AN IMPLEMENTATION OF SVM CLASSIFIER FOR BACTERIAL BLIGHT IDENTIFICATION

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Abstract

The image Classification is the process of finding and grouping the correlated pixels in the particular image. There are different types are available find the correlated pixels in the image. In this paper, the Support Vector machine is used for Classification to identify the bacterial blight disease in a paddy leaf image. At first, the input samples are converted into Gray scale images, after that those images are processed by Support Vector machine to produce the classified image output. The Support Vector machine based on the grouping of similar pixels and the allotment of the center pixels. By repeating the same process several times, then the output classified image will have excellent object classifications. Out of several algorithm for image Classification, the Support Vector machine classification will provide good results. The objects classification is purely based on the correlation of pixels available in the image. After processing, the image reshaping also performed for better visualisation of the classified image.

KEYWORDS: Image Processing, Image Classification, Support Vector machine Classifier, Vector Centers, Label Function, Reshaping

1. INTRODUCTION

In the field of image processing [3], there is a similarity between the object tracking [5], object detection and object classification [1]. The image Classification concept is mostly related with the concept of object classification in an image [2]. The image detail will be preserved in every concept of image processing [4], which is also applicable for the Classification [6,26]. The vectoring is based on the observation of the correlated pixels in the particular frame [8] and forming those pixels together [7]. The pixel forming has the center pixel [10], which is also to be decided by the algorithm [11], used to measure the distance between the node pixel [9] and the correlated pixels for different object detection [12]. W.Zhao et.al, (2020) implements the machine learning concept with the help of Recurrent Constraint Network for image Classification. It gives more effective output because of the supervised focus region technique. Y.Chen et.al, (2020) have done the approximation in the pixels using the Low Rank Quaternion in a color image and processed better for good Classification results. V.Jatla et.al, (2020) uses a novel method of coronal hole Classification, the newly developed methodology improves the object classification in a better way. X.Deng et.al, (2020) improved the resolution of an image

along with the Classification, which are processed by the double coupled network. The ISTA is the type of network which is newly implemented in the multi modal images.

2. RELATED WORK

B. Demir et.al, (2009) estimates the Flow of the frames during the movement of objects in an image during Classification. The video processing is also done like enhancing, deblurring, etc. S. Manthira Moorthi et.al, (2011) implements deep learning algorithm to estimate the loss function parameters to achieve the efficient image Classification. Z. Xiang et.al, (2014) also performed the video processing to distinguish the foreground and background information of the particular frames. Additionally, the Tensor completion method is used as video frame assistance. X. Deng et.al, (2020) used the conventional convolution method using variational Bayesian formulas for the pathological images. W. Chen et.al, (2018) used the adaptive networks for scale estimations for the semantic object differentiation. B. Kim et.al, (2020) distinguishing the objects instantly using the SSD Filters. This is a single stage approach which produces the effective Classification results. I. Colkesen et.al, (2016) also referred the Mumford-shah model which is already referred by the N. Hidalgo-Gavira et.al, (2020) but the difference between these two implementations one researcher uses the loss function and another researcher uses the discrete method with minimization. The alternate data points are helpful for the object classification. C. S. Janadri et.al, (2017) also implements the Neural Network to estimate the smoke density. The wavelets are also used to find the unknown data points with the help of known data point parameters. A. Kumar et.al, (2018) implemented the robust algorithm for exact placements of the objects. The shaping modal in the deep learning neural network helps to achieve these proper placements of an objects. V. Solanki et.al, (2018) also used the shaping of an image after the blur filter is applied to an image. The process of reconstruction and recovery of the image is done by ranking the data points available in the image which are estimated by Hankel Structured modal. Parveen et.al, (2015) tried for the faster estimation of the data points with high accuracy using the sparse representation parameters for image Classification.

3. PROPOSED METHODOLOGY

The image is applied in the input side will be converted into Gray image as shown in Fig.3 and the Support Vector machine classifier is applied to get the Classified image at the output which is shown in Fig.4.

