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# Detection of Leukemia using Image Segmentation

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**ABSTRACT:** In olden days, cancer detection at early stage and its prevention became a difficult task to predict and enhance the stage and image techniques to improve resources for accuracy is not available. Due to wrong analysis of cancer presence, patients are treated wrongly. In our method we detect acute myeloid leukemia effectively. After plotting data from image histogram plot and knowing the segmented region, area of cancer can be obtained by classification of cancer and non-cancer cells. Wrong diