**PADDY LEAF DISEASE RECOGNITION AND REMEDY PREDICTION USING CONVOLUTION NEURAL NETWORK**

**ABSTRACT**

Rice is an important agricultural crop. Most of the world’s population consumes rice as staple food. But the production of rice is hampered by various kinds of paddy diseases. One of the main diseases of paddy is leaf disease. Leaf disease is the crucial factor and causes 20-30% reduction of the productivity in case of its infection. Therefore, the farmer concentrates on the cause of the disease in the crops during its growth, but it is not easy to recognize the disease on the spot. Until now, they just relied on the opinion of the experts or their own experiences when the disease is doubtful. Though experts are available, disease detection is performed by naked eye which causes inappropriate recognition sometimes. In this paper, an automated system is proposed for diagnosis three common paddy leaf diseases (Brown spot, Leaf blast, and Bacterial blight) and pesticides and/or fertilizers are advised according to the severity of the diseases. K-means clustering is used for separating affected part from paddy leaf image. Visual contents (color, texture, and shape) are used as features for classification of these diseases. The type of paddy leaf diseases is recognized by CNN (convolution neural network) classifier. After recognition, the predictive remedy is suggested that can help agriculture related people and organizations to take appropriate actions against these diseases.

**OBJECTIVES**

* To provide a robust paddy leaf disease recognition system using image processing techniques and give remedy prediction to take proper cures.
* To Design a fast, accurate and user-friendly paddy leaf disease recognition system and proper care according to the severity of disease.

**LITERATURE SURVEY**

**TITLE:** Rice production in the Asia-pacific region: issues and perspective.

**AUTHOR:** M.K. papademetriou

**YEAR: 2017**

**DESCRIPTION:** Rice is the staple food of Asia and part of the Pacific. Over 90 percent of the world’s rice is produced and consumed in the Asia-Pacific Region. With growing prosperity and urbanization, per capita rice consumption has started declining in the middle and high-income Asian countries like the Republic of Korea and Japan. But, nearly a fourth of the Asian population is still poor and has considerable unmet demand for rice. It is in these countries that rice consumption will grow faster. The Asian population is growing at 1.8 percent per year at present, and population may not stabilize before the middle of the next century. A population projection made for the year 2025 shows an average increase of 51 percent, and in certain cases up to 87 percent over the base year 1995. So far the annual growth rate for rice consumption in the Asia-Pacific Region over a period of 45 years (1950 to 1995) has kept pace with the demand, more through yield increase rather than area expansion. Improved varieties have made a significant impact (Khush, 1995) in an ever increasing order during this period. The world rice supply has more than doubled from 261 million tonnes in 1950 (with Asian production of 240 million tonnes) to 573 million tonnes in 1997 (including the region’s production of 524 million tonnes). Production has more than doubled overtaking the population growth of nearly 1.6 times in Asia. A measure of this success is reflected by the fall in the price of rice in the world markets.

**TITLE:** Detection of paddy leaf diseases.

**AUTHOR:** R. Deshmukh

**YEAR: 2015**

**DESCRIPTION** India is an agricultural country. Farmer has wide range of diversity to select suitable crops. However, cultivation of these crops for optimum yield and quality produce is highly technical by using technical support. Detection of plant disease is an essential research topic. Studies show that relying on pure naked-eye observation of expert to detect such diseases can be prohibitively expensive, especially in developing countries. Providing fast, automatic, cheap and accurate image processingbased solutions for that task can be great realistic significance. This paper presents computationally efficient method for paddy leaf disease identification. The proposed approaches consist of three phases: image segmentation, feature extraction and classification. Image segmentation technique is used to detect infected parts of leaf by using K-means clustering. The feature extraction phase derives features based on the paddy leaf image. These features are used as input to the classifier for classification purpose. In this experiment, the classifier is used as artificial neural network. Many researchers are working on real time plant leaf diseases from many years. In future, this project will be implemented for real time leaf disease detection. This project is very useful to farmer to detect paddy diseases at early stage.

**TITLE:** “Classification of rice leaf diseases based on morphological changes,”

**AUTHOR:** S. Phadikar, J. Sil, and A. K. Das

**YEAR: 2012**

**DESCRIPTION:** Rice is widely cultivated economical crop in the world. During cultivation the earliest and accurate diagnosis of the rice plant diseases able to reduce the damage, resulting environment protection and better return. In the work, an automated system has been developed to classify the leaf brown spot and the leaf blast diseases of rice plant based on the morphological changes of the plants caused by the diseases. Radial distribution of the hue from the center to the boundary of the spot images has been used as features to classify the diseases by Bayes’ and SVM Classifier. The system has been validated using 1000 test spot images of infected rice leaves collected from the field, gives 79.5% and 68.1% accuracies for Bayes’ and SVM Classifier based system respectively.

