Blood Cancer Detection In Microscopic Images Of Human Blood Sample Using Image Processing

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Abstract

In this project is to detect the leukemia at earlier stage with the help of image processing techniques. Leukemia means blood cancer which is featured by the uncontrolled and abnormal production of white blood cells (leukocytes) by the bone marrow in the blood. Acute Lymphoblastic Leukemia (ALL) is a type of leukemia which is more common in children. leukemia can progress quickly and if not treated may lead to fatal death within few months is called "acute". Because of this non specific nature of the symptoms and signs of ALL leads wrong diagnosis. Also hematologist finds it difficult to classify the leukemia cells, there manual classification of blood cells is not only time consuming but also inaccurate. The early identification of leukemia yields in providing the appropriate treatment to the patient. Comparing to other methods Detection through images is fast and cheap method as there is no special need of equipment for lab testing. We have focused on the changes in the geometry of cells like area, perimeter and statistical parameters like mean and standard deviation which separates white blood cells from other blood components using processing tools like MATLAB. After recognizing its statistical properties, types of leukemia will be identified based on the irregularities in the shape.

Keywords: *Blood Cancer; Leukemia; Acute Lymphoblastic Leukemia (ALL); Statistical Parameters.*

I. INTRODUCTION

LEUKEMIA is the most critical blood disease, common in children and adults. A majority cancer cell begins in body parts but leukemia is the type of cancer which begins and grows in blood cells .Blood is crucial content without which metabolic functions of bodyseverely affects. Human system is like, cell grows and multiply into new cells. Old cells are destroyed and so that new cells can take their place. In cancer, an old cell does not die and remains in the blood so that new cells which are produced cannot get enough space to live. In this way, functioning of blood disturbs and white blood cells production is abnormal and uncontrolled.

Blood cells are produced from the stem cells present in bone marrow. Blood consists of following components. RBCs has a capacity to carry oxygen to and take back CO_2 away from tissues.WBCs are the cell which fights with the foreign bodies and prevents from infection. There are different types of WBCs like lymphocytes, monocytes, eosinophile, basophilsand neutrophils. According to WBCs types there are different types of leukemia.

II. EXISTING METHOD

Various image processing techniques has been developed by researchers to detect leukemia in microscopic images of human blood samplesSome of them are uses thresholding techniques in determining the ratio of blood cells for cancer cells detection. In thresholding technique, [Abdul Nasir et al3] image processing techniques has been used to count the number of blood cells in the biomedical image. With this counted value of blood cell, the ratio of blood cell for leukemia is calculated. The original image which is converted to grayscale image for which a threshold value of intensity is set in order to differentiate WBC to RBC (thresholding converts a gray scale image to binary image). If results are not satisfied the process is repeated by setting a new threshold value. The results acquired using thresholding technique shows that the ratio of

RBC and WBC for normal image to the abnormal image has different range of ratio. For normal images the ratio is 0 to 0.1 whereas for abnormal images its ratio ranges 0.2 to 2.5 for ALL and 0 to 14 for AML. The disadvantage of this technique is setting of proper threshold value would be difficult and time consuming

III. PROPOSED METHOD

Fig.1: Processing system
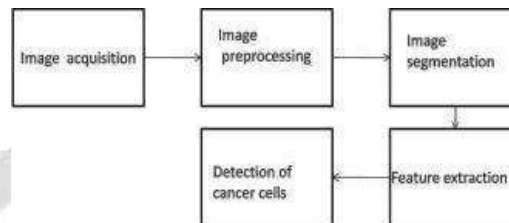
The main approaches for processing and classifying Blood cancer cells based techniques. The proposed system Fig.1 consists of mainly four processes i.e. Image acquisition, Image pre-processing, Feature extraction and Image classification.

a)Image Acquisition

Microscopic images of blood cells are acquired with the help of digital microscope. Digital microscope which has inbuilt camera inside it is in trend to acquire digital images of cell.

b)Image Preprocessing:

