Detection of Avian Pox Disease using K-Means and Svm Classifer

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Abstract: ***This paper discusses about various methods involved in detection of avian pox in the birds using images. Digital images are corrupted while sending and receiving the images because of noisy sensors which degrade the quality of image. Pre-processing becomes an initial and crucial step in image processing to remove the noise and maintain fine details and texture of the image. Pre-processed images can be used for further work. Mean, Median, Weiner, Mean Maximum, Mean Minimum filters are used and performance tests are made using Signal Noise Ratio. Based on the performance test, removal of impulse noise is well done by Median filter and produces the best result when compared to other filters. K-Means clustering and SVM are used for identification of the disease.***

Keywords—Avian Pox, Pre-processing, Median Filter, K-Means, SVM

INTRODUCTION

Avian pox is a slowly growing disease in birds caused by several strains of avipoxvirus. Avian pox is usually transmitted by mosquitoes, the symptoms of this virus is appearance of warts. Avian pox occurs in just these two forms: cutaneous pox and diphtheritic or also known as "wet" pox. Cutaneous pox can be seen on external regions of the body in un-feathered portion, Diphtheritic pox occurs in wet areas. This virus can cause death of birds in large number. Identification of this disease becomes very important. This process includes pre-processing and segmentation.

Digital images are often damaged by different kinds of noise while transmitting or receiving the images because of errors produced by noisy sensors. This noise could degrade the fineness of the image and cause damage to the fine details and texture of the image. To upgrade the quality of the image and make it more productive pre-processing becomes an important step in the image processing. We present different methods to remove the noise from images and also compare various methods for detection of the disease using the images. This paper includes various active filters like median, mean, wiener, mean maximum, mean minimum for removing the noisy disturbances from the images and for segmentation we have K-means clustering, SVM, ELM methods.

The existing method for avian pox detection is through naked eye expert observation. For this it requires a group of experts and continuous observation. At the same time, some people might not be having such contacts and also would cost a lot for them. In large poultries or sanctuaries, it will be difficult to do the detection of the disease in a continuous stretch and also it is very difficult to identify it at earlier stage of its growth. Small warts or any other sign might go undetected by naked eyes. Suggested methods seems more beneficial in monitoring. Automatic detection by just seeing the symptoms makes it much easier.

Visually detecting the disease is more labor and time consuming task and is less accurate. Whereas if it is automatically detected it will be less effortless and more accurate. K-means clustering and SVM are the two techniques used to identify the disease affected areas.

LITERATURE SURVEY

Hemalatha, C.,et.al[1] They have worked on elimination of pepper and salt noise from the affected image. They have compared the three filters i.e median filter, weiner filter and mean filter. They have also calculated mean square error (MSE) and peak signal noise ratio(PSNR) values for all the filters for different noise ratio and based on the performance of evaluation test they have concluded that median filter is most suitable one for removing the pepper and salt noise.

Kaur, S.,et.al[2] They have listed various types of noises and the techniques to remove them. Some of the techniques given provide good results in removal of noise and also preserve the edges having fine details present in the image. They have used MSE, MAE, PSNR and SNR evaluation metrics to check the quality of image. Some of the techniques given give a very good result for particular type of noises while they do not give very good results for other type of noise.

Zhu, Y., et.al[3]They have given a better and an improved algorithm for median filtering technique for reducing the noise in image. They have used an algorithm which adaptively resizes the filtering mask on the image based on noise with respect to the noise levels of the mask. Median filter have time complexity problem, so they have proposed a new algorithm to reduce time complexity.The result is that the improved algorithm gives a better output for noise reduction and time complexity.

Kohli, M.,[4]In this paper, image-denoising proposed filter is implemented for edge preservation and denoising the corrupted image and proposed median filter is introduced for removal of salt-and-pepper noise. Results show that the given method gives a much better performance than the standard

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median filter and adaptive median filter. Saxena, K.,[5] Paper uses the hybrid fuzzy system to enhance the iris image. For removing noise (salt-pepper) from Iris images, all the three techniques were applied, and the outputs obtained from all techniques were compared. The enhanced images were compared with existing methods and showed the improved quality of the images.

Y.Zhu,[6]They had proposed a new filtering algorithm called median for reducing the noise. They have used an algorithm which adaptively resizes the filtering mask on the image based on the noise according to noise levels of the mask.