**TITLE:** “An image processing technique to calculate percentage of disease affected pixels of paddy leaf,”

**AUTHOR:** R. Islam and M. R. Islam.

**YEAR: 2015**

**DESCRIPTION:** Bangladesh is an agricultural country. Paddy is a principle crop of it. Millions of people depend for their living on paddy by way of its farming and processing. Blasts in paddy leaves are the most predominant disease which appears as brown spots on the leaves. If not treated on time, it may cause the great loss. Excessive use of pesticide for treatment of plant diseases increases the cost, environmental pollution and decreases the production. So their use must be optimized. This can be achieved by targeting the disease places, with the appropriate quantity and concentration of pesticide by estimating disease severity using image processing technique. In this paper Kmeans clustering method has been used to segment the image into three images based on color. Among these images unaffected leaf regions and disease affected regions are used to calculated percentage of affected pixels. By calculating percentage of affected pixels disease severity can be observed LBP and GFE techniques. The experimental results are evaluated in terms of accuracy, sensitivity, specificity and Positive Predictive Value (PPV).

**EXISTING SYSTEM**

Disease detection and recognition is a demanding task. Generally, diseases are detected manually which is very difficult and time-consuming. The naked eye observation of experts is the main approach adopted in practice which is expensive large farms. Most of the farmers in rural areas determine disease manually that sometimes causes an error to identify the types of disease. For this reason, developed an automated system to classify brown spot and leaf disease of rice plant-based on morphological change. Otsu’s segmentation algorithm was used to segment the image. Radial distribution of the hue from the center to the boundary of the spot images were extracted as features to classify disease. Another study which used K-means clustering technique to detect infected parts of a leaf and then extracted features from the segmented image. Gray level co-occurrence matrix and discrete wavelet transform were used for feature extraction. Finally, Back Propagation Neural Network (BPNN) and Support Vector Machines (SVM) algorithm was applied to classify paddy leaf diseases.

**EXISTING SYSTEM DRAWBACKS**

* Theconventional methods of disease detection sometimes cause an error to identify the types of disease.
* Although previous classifiers have good generalization performance, they can be abysmally slow in test phase
* The existing systems are less efficient and time-consuming.

**PROPOSED SYSTEM**

Proposed an automated leaf disease recognition system. Leaf disease can recognize using MATLAB. Here it detects the diseases of leaf through image processing where we will give images of the disease affected crops. The image will go through several levels of processing to detect and identify the disease. System has concentrated on recognizing the paddy leaf diseases which assists the farmers to take a proper measurement and increases the production of paddy. The K-means clustering segmentation algorithm is used to segment the image and visual-based features i.e. color, texture, and shape features are extracted. At the end, SVM classifier is applied to classify paddy leaf diseases. This system provides a proper guidance containing instantaneous remedies based on the severity of the disease.

**PROPOSED SYSTEM BLOCK DIAGRAM**

**Database**

**Disease type**

**Image preprocessing**

**Image Acquisition**

**Support vector Machine (SVM)**

**s**

**Feature extraction**

**FIGURE 1: PROPOSED SYSTEM BLOCK DAIGRAM**

**FLOW CHART:**

SVM

FILTERING

CPNTRAST ENHANCEMENT

SUGGEST PESTICIDES AND FERTILIZERS

TRAINING IMAGES

RESIZING

IMAGE ACUISITION

IMAGE SEGMENTATION

**DATABASE**

DISEASE TYPE

CLASSIFICATION

Median filter

K-Means algorithm

Pre-processing



**PROPOSED METHODOLOGIES**

**Methods and Algorithms**

1. Image pre - processing
   1. Filtering - Median Filter.
   2. Segmentation - K-Means clustering.
2. Feature Extraction
   1. Color features 🡪 Color moment

(Mean, RMS, Variance, Standard deviation, and Kurtosis values)

* 1. Texture features 🡪 Gray level co-occurrence matrix (GLCM).

(Contrast, Energy, Entropy, Correlation)

1. Classification 🡪 Support vector Machine (SVM).

**PROPOSED SYSTEM ADVANTAGES**

* Our proposed method shows better performance.
* The system shows robust result than some existing methods.
* SVM gain the accuracy of classification of the disease.
* System assists the farmers to take a proper measurement and increases the production.

**SOFTWARE REQUIREMENTS**

* MATLAB 7.14 Version R2012

**MATLAB**

The MATLAB high-performance language for technical computing integrates computation, visualization, and programming in an easy-to-use environment where problems and solutions are expressed in familiar mathematical notation.

* Data Exploration ,Acquisition ,Analyzing &Visualization
* Egg drawing and Scientific graphics
* Analyzing of algorithmic designing and development
* Mathematical functions and Computational functions
* Simulating problems prototyping and modeling
* Application development programming using GUI building environment.

Using MATLAB, you can solve technical computing problems faster than with traditional programming languages, such as C, C++, and FORTRAN.