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PRECISION AGRICLUTURE-CLASSIFICATION WEED FROM PADDY USING IMPROVED CNN

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Abstract — **Rice is a primary food and Encounter an Essential role in providing food security worldwide. However the existing Disease diagnosis method for rice are neither accurate nor efficient and special equipment is often required .In this study, The disease classification is done by SVM classifier and therefore the detection accuracy is improved by optimizing the info exploitation .In this proposed system we are using image processing techniques to classify disease. This Approach will enhance productivity crops. Furthermore in precision agriculture, the accurate segmentation crops and weeds has been always been the center of attention. This work proposes a segmentation method based on combination of semantic segmentation and K means algorithm for segmentation crop and weeds in color image. The proposed algorithm provided more accurate segmentation in comparison of other method with the maximum accuracy of equivalent to 99.19% the result indicate that the proposed method successfully provided accurate result for the segmentation of crop and weed in the image with a complex presence of weed.**

Keyword: **semantic segmentation; k-means algorithm; precision agriculture; leaf disease detection SVM.**

I. INTRODUCTION

Rice is an important crop in agriculture however, crop diseases can significantly reduce its yield and quality, which is a great threat to food supplies around the world. Through early detection search diseases and remedial steps take an timely can avoide huge loss and can yield good crop that is high in quantity and best quality. The aim of research in agriculture is to improve the productivity and quality of the crop yield with less expenditure and good yield. There are variety of plant disease such as viral bacterial fungal and these can damage different plant parts above and below the ground. The spread of various disease in rice leaf are increased in recent years. To identifying the correct disease symptoms and understanding when to control these disease are difficult. During this process the advanced techniques of Support vector machine play a key role in the disease classification.

Weeds are unwanted plant and can significantly reduce crop yield. The broad categories of weeds found in paddy field are grass, sedges, and broadleaved weed. It would benefical if each of this weeds are treated with specific type of herbicide application. Therefore it would be of great help for farmer if this task of classification of weeds in paddy field where done automatically. This paper focus on implementing deep learning based computer vision technique for automatic classification of paddy crop and two types of weeds, namely broadleaved weed and sedges weed. The standard way of handling weed in India is hand weeding mechanical weeding and herbicides. Hand weeding is a time consuming and labor intensive job. Mechanical weeding is carried out using a machine called a rotary weeded. Herbicides have many ill effect on the environment. When controlling weeds with herbicides, it is important to know the species of the weed so that the right herbicides. The proposed method brings up promising technique for the segmentation of crop and weed. The result of semantic segmentation and the separation of crop and weed allow to analyze the shape, detect weed and make an accurate analysis of weed control operation in precise agriculture.

II. LITERATURE REVIEW

Savita .N.Ghaiwat describe the different type of Technique classification & identification of green foliage of plant . for class estimation they use K nearest neighbor technique is the best method.

K. Jagan mohan, M.Balasubramanian , S.Palanivel describe scale invariant feature transform (SIFT) is used to get feature for recognition and detection of disease.

Y. J. Shang & L. Way describe scheme in their paper as using KNN classifier for plant disease identification

& detection where developed algorithm can work for five dissimilar varities of maize disease.

Dipak kumar kole, Diplest majumdar given a solution applies image processing & ANN mechanism to detect disease in various commonly grown plant resulting with an accuracy of 99%.

Bakshipour A. & Jafari.A. provides the classification of sugar beet crop & four type of weed was done using an SVM & artifi -cial neural network classifier using shape feature. The correct identification of weed by ANN & SVM was 92% & 93%.

Soliago W.E.Leite , N.J.Teruel, B.J.Kerle the discrimination of Rice seedling & weed done using the deep FCN.FCN model head an accuracy of 83% for soil background, 92% for rice & 92% for weeds.

Abdalla .A, H.Cen, L.Wan, R. RASHID, H. Waleng . took advantage of convolution neural network for semantic segmentation of oilseed rape image. In their study, the beat accuracy that was achieved amount to 96%.

Majeed. Y, M.Karkee, Q.Zhang, M.D.Whitiy their study determine grapviwe corden shape using semantic segmentation & deep learning. The result of study that could fit about 80%.

