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Classification of various shape features of Micro-Based white blood cells by Segmentation Method

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Abstract:- In order to improve patient diagnosis various image processing software are developed to extract useful information from medical images. Hematologist makes the microscopic study of human blood which led to a need of methods, including microscope color imaging, segmentation, classification, and clustering that can allow the identification of patients suffering from leukemia. Leukemia is related with blast white blood cell (WBC). This paper has proposed threshold blood cell segmentation method along with image enhancement and arithmetic for WBC segmentation and using Euclidean distance extract various feature of leukocytes in blood cell.

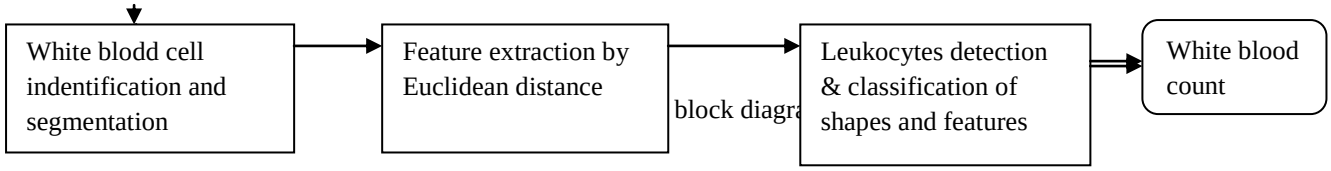
Keywords:- blood cell count, euclidean distance, Micro-based cell shape extraction

I. INTRODUCTION

Microscope-based white blood cell classification is still an important source of data for clinical cytology in pathologies fields, even if blood cell analysis has beenprogressively developed using various new technologies. In order to improve the accuracy, an automatic classifierbased on blood smeared images is proposed. There are five typed of white blood cells which are classified as granulocytes and agranulocytes .The granulocytic series include neutrophilic granulocyte (N), eosinophilic granulocyte (E) and basophilic granulocyte (B).The agranulocytic series include lymphocyte (L) and monocyte (M). The early and fast identification of the leukemia type, greatly aids in providing the appropriate treatment for the particular type. Its detection starts with a complete blood count (CBC) . If the count is abnormal, the patient is suggested to perform bone marrow biopsy. Therefore, to confirm the presence of leukemic cells, a study of morphological bone marrow and peripheral blood slide analysis is done. In order to classify the abnormal cells in their particular types and subtype of leukemia, a hematologist will observe some cells under a light microscopy looking for the abnormalities presented in the nucleus or cytoplasm of the cells. Hence automatic technique is adopted for fast and accurate results. In this technique image of blood sample is processed and nucleus part is segmented and finally cells are classified whether they are blast or normal one .

II. METHODOLOGY AND DESIGN SYSTEM

Figure 1 shows the block diagram of a proposed system. It consists of various functional modules. The main two steps in the proposed system are image segmentation and classification. The input image of blood slide is fed to the system.



White blood cells fall into five categories: Neutrophil, Eosinophil, Basophil, Monocyte and Lymphocyte.As there are many categories to identify leukocyted they are identified by segmentation method which include conversion of colour image into grayscale ,thresholding ,edge detection,conversion of RGB image into HSV image.

2.1. IMAGE SEGMENTATION

Feature extraction and classification depends on the correct segmentation of white blood cells.

Thresholding is the simplest method of image segmentation. From a grayscale image, thresholding can be used to create binary images Colour images can also be thresholded. One approach is to designate a separate threshold for each of the RGB components of the image and then combine them with an AND operation. This

reflects the way the camera works and how the data is stored in the computer, but it does not correspond to the way that people recognize colour. Therefore, the HSL and HSV colour models are more often used; note that since hue is a circular quantity it requires circular thresholding.

Edge Ddetection is the name for a set of mathematical methods which aim at identifying points in a digital image at which the image brightness changes sharply or, more formally, has discontinuities. The points at which image brightness changes sharply are typically organized into a set of curved line segments termed *edges*. The same problem of finding discontinuities in 1D signals is known as step detection and the problem of finding signal discontinuities over time is known as change detection.