Due to excessive stains and manual intervention microscopic images   which are acquired possesses noise. Here noise present are mainly shadows of nuclei. Our region of interest is blood cell nucleus, so we process images to remove unwanted noises and recover important one. Some previous studies proved that the image enhancement technique like contrast enhancement can improve medical image quality. In this enhancement process, images are improved to make it suitable for further stages of processing. Blood cell images are enhancement with the help of linear contrast enhancement technique. Popular contrast enhancement technique is histogram equalization which adjusts the contrast and image intensity as per required.

c)Image Segmentation

Image segmentation of microscopic blood cell images are done to locate the WBCs structure which are abnormal. Segmentation of images means partitioning the image into a set of pixels. A novel cell detection method which uses both intensity and shape information of blood cell to improve the nucleus segmentation. Accuracy of feature extraction of images is depends of proper segmentation of white blood cells. WBCs segmentation means segmentation of nuclei of abnormal cells.

d)Feature Extraction

Features of WBCs are extracted to decide whether the cell is blast or normal. Following are the features which are considered while detection of leukemia. **Statistical:** Statistical parameters like mean, variance, standard deviation and skewness of histogram of image matrix of cell and gradient matrix are acquired. **Textural:** Textural features of WBCs cell include cell homogeneity, correlation factor, entropy, contrast and energy. **Geometrical:** It includes geometrical features like area of cell, perimeter, radius, eccentricity,symmetry and concavity.

e) Classification

Image classification is assigning the pixels in the image to categories or classes of interest. Image classification is a process of mapping numbers to symbols. In order to classify a set of data into different classes or categories, the relationship between the data and the classes into which they are classified must be well understand. Training is key to the success of classification.

Computer classification of remotely sensed images involves the process of the computer program learning the relationship between the data and the information classes. After the images are processed and classified, then the result is displayed.

IV. RESULT AND DISCUSSION

The images are captured through microscopic camera and they are preprocessed to filter out the noises and obtained filter image is undergone feature extraction. The captured image is processed through multi SVM method, and then the output is displayed.

V. CONCLUSION

The purpose of this paper was to implement image processing techniques in deciding presence of leukemia in white blood cell images. Image segmentation of various leukemia types such as Acute Lymphocytic Leukemia (ALL), Chronic Lymphocytic Leukemia (CLL) are covered using MATLAB which is 91 accurate. Image processing technique for leukemia diagnosis is time saving and cheaper as compare to the old laboratory testing method.

REFERENCES

[1] R. Adollah, M.Y. Mashor, N.F.M. Nasir, H. Rosline, H. Mahsin & H. Adilah (2008), "Blood Cell Image Segmentation: A Review", Proceedings of Biomed, Pp. 141–144.

[2] N. Ritter & J. Cooper (2007), "Segmentation and Border Identification of Cells in Images of Peripheral Blood Smear Slides", 30th Australasian Computer Science Conference, Conference in Research and Practice in Information Technology, Vol. 62, Pp. 161– 169.

[3] Abdul Nasir, N. Mustafa & Mohd Nasir (2009), "Application of Thresholding in Determining Ratio of Blood Cells for Leukemia Detection", Proceedings of International Conference on Man-Machine system (ICoMMS).

[4] A. Sindhu & S. Meera (2015), "A Survey on Detecting Brain Tumor in MRI Images using Image Processing Techniques", International Journal of Innovative Research in Computer and Communication Engineering. Vol. 3, No. 1.

[5] Niranjan Chatap & Sini Shibu (2014), "Analysis of Blood Samples for Counting Leukemia Cells using Support Vector Machine and Nearest Neighbor", Vol. 16, No. 5, Ver. III, Pp. 79–87.

[6] Athira Krishnan & K. Sreekumar (2014), "A Survey on Image Segmentation and Feature Extraction Methods for Acute Myelogenous Leukemia Detection in Blood Microscopic Images", International Journal of Computer Science and Information Technologies, Vol. 5, No. 6, Pp. 7877–7879.

[7] Minal D. Joshi, Atul H. Karode & S.R. Suralkar (2013), "White Blood Cells Segmentation and Classification to Detect Acute Leukemia", International Journal of Emerging Trends &Technology in Computer Science, Vol. 2, No. 3.

[8] Xu Gongwen, Zhang Zhijun, Yuan Weihua & XuLi Na (2014), "On Medical Image Segmentation based on Wavelet Transform", IEEE.