Richle.D, D.Reiser, H.W.Griepentrong. used an index based Semantic method for the plant backgroung segmentation in RGB image plant segmentation was done successfully accuracy of 97.4%.

C. Polena, D. Nardi, P.A.Jaly. In Fast & accurate crop of & weed identification with summarized train set for precision
agricltuer. applied CNN on RGB image for the identification Of weed image of different dataset were used and & accuracy 98.7%.

PADDY DISEASE AND THEIR SYMPTOMS:

Lessen the yield due to paddy leaves affected with disease can Cause damage to plant to a great extent In fact affect the entire Crop if not timely diagnosed. Paddy disease are due to many Constraints such as insect pest, deficiency of nutrient, pathogen C And unusual environmental condition. This section provide Information about the paddy disease with their appearance. Some Of the significant disease affecting the paddy disease.

Detailed as follows:
1.Brown spot(BS)
2.bacterial leaf blight(BLB)
3.leaf smut(LS)

A) BROWNSPOT

This disease occurs on leaves of rice plant. This is fungal disease which infect the entire crop that can be easily identified
in early stage . The symptoms of the disease are round to oval shape with dark brown Lesions.

B) BACTERIAL LEAF BLIGHT

Dew drops with bacterial masses can be seen on fresh lesions early in the morning. a narrow yellow border surrounding lesion also characterizes this spots. the lesions ture the entire leaf into white or straw colored on sheath of leaf disease.

C) LEAF SMUT(LS)

The wounds of LS on the leaves may be in oval shape or Circular in shape or irregular shape with a kind of rough Surface. Heavily infected leave turn yellow, and the leaf tips Die and turn gray.

A) BROWN SPOT

C) LEAF SMUT(LS)

WEED IN PADDY FIELD

Weeds in paddy field can be broadly categorized into3 types,

1. Broad leaved weed.
2. Grasses
3. sedge

a) BROAD LEAVE WEED

Broad leaf plant have relatively broad leaves. Leaves of broad leaf have one main vein from which smaller veins branch. Broad leaved weeds are usually dicot with taps roof system.

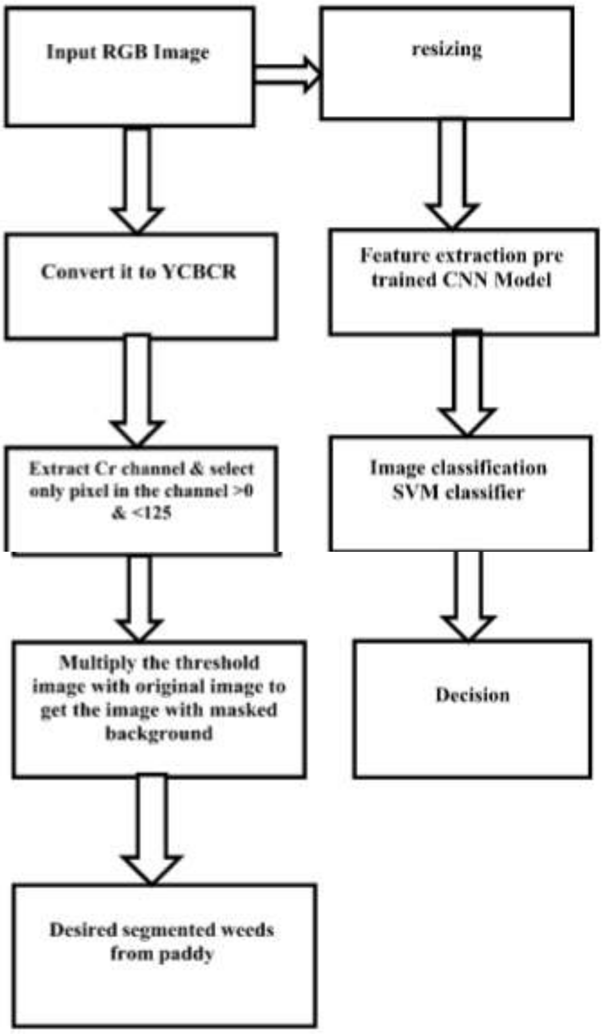
b) GRASSES

Annual summer grass that germinates throughout the season, Capable of producing 1501000 seed per plant, per season. Short, flat, purplish- green steams perennial grass most active During cool spring and fall season.

c) SEDGE

Sedge are perennial plant that are found in moist soil .
They are grass like in appearance & often grow in thick cluster.
Depending on the species these weeds can research reach up to Four feet in height.

