**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 neuralnetwork) classifier. The detected leaf disease is indicated to user by using LCD and buzzer. An 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.
* ToDesign a fast, accurateand user-friendly paddy leaf disease recognition system and proper care according to the severity of disease.

**EXISTINGSYSTEM**

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 expensivelarge 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 SYSTEMDRAWBACKS**

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

**PROPOSED SYSTEM**

Proposedan 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, CNN 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**

**Image Acquisition**

**TESTING**



**Resizing**

**Filtering**

**Image Segmentation**

**Contrast Enhance**

**Feature Extraction**

**(Color, Texture,shape)**

**Creating Feature vector**

**Image Acquisition**



**Resizing**

**Filtering**

**Image Segmentation**

**Contrast Enhance**

**Feature Extraction**

**(Color, Texture,shape)**

**Database**

**Convolutional neural network (CNN)**

**Disease type**

**Suggest pesticides & fertilizers**

**Creating Feature vector**

**TRAINING**

**FIGURE 1: PROPOSED SYSTEMBLOCK DAIGRAM**

**PROPOSED HARDEARE BLOCK DIAGRAM**

**UART**

**POWER SUPPLY**

**ARDUINO UNO**

**LCD**

**BUZZER**

This system consists of Arduino Uno controller, UART, LCD and Buzzer. The system will gets the input from the system using UART and process the information. If the Matlab detects the disease it will indicate the user through the LCD display. When the system detects the disease, the buzzer will ON for alerting purpose. Arduino Uno controller is used for controlling overall system.

**FLOW CHART:**

FILTERING

CPNTRAST ENHANCEMENT

**Color features (mean, RMS, variance, kurtosis)**

**TEXTURE FEATURE (contrast, energy, correlations, entropy)**

**SHAPE: AREA**

SUGGESTPESTICIDES AND FERTILIZERS

TRAINING IMAGES

RESIZING

IMAGE ACUISITION

IMAGE SEGMENTATION

**DATABASE**

DISEASE TYPE

CLASSIFICATION

CRERATING FEARURE VECTOR

Median filter

K-Means algorithm

Color momentent

GLCMent

Pre-processing

Feature extraction

CNNent

**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 🡪Convolution neural network (CNN).

**PROPOSEDSYSTEM ADVANTAGES**

* Our proposed method shows better performance.
* The system shows robust result than some existing methods.
* CNN 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.