Prediction Of Hematologic Cancer And Restoration Of Blurred Image Using K-Means Clustering Algorithm And Neural Networks

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Abstract :Image Processing is the process of analyzing and manipulation the digitized image, so as to improve its quality. Motion blur is generated when people capture a picture that may be in non-liner motion, image may be affected due to blur and noise. Image restoration recovers the original image from its blurred appearance. The image degradation is the capture of the motion pictures between the camera and the object which may blur the captured image during its formation. In existing system, blurred image restoration is done based on fast blur-kernel algorithm that quickly finds the best kernel among the set of available kernels. Motion blur estimation is quite time-consuming. Degradation may also occur in medical images such as CT scan images, X-ray etc.In proposed system, it restores the blurred/degraded medical (blood tissue) images using Blind Deconvolution algorithm. The basic step of deblurring image is to perform de-convolution in the degraded image with the PSF that describes the distortion. This system can effectively increases the executing time and produces the best high quality of deblurred image. The recovered blood tissue images are compared with the normal (non-affected) blood tissue images by using Feed Forward algorithm. The feed forward approach and takes care of spatial correlation between neighboring pixels of the image by comparing two images. It compares the affected and non affected cell among the clusters and produces the result . This algorithm can efficiently reduce the computational time and the hematologic cancer is predicted with high accuracy.

IndexTerms:—Pointspreadfunction(PSF),GrayLevelco-concurrencematrix(GLCM)

1 Introduction

The process of removing the blurred, noisy data from the affected image ,and reverting the image to its original form is Image restoration. Image distortion may also occur in medical images. Cancer is a widely spreading disease. Prediction of cancer is a very long process and it involves many risks. Proposed system is used for the prediction of hematologic cancer and provides a safer and riskless environment.

2 Related Work

The blood tissue images are used to predict the blood cancer. These images are deblurred using Blind deconvolution algorithm. Deblurred images are then converted in to Lab component images and L component images are further taken for the clustering process . The cluster formation is done using k-meansclusteringalgorithm. The nucleus extraction is done as a result of cluster formation. In neural network the texture areextracted from

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2.1 Existing System

The system proposes an blurred image restoration based on fast blur-kernel estimation. To estimate the power spectrum of the blur spectral whitening formula is used. In next step, blur kernel is recovered by using a phase retrieval algorithm for improved convergence and disambiguation[1].A deconvolution approach is faster and uses hyper-Laplacian priors. This work[4] uses iterative phase retrieval algorithm and normalized sparsity measure to obtain the best kernel and to achieve the deblurring.

2.2 Proposed Work

The blood tissue images are used to predict the blood cancer. These images are deblurred using Blind deconvolution algorithm. Deblurred images are then converted in to Lab component images and L component images are further taken for the clustering process . The cluster formation is done using k-means clustering algorithm. The nucleus extraction is done as a result of cluster formation. In neural network the texture of the images are extracted. Then the clustered input image is compared with the neural network and then it is classified in to cancer affected cell and normal cell.

$$y = k \otimes x$$

where x - sharp image, and k - non negative blur kernel for (x, k) - infinite set of pairs, k -delta kernel and x = y. The Blind Deconvolution Algorithm can use the images affected by distortion (blurring and noise) efficiently. The algorithm efficeiently restores the image by removing the noise and also obtains the point-spread function (PSF) simultaneously.

3.METHODOLOGY IMPLEMENTED

3.1 Read image:
The input image is read with an high intensity . The deconvolution blind function handles array of any dimension and it reduces the noise and blur found in the image.

3.2 Simulate a blur:
Simulating an image is the process of simulating the blur by using a Gaussian filter with the true image and the outcome represents a point-spread function, PSF.

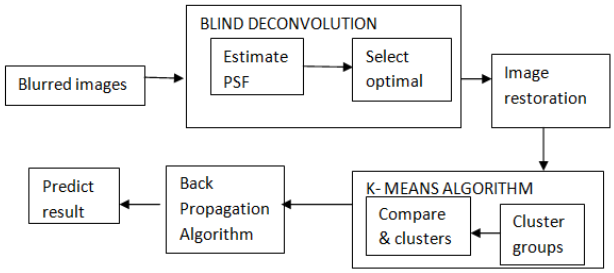
3.3 RESTORE THE BLURRED IMAGE:
Three restorations are perfomed to obtain the true PSF performed, reconstruction of PSF starts from an uniform array.

3.4 ANALYZE THE RESTORED PSF:
Restorations produces a PSF. In Gaussian filter, the maximum values at the center are represented as white and diminished values at the borders which are represented as black. The PSFrestoration, is considered to be intermediate, where array resembles the true PSF.

3.5 IMPROVING THE RESTORATION:
The algorithm weights each pixel and restores the image along with the PSF, desirable threshold level 0.3 is maintained. The image is restored by deconvolution blind with an increased number of iterations.

3.6 PSF RESTORATION:
A modified PSF array is used by the deconvolution blind for the next iteration. It modifies the PSF by cropping and pads the array with zeros to its original size, where center value remains same, but effectively reduces the PSF size.

3.7 ARCHITECTURE DIAGRAM:



MODULE 1: *Sample data set collection.*
MODULE 2*: Blurred image to normal image.*
MODULE 3: *Classification of blood samples.*
MODULE 4*: Prediction.*

3.8 READ/WRITE MODULE:
The read /write module performs the basic operations of loading and saving the input .It also obtains the resultant images from the algorithms. The image files are read, processed and the predicted results are displayed.

3.9 DEBLURRING MODULE:
The blurred images are deblurred by using Blind deconvolution algorithm. Based on the PSF value the images are deblurred. Blind deconvolution is the process of recovering a sharp texture of an input from the blurred image even if the blur kernel is unknown. Decompose a blurred image y as

$$y = k \otimes x \quad (1)$$

x - visually sharp image, and k - non negative blur kernel. (x, k) -an infinite set of pairs.

1 - no-blur explanation: k - delta kernel and x = y.

3.10 COLORSPACE CONVERSION:
The RGB colorspace is converted in to LAB colorspace.It is converted to Lab colorspace because in L component in the nucleus of the cell is viewed clearly.

3.11 KMEANS CLUSTERING:
L component image is taken for clustering. In this different color groups are grouped in to different same colored group. Hence the nucleus is clustered in to separate group.

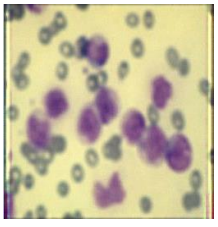
3.12 FEATURE EXTRACTION :
The affected and normal images are trained with feature extraction From the input image the Contrast, Correlation, Energy and Homogeneity are extracted based on the texture & features .The gray scale conversion is calculated based on pixel value i - spatial relationship to a pixel with the value j. Each element (i,j) in the resultant glcm is the sum of the number of times that the pixel with value i occurred in the specified spatial relationship to a pixel with value j in the input image. The number of gray levels determines the size of the GLCM.

3.13 CLASSIFICATION AND PREDICTION:
Based on the GLCM, value the images are classified. And the predicted result is obtained. BackPropogation Algorithm is used for prediction of cancer cells. The algorithm compares the input data with the already existing data and produces the result.

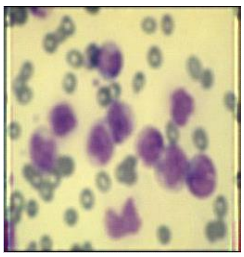
4 RESULT AND ANALYSIS:
This system is developed to deblur the blurred blood tissue images. And the deblurred image is then clustered for feature extraction. Then it is classified in to normal or cancer affected cell.

4.1 TRAINING MODULE:
This process follows unsupervised learning and requires training data set .Training dataset contains both affected and non-affected blood tissue images. It follows iterative process and stores details in to neural network database. Once if training process gets over ,then the input image is classified as affected or not in the test module.