PROPOSED METHOD:
SYSTEM architecture



BLOCK DIAGRAM FOR CLASSIFICATION USING SVM

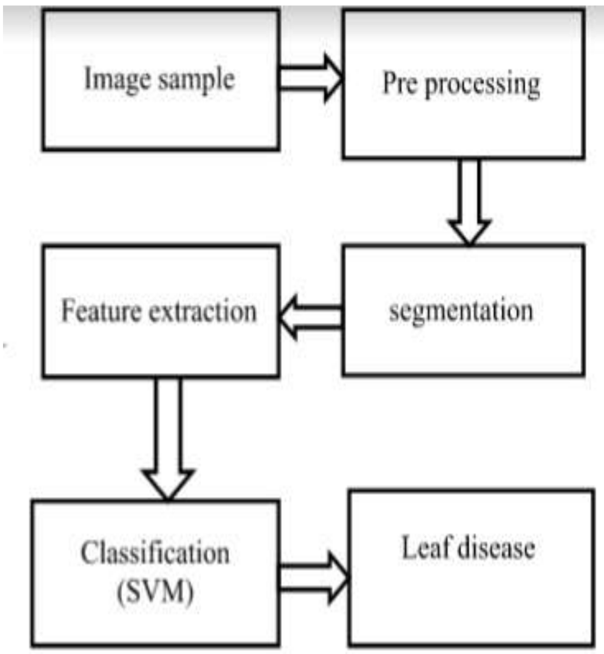
We use plant dataset containing rice plant species Digital cameras where used to capture the image in The paddy field under natural lighting condition Some of them healthy & some affected by various Disease. Different growth stage of paddy are consisted By the image. The image where saved in RGB color space (540x733) In JPG format. The PYTHON 3.7 was used to process the Image. The sample image where resized to when working With python 3.7 . to overcome reflection, shadow of plant, & unwanted object here the field problem, we segmented The for ground object form background by using ycbr Model.
The Support vector machine is a supervised classifier The SVM with radial basis function (RBF) kernel was used.
In this approach, support vector machine was designed for Classification to achieve the classification of paddy leaf disease. SVM classifier is approached to miximize the classification Accuracy, & minimize the available dataset.

Image-segmentation- keras APIs were used for the Implementation of different model. In the model, transfer learning was used to get better result. each RGB original image has a corresponding annotated Image with the same in format. weight obtained from

ADE-20 k dataset were used as initial weight in the Model. Sematic segmentation models are built upon A standard CNN network.ADE-20K dataset weight Are trained on 150 different classes. The classification Of sugar beet crop and four types of weed was done Using an SVM and artificial neural network(ANN) Classifier using shape features. Paddy-weed image from Taken from the above said two different sources were Combined. The dataset consists of four classes: paddy, Two types of weed –sedges and broadleaved weed, and Back. While pre processing two types of images were Generated. The first set of images has only one type Class (plant) in the picture, that is, either paddy, or sedges Or broadleaved weed. The second set of images consists

Of multiple classes in the same picture, for example, paddy With broadleaved weed or paddy with sedges.

Deep learning is a subset of machine learning. many Research used convolutional machine learning techniques In combination with image features to accomplish the Task of weed recognition. These techniques can work With smaller data sizes and are not computationally Intensive.



SUPPORT VECTOR MACHINE (SVM);

Support vector machine is a types of module used to analyze the data and discover pattern of analysis in regression classification. When your data has exactly two classes support vector machine is used.