III. IMAGE SEGMENTATION

3.1 ALGORITHM

- Initially an image is selected and then converted into Gray level image of size.
- With the help matlab,the original and resized image is displayed on the screen.
- Then the gray scale image is converted into threshold image of colour image.
- The value of the concerned parameters, if any, is selected.
- •Then the the edge detection of threshold image is obtain
- Then it is converted into HSV in order to obtain hue and saturation. and clustering is done.
- The segmented image is displayed at a particular position according to the range of the selected value of the parameter.
- Every output image in that figure window contains the value of parameters and the duration of process

3.2 SEGMENTATION IMAGES

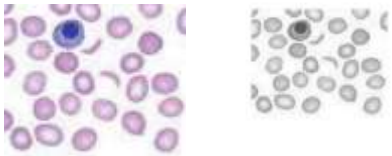


Fig1.Conversion Rgb To Grayscale

Fig 2.Grayscale To Threshold

IV. FEATURE EXTRACTION

4.1 Using Euclidean Distance

The **Euclidean distance** or **Euclidean metric** is the "ordinary" (i.e. straight-line) distance between two points in Euclidean space.In image processing the Euclidean distance plays the vey vital role for the feature extraction of blood cell containing leukocytes.

In order to find the Euclidean distance between two images following in the matlab code

```
I = imread('myimage.jpg');
I = rgb2gray(I);
h = imhist(I); % this will have default bins 256
% now second image
J = imread('myimage1.jpg');
J = rgb2gray(J);
h1 = imhist(J); % this will have default bins 256
E_distance = sqrt(sum((h-h1).^2));
```

In order to find euclidean distance between 1000 images matlab code is as follows,

You can do it for 1000 images as well. Let say now your 1000 images histogram are concatenated into **h1**. where each column is one histogram. Then your query image histogram is **h**. Then distance can be computed as follow.

```
h_new = repmat(h,1,size(h1,2));
E_distance = sqrt(sum((h_new-h1).^2));
```

V. CONCLUSION

5.1 ADVANTAGES:

- The characteristics (quantity, shape and color) of the white blood cell (WBC) can give vital information about a patient's health. Hematologists, with the aid of microscopes, use their experience to classify WBCs and make appropriate reporting and recommendations to physicians.

- Soft computing algorithms including neural network (NN) and polynomial classifiers (PC were used for WBC classification, while watershed and thresholding based on size, shape, color and texture characteristics were used to segment WBC from Red Blood Cells RBC, platelets, cell fragments and stains.
- Using image processing to differentiate WBC could give various advantages including more examination accuracy, less human error and faster analysis time.
- Segmentation and classification of WBC could lead to appropriate analysis of human health where the ration between the types of WBC could distinguish between healthy person from a person suffering from a variety of diseases ranging from an infection to AIDS.
- The experimental results show that the proposed approaches can extract the features efficient.

5.2 LIMITATIONS

- The current approaches classify leukocytes by the color of nucleus and leukocyte cytoplasm . These approaches only provide a limited accuracy
- For classification, neural networks can also be used . Their results are good, but they have not used the number of segments and the shape of segments as inputs, therefore, it is very hard to identify the various maturity

5.3 APPLICATIONS

- The most important application of paper is useful to diagnose not only blood cell but the blood count therefore can be used for in various pathologies all over the world for the accurate and fast result

5.4 CONCLUSION

This project presents a euclidean distance based approach for leukocyte classification from a blood smeared image. The results provided a set of efficient shape features for leukocyte classifiers such as neural networks or other classifiers. The advantage is that the features can be automatically extracted important shape features from a blood smeared image. It is also able to reduce the input number and complexity of leukocyte classifiers using such features. These features are able to distinguish different ages of leucocytes in a smear image efficiently so that the performance of leukocyte classifiers can be improved.

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