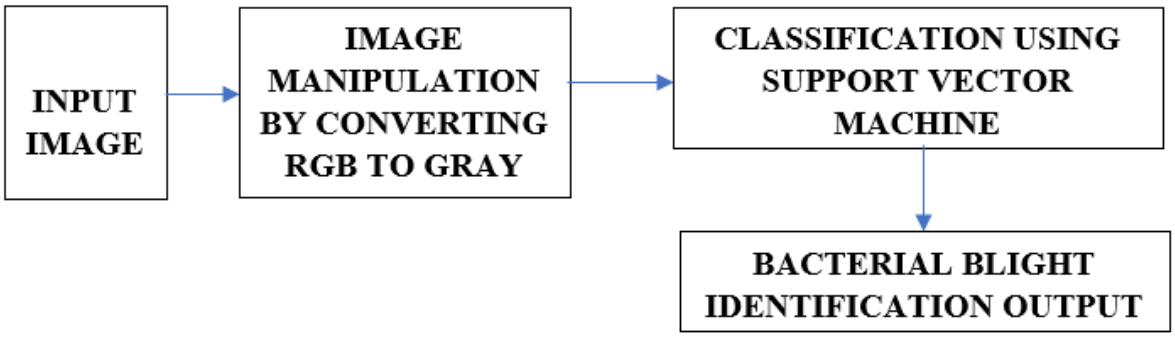


Fig.1. Flow Sequence of Proposed Implementation

In the first step of the Support Vector machine classifier, the data points are created and those points are separately grouped for further processing [13, 18, 21]. The formation of the group based on the similarity between the data points [16, 17,24]. Those similar data points which are grouped together is also called as the vectors. There are many vectoring algorithms are available. The Support Vector machine classifier is one of the efficient and widely accepted algorithms that is used in this implementation. The number of the vectors available in an image can be represented as V in the Support Vector machine classifier.

In the beginning of the algorithm, it is choosing a group of vectors out of all vectors and it allots the data points to those vectors for further steps of processing.

The next step of the processing is finding out the center point of the vector to calculate the distance of each and every data point from the center point [25]. The reallotment of the data points is done based on the distance calculation to the short distance vector [23,27]. Again, it will find out the center point for the recently grouped vectors. Based on these steps, the image Classification quality will be improving by repeating those steps again.

The algorithm of the proposed model are as follows

i) The process of image acquisition using High resolution capturing device.

ii) The image is in the form of binary which is further converted from RGB to Gray form.

$$\text{Grayscale image} = [(0.3\text{Red}) + (0.59\text{Green}) + (0.11\text{Blue})] \quad (1)$$

iii) The process of image Classification is applied with the Support Vector machine classifier method.

iv) The vectoring approach includes all mathematical models and post processing approaches.

$$V(C) = \sum_{p=1}^{m} |Di| - \sum_{q=1}^{n} |Ci| \quad (2)$$

Where,

V(C) = Support Vector machine classifier

m=number of center vectors

n=number of data points of final vector

D=set of data points

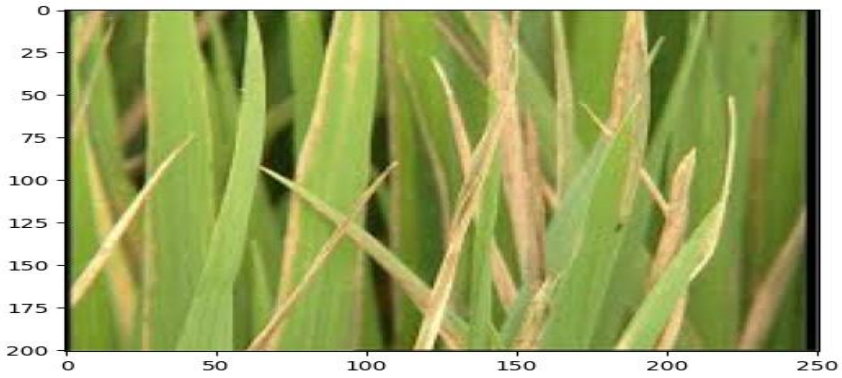
C=set of vectors

v) Finally, the image Classification output is obtained for all input images as shown in the figure 4.