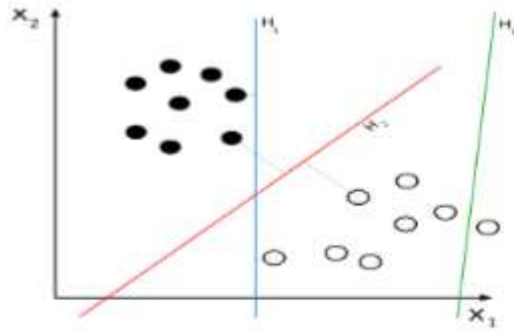


IMAGE ACQUISITION:

Image acquisition stages is the first stage of any vision system.in real time application. Photograph of rice plant leaves are collected using a high resolution digital camera. In addition this stage includes the pre-processing undertaking for example, image, scaling. A dataset containing image of both normal and diseased leaves was in the analysis process.

PRE-PROCESSING:

An input image has some unwanted noise as well as redundancy present it. Image in the dataset were scaled to a uniform size of 300x450 pixels to limit demands for storage and processing power. If is a sort of signal dispensation which input is image, like video edge or photo and result may be picture or characteristics related with that image. Accordingly. The RGB image were first converted into HSV images next, the S value (saturation) was used to account for the present of excess exposure.

FEATURE EXTRACTION:

Extracting the relevant information from the input images Is called process of feature extraction. Color were also used to define share and feature. The importance of feature data. Compoment extraction is a core limit in various image-processing application like Remork detecting, biomedical imaging and object based image. Using GLCM features image analysis techniques are used to extract contrast, correlation and homogeneity of the image.

Sematic Segmentation Of Weed Classification:

The discrimination of rice seedlings and weed was done using The deep FCN, U net. Computer vision is rapidly expanding area that is dependent on capability to automatically segment, classify and interpret image. Segmentation is central to successful extraction of image feature and their subsequent classification. Image segmentation technique can be grouped into six categories. Amplitude, thresholding, component labeling boundary based segmentation, region based segmentation template matching and the texture segmentation. The segmented

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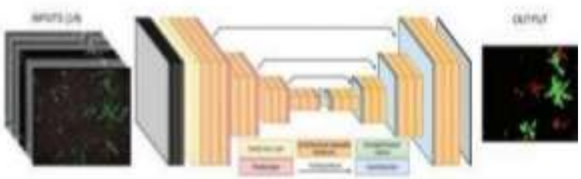
image is routed to classifier understanding system. K means clustering algorithm is used. In this algorithm it is suppose that the resolution of the image and it should be cluster in to k number of cluster. The proposed algorithm start with removing soil from the image. Afterward, sematic segmentation with U net is employed. Using the K means subtractive algorithm, the image including a signal crop or Weed. The model used is U net based on modified VGG60 encoder followed by Binary pixel wise classification layer. The U Net architecture uses an encode- Decode framework In which encode- decode layers are symmetrical to each other. U net also uses skip connection. Skip Connection are extra connection, which link sampling layers with earlier down sampling layers. skip connection helps in the reconnection of segmentation boundaries after down sampling and hence produces a more precise output image. sematic segmentation is expressed as the labeling of each pixel in the image with a class. This method provides a pixel-level prediction that classifier each pixel based on a category. the following section discusses the Architecture of our de convolution network, and describes the overall semantic segmentation algorithm.

SEGMENTATION

The main goal of the segmentation is to be extract meaningful and useful information from the iq2mage with respect to certain feature. The centroid value was used to make accurate segments for resolution randomness issues by constructing a histogram of hue components. If is a standout amongst the most troubles some errands in computerized image processing. When your data has exactly two classes Support vector machine (SVM) is used

CLASSIFICATION:

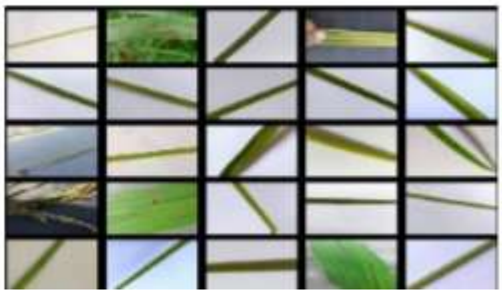
The classification technique is used for both training and testing process. A time training model was then used to determine how well the model could be generalized to different plant species dataset. So the support vector machine technique is used for classification of leaf disease. The trained classifier used to group different pictures. For this purpose the training image were divided into two denoted as ds1 and ds2. SVM is binary classifier which used hyper plane this hyper plan is a line in each class way.