Hemalatha, et.al[7]They discussed about pre-processing, feature extraction and detection. They have used two computing approach like svm(Support Vector Machine) and ELM(Extreme learning Machine). They had concluded that ELM is the best result than the SVM.

Hambal,et.al [8]They had established many filter techniques. Linear filtering and non-linear filtering techniques are proposed for reduction of noise. Linear filtering techniques were not able to eliminate impulse noise effectively and nonlinear filters give best results with impulse noise. And they gave the different techniques and compared the results with those techniques.

Maheswari, et.al[9]They have attempted to remove salt and pepper noise from several types of compound images. They have used Median filter for removing the noise in different types of compound images and compared those images. They concluded that it holds good for document type compound image than scanned image.

Patil, R.,et.al[10] This paper is meant to help within the classification and detection of leaf diseases of grape using SVM classification technique. Initially the morbid region is found using the k-mean algorithm, then each color and texture options area unit extracted. Finally, classification technique is applied to observe the disease type of leaf. The proposed system can identify and classify the image successfully by detecting the diseased part.

Existing System

Present system takes an color image as input converting it to gray scale and then apply various noises and removing it by implementing various filtering techniques to obtain an enhanced output.

Proposed System

Our proposed system takes a color image as an input, adds salt and pepper noise and then applies median filter to it to obtain an enhanced output, then to that image apply K-MEANS clustering to cluster the images which detects the diseased part, SVM classifier is implemented to detect disease portion in the image.

Proposed Method

Median Filter

Step 1: Input the image, which is the basic and important step, feed the image which is raw and needs to **b**e pre-processed for further usage in the process.

Step 2: Add pepper and salt noise (appearance of white and black dispersed dots on the image) to the image so as to get the clear edges of the image, we add this noise to understand the process of De noising, any noise in that case is added for testing process.

Step 3: Median Filter is applied to the noised image as it very well suits our purpose of edge preservation while removing the impulse noise.

Step 4: We get a fine image with no details corrupted which can be used further in the process.

K Means

Step 1: Input an image. The inputted image should be the pre-processed image from the previous step.

Step 2: Enhance its size and color to provide a better input for further steps in clustering.

Contrast Enhanced

Use of K Means clustering for segmentation.

Its main aim is to cluster the observations with the nearest mean.

Convert the Image from RGB scale into L*a*b* Color Space

The L*a*b* space has luminosity layer; L* chromaticity-layer a and b.

All of the color information are present in a and b layers

Step 3: Classify the colors in a*b* color space using K means.

Since the image contains three colors create three clusters. calculate the distance using Euclidean Distance Metric.

Cluster 1

Cluster 2

Cluster 3

SVM

Step1: Select Training Image

These are the images which are used to train the system to train it to detect the diseased portions of the image. System will easily detect the diseased image. The training image should be proper.

Step 2: Input Image

Select the image which we have to segment and to detect the diseased part. The colored image will be displayed in the figure 1

Step 3: Color to grey scale

This is the first step in SVM code. It will convert the color to grey scale image and also add salt and pepper noise to get the fine details. The filtered image will be displayed.

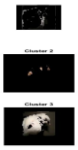
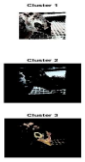
Step 4: Segmented image

At the last step it will detect the diseased part in the given image by using SVM classifier.

Results

The table below contains the results obtained after performing our proposed method.

The first column consists of the original image which is given as an input, the next column consists of image which is filtered using median filter on the noise effected image, then there is a column which has the k means clustered image in which the disease is detected, the last column has the svm classified image in which the diseased part is highlighted.

Sl.No	Original	Filtered	K Means	SVM
1				
2				
3				
4				
5				
6				
7				
8				

EXPERIMENTAL SETTINGS

The dataset that we have used contains images of various birds from internet. We have collected 200 images in which 100 are diseased and 100 are non-diseased. For K-Means classification we have used 100 images in which 90 images are properly clustered. For SVM classifier we have used 90 images for training and 50 images for testing in SVM classification.

ACCURACY TABLE

Classifier	Accuracy	Maximum Accuracy
K-Means	75%	100%
SVM	50%	100%

CONCLUSION

The obtained results are pre-processed image in which the noise is removed using filtering technique and on this obtained image k-means is applied and clustered images are obtained in which the diseased portion is detected in the image. SVM is also applied to detect the portion which is diseased.

Further different datasets can be collected, this paper concentrates only on cutaneous type of pox later diphtheritic type of pox images can be collected and worked on.

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