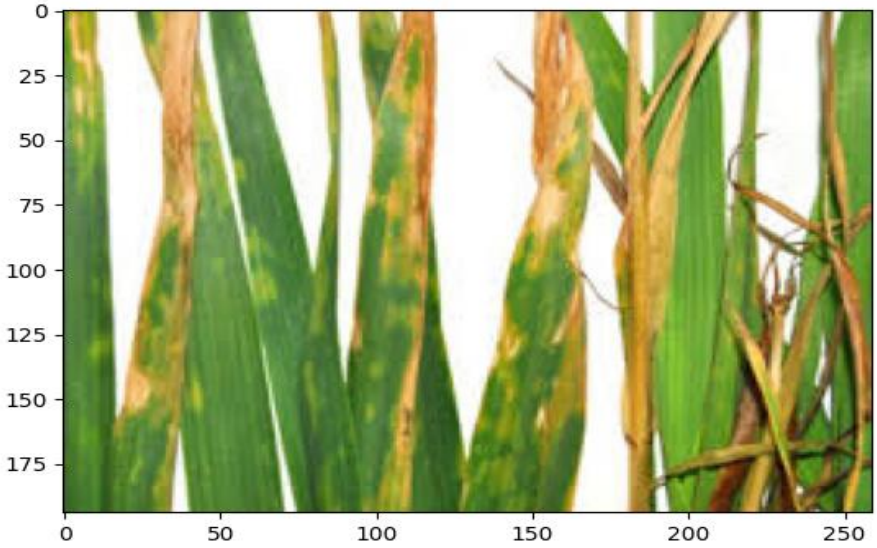
4. RESULTS AND DISCUSSIONS

To implement this SVM based image Classification, there are three number of natural sample images with different scenes and different luminance conditions are taken which are shown in figure 2.

(a)



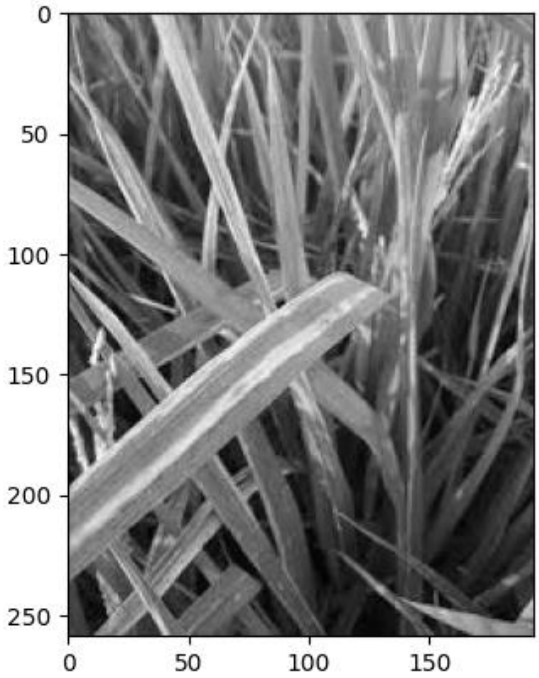
(b)



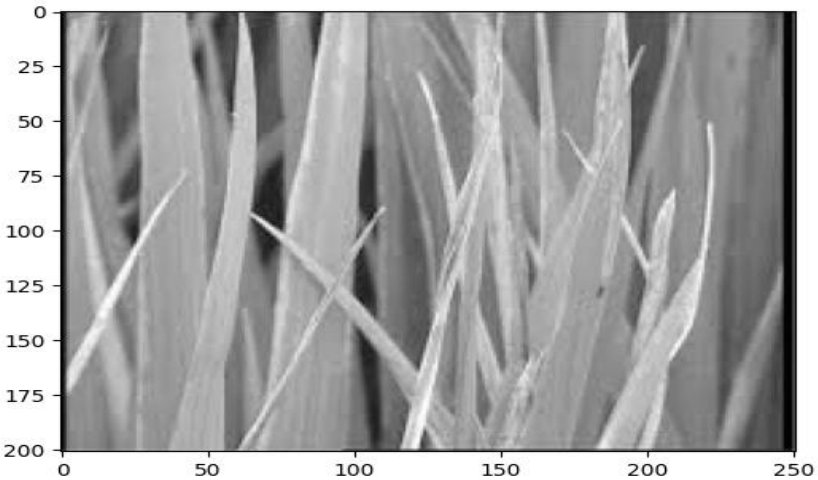
(c)