Architecture for pixel-wise segmentation of crop and weed

III. EXPRIMENTAL RESULT:

In this paper k means algorithm is used for image segmentation And SVM for classification the result obtained is disease name The system accept the input image, these image are unknown to SVM classifier compare the image feature based on previously Trained image feature and produce the output. The input leaf Image for the system taken are The image were classified in 8 classes: bacterial leaf blight, brown spot, false smut, healthy, hispa, leaf blast, neck blast, sheath blight rot.

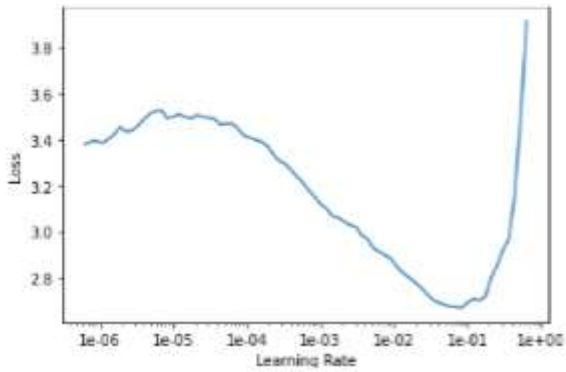


Sample for disease detection in paddy leaves.

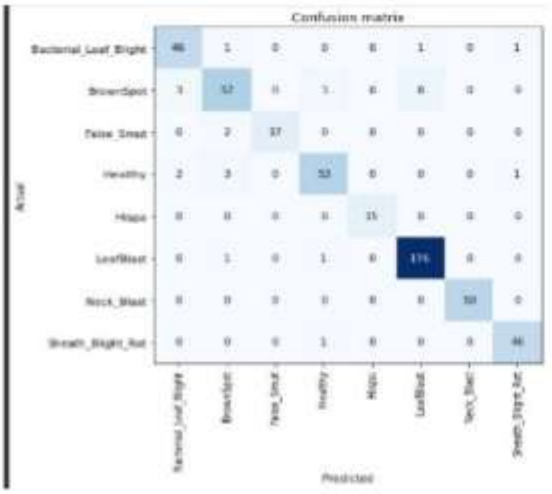
CLASSIFICATION RESULT WITH ACCURACY

EPOCH	TRAIN LOSS	VALID LOSS	ACCURAY	TIME
0	0.593	0.568	0.800	02:22
1	0.598	0.594	0.786	02:23
2	0.625	0.611	0.784	02:21
3	0.599	0.571	0.804	02:19
4	0.568	0.585	0.794	02:17
5	0.538	0.543	0.812	02:22
6	0.491	0.520	0.817	02:15
7	0.466	0.519	0.811	02:17
8	0.428	0.508	0.829	02:17
9	0.420	0.505	0.832	02:17

Learning rate finder is complete, type{learner_name}.recorder.plot( ) to see the graph



Then image were classified in 8 classes



On test data accuracy is around 85%

RESIZE ORIGINAL DATA

IV. CONCLUSION:

Detection & identification of leaves disease using multiclass SVM plays very important role in agriculture solution to their problems. the algorithm predicted the rice leaf disease with varying degrees of accuracy. It is observed that CNN model with high level fusion technique is the best solution with test accuracy exhibiting. This approach facilitates the use of simplistic statistical learning techniques together with a decreased computational workload to ensure both high efficiency and high classification accuracy. Overall results indicate that deep based semantic segmentation of paddy crop and weeds can be used. And this towards sate food production. the pre-trained U Net model was chosen for feature extraction since it provided a promising performance in the general texture dataset evalution and exhibited the smallest processing time. Hence in future work, the quality of the solution image will be improved by using quality of the enhancement methods. Also the proposed method will be used for crop weed segmentation in multi-spectral image.

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