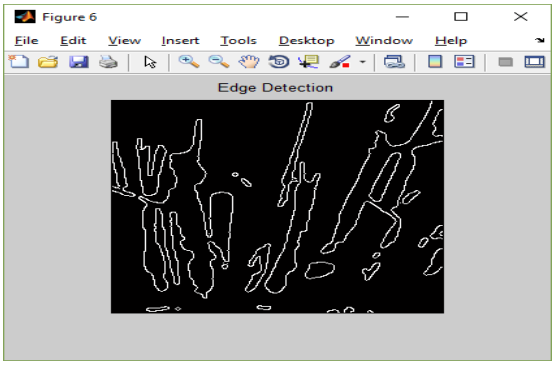


Fig. 5: Different clusters in segmentation 3.4

4.4 Feature Extraction

In machine learning, pattern recognition and in image processing, feature extraction techniques are applied to get features that will be useful in classifying and recognition of images. Feature extraction techniques are helpful in various image processing applications e.g. character recognition. As features extraction define the behavior of an image, they show its place in terms of storage taken, efficiency in classification and obviously in time consumption also feature extraction methods in case of character recognition application. Feature extraction is related to dimensional reduction.

a) GLCM:

Texture Analysis Using the Gray-Level Co-Occurrence Matrix (GLCM) A statistical method of examining texture of image that considers the spatial relationship of pixels also known as the gray-level spatial dependence matrix. For calculating the statistical confidence the joint probability distribution matrix used to achieved by

b) In texture analysis the number of quantization level identified by using different amplitude.

c) for fixing the error the textures changes accordingly by large window by the comparison of 20 to 60 pixels by each side it can be analyze by

• Maximum probability entry

• Element difference moment of order k: P i P j (i − j) k cij this descriptor has relatively low values when the high values of C are near the main diagonal. The main diagonal can be identified by maximum pixel values by position operator values, where n=2 to be contrast.

• Contrast = N i N j (i − j) 2 xij

• Entropy = − N i N j xij log xij This is a measure of randomness, having its highest value when the elements of C are all equal. The entropy would be calculated by low intensity value like

• Uniformity (also called Energy) = N i N j c 2x ij (smallest value when all entries are equal)

• Homogeneity = M i M j bij 1+|i−j| (large if big values are on the main diagonal)

To analyse GLCM values by the intensity value *i* occurs in a pixel by specific spatial relationship to a pixel with the value *j*. By default, the spatial relationship is defined as the pixel of interest and the pixel to its immediate right (horizontally adjacent), showed in fig.5.

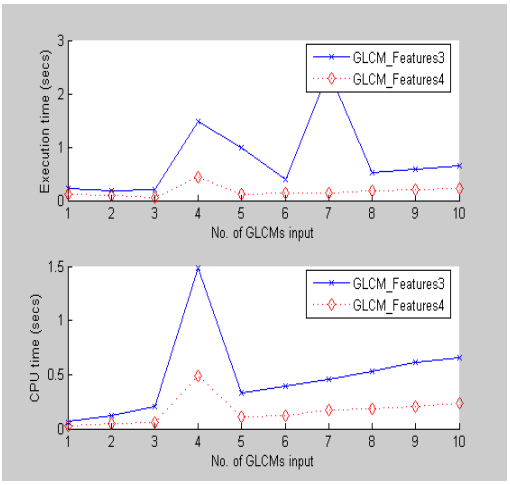


Fig. 6: Different features in diseased leaf

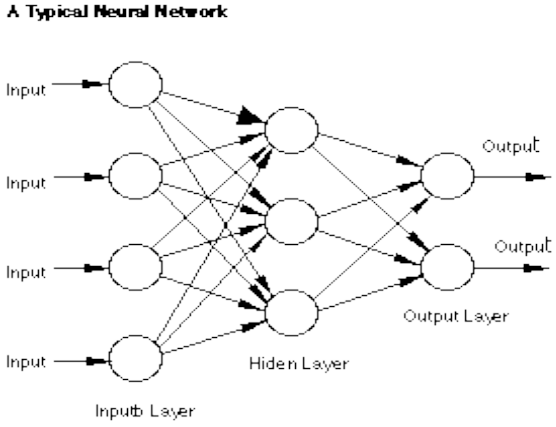
4.5. Classification

Classification is an order to classify the set of data's into an different classes or different categories. To achieve this by trained computer must we have to learn the relationship between the classes and the data. Then it will be easy to classify the process under the terms and conditions. Here relationship between data and classes are much important for classification in image processing.