Fig.2. (a), (b) and (c), Sample input images

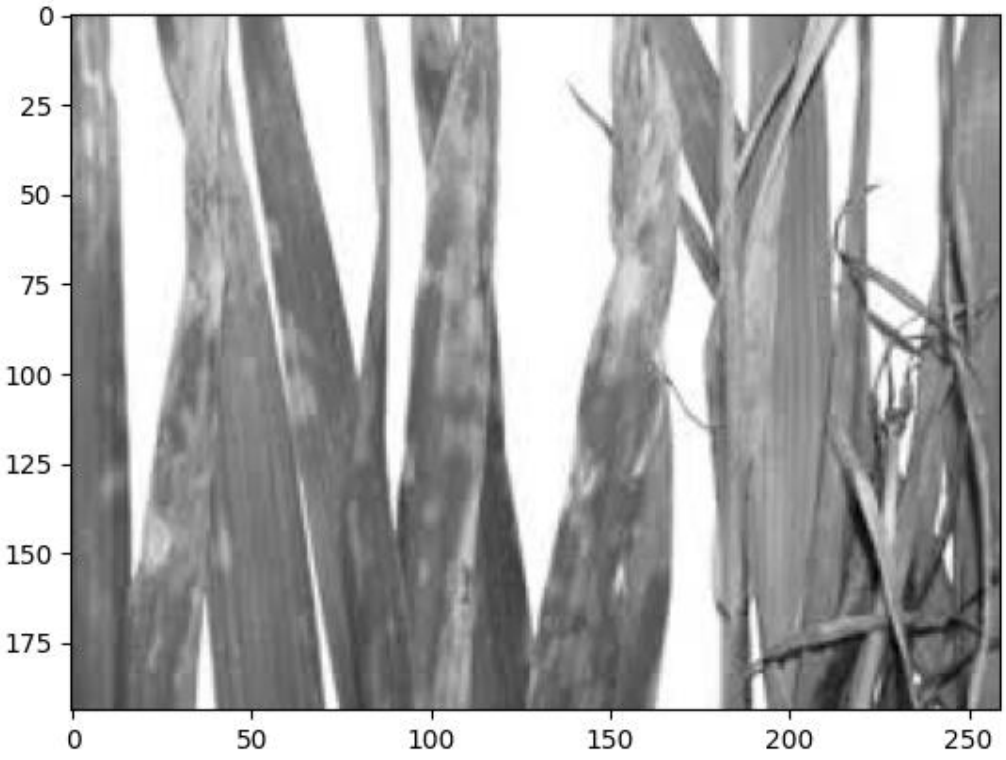
These images are taken as a sample images to compute the SVM Classification and the same are converted to the Gray scale images as the first step and the pre-processing step of the image Classification which are shown in the Figure 3. In that, it is clearly showing that the difference of images under various luminance conditions.



(a)

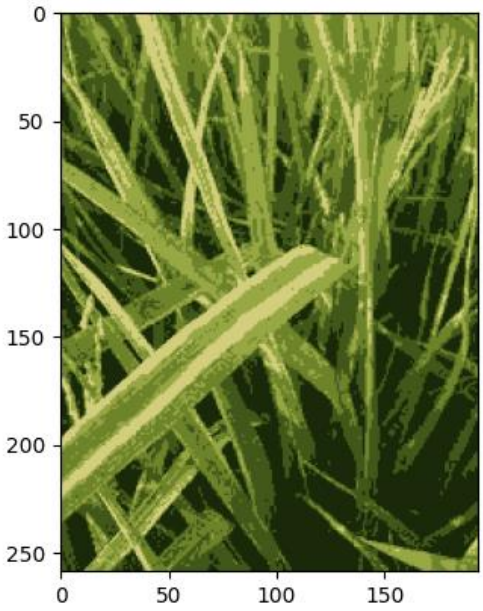


(b)