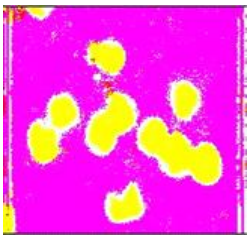
Deblurred image

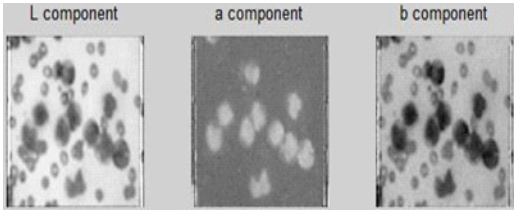


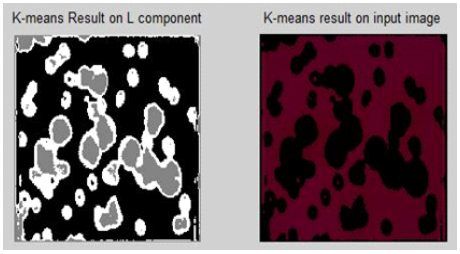
Input RGB image



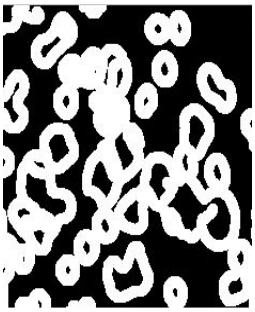
L*a*b color space result



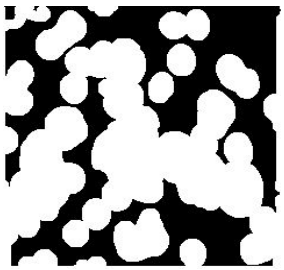




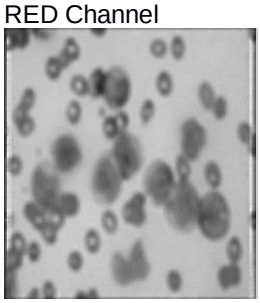
Dilation Result



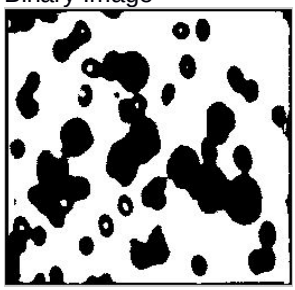
Filling Result



RED Channel



Binary Image



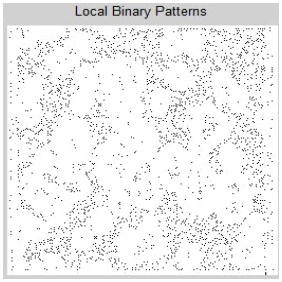
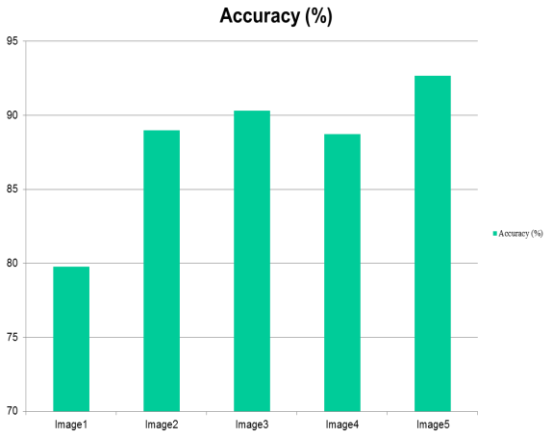


***TABLE 1**: Blurred image restoration*

Image	*Accuracy (%)*
Image1	*79.77*
Image2	*89*
Image3	*90.3*
Image4	*88.71*
Image5	*92.66*



Prediction of hematologic cancer result

5.CONCLUSION

This system is an efficient system to restore the blurred image. Further the restored image can be used for the prediction of cancer and produces accurate result. The process can be further extended for various applications.

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