- ♦ success of classification is the key of training
- ♦ original development in Classification techniques
- ♦ In the process of computer learning the relationship between the information classes and data , they are sensed with remotely for the field research of pattern recognition are involved with the process of computer learning and computer classification.

Neural Network Classifier

To use the Machine learning method Artificial Neural Network for classifying the normal crop and the weed parts in the farms using extracted features. A neural network has three different nodes input node, hidden node, and output nodes. These nodes are applied with some functions they may be a soft max, linear, and logistics and returns an output from the image. Until the output receives successfully the every node proceeds the layer and weighted average of the output. In classification we can solve the problem by insight the collectively gained nodes for multiple reasons.



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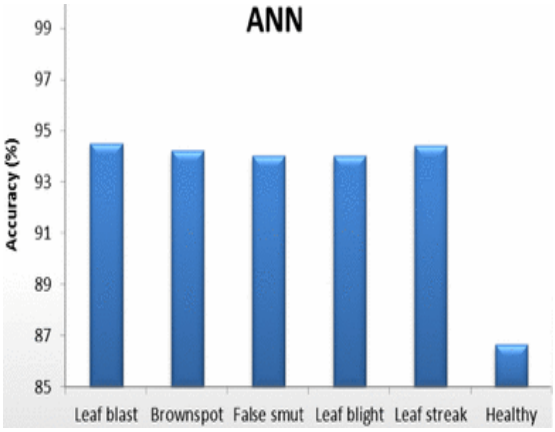
The reason of using the multiple nodes is that can collectively gain insight about solving individual node cannot.

Artificial neural networks are neural network structure of the brain and they are relatively crude for electronic networks. In ANN we can process the record only one at a time and they can learn by comparing their classifications with another record (largely arbitrary) with the actual classification of the known record. While processing the first record at the initial stage it classifies its error from the known record and fed them back into the neural network. Later we can modify the errors in the network algorithm for further iterations.

Artificial network neurons function:

1. There is a set of input values and associated weights.
2. The sum of weights and the maps results to the output is the function of neurons.

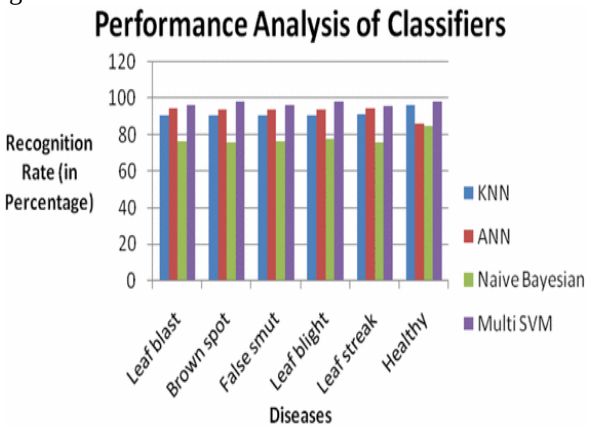


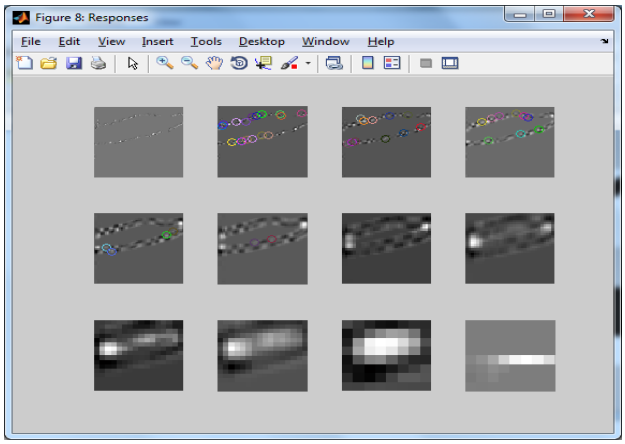
Neurons are organized with three different layers they are input layer, hidden layer, output layer. The input layer consists of record values and composed with full neuron networks to the next layer. In hidden layer it consists of several neural networks and it exists with one neural network. The next layer is the hidden layer. At last the output layer is final it consists of a single node for each class. Here the record is assigned with highest value compared with other values and the network consists of assignment value for each single node, these values are forward through the sweep networks.