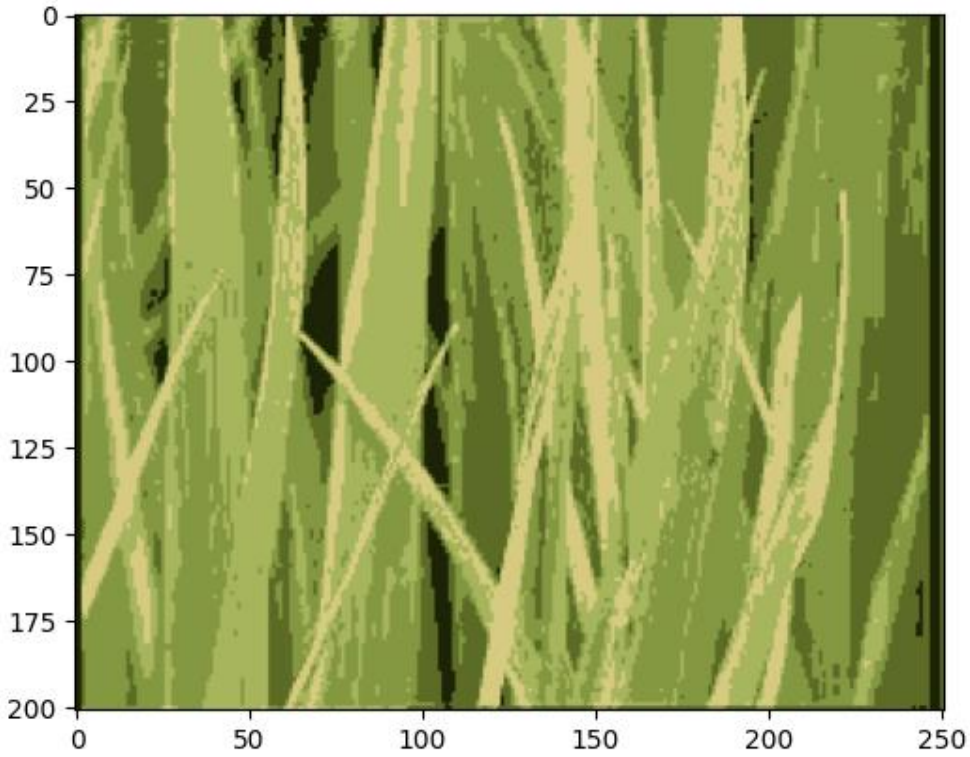


(c)

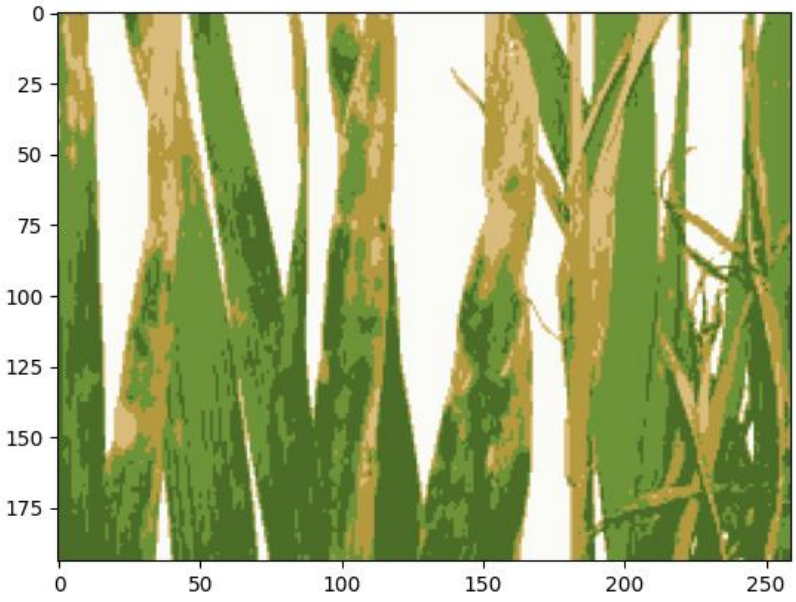
Fig.3. (a), (b) and (c), Images After RGB to Gray Conversion



(a)



(b)



(c)

Fig.4. (a), (b) and (c), Images After Support Vector machine classifier

The obtained output images are clearly showing the Classification with natural background on the image which are represented in the figure 4. The Classification output is achieved for all the six input sample images by converting them into Gray scale images for further processing and the post processing is also done to obtain the efficient Classification output.

5. CONCLUSIONS

The efficiency of the Support Vector machine classifier is observed in this implementation by trying out with six different sample images. In that, the foreground and background classification are clearly distinguishable based on the grouping of data points. The classification in the output based on the illumination in an image which is clearly observed at the output images in comparison with input images. It is only possible by calculating the distance of nearest neighbour to form the vectors. The concept of using label function and center the vector improves the quality of Classification and finally the image reshaping is also done to coincide with the input sample images.

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