V. RESULT AND DISCUSSION

This project provides the identification of various rice plant disease. SURF and GLCM feature extraction provides an efficient way for identifying the rice plant disease. Artificial neural network provides classification of various disease and also used to find the normal and diseased rice plant. accuracy, sensitivity and specificity also done for the efficient analysis of various rice disease. The below images are the results of different diseases of rice plant . The disease is identified by using SURF and GLCM feature extraction and to classify the disease and also to identify the diseased plant artificial neural network is used which is effective method for classifying the disease of rice plant.

In this paper, ANN is used to classify disease in rice ,by applying different types of images , ANN image are extracted by the features of the infected parts of the leaves .by using simple computationally efficient techniques, algorithm extraction features is done in image, which results is satisfactory classification for the images. The below images are the results of different diseases of rice.





VI. CONCLUSION

At last it concluded that management of plant disease is a challenging task, most of the disease are seen only in the plant leaves. The three main different types of leaf disease, they are classified as Bacterial leaf disease, fungal leaf disease and viral leaf disease. The speed and accuracy is the main characteristic of detection of disease. The image processing techniques is used in working development of automatic, efficient, fast and accurate detection of disease in leaf, development of machine in the detection of rice disease. In vision system that automatically recognizing, classifying and quantitatively detects leaf disease. It has been recognized by detecting the leaf blast, bacterial blight, brown spot. In this paper, the image of rice disease are classified using ANN algorithm we can obtain the infected parts of the leaves by feature extraction. For testing purpose there are four different types of images can be applied. The image using simple computationally efficient techniques is extracted by the algorithm of GLCM and SURF which satisfactory classification for test image .

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REFERENCES

1. Cai, J., Liu, Z.Q., 1998. A new thresholding algorithm based on all-pole model. In: Int. Conf. on Pattern Recognition, pp. 34–36.
2. Cleary, J., Trigg, L., 1995. K_: an instance-based learner using an entropic distance measure. In: Proceedings of the 12th International Conference on Machine Learning, pp. 108–114.
3. Couch, B.C., Kohn, L.M., 2002. A multilocus gene genealogy concordant with host preference indicates segregation of new species, Magnaporthe oryzae, from M.grisea Micrologica, 94(4), 683–693.
4. Goldberg, D.E., 2009. Genetic Algorithms in Search, Optimization & Machine Learning. Pearson Education, New Delhi.
5. Gonzalez, R.C., Woods, R.E., 2007. Digital Image Processing. Pearson Education, New Delhi, India.
6. Guo, R., Pandit, S.M., 1998. Automatic threshold selection based on histogram modes and a discriminant criterion. Machine Vision and Applications 10, 331–338.
7. Hall, M.A., 1998. Correlation-Based Feature Selection for Machine Learning. PhD Thesis. Dept. of Computer Science, Univ. of Waikato, Hamilton, New Zealand.
8. Hu, M.K., 1962. Visual pattern recognition by moment invariants. IEEE Transactions on Information Theory 8, 179–187.
9. Huang, Y., Huang, X., Cercone, N., 2004. Feature selection with rough sets for web Page classification. Transactions on rough sets. Springer Link Publishers 2, 1–13.
10. Irina, R., 2001. An empirical study of the naive Bayes classifier. In: IJCAI 2001
11. Workshop on Empirical Methods in Artificial Intelligence, pp. 41–46.
12. Jawahar, C.V., Biswas, P.K., Ray, A.K., 1997. Investigations on fuzzy thresholding based on fuzzy clustering. Pattern Recognition 30, 1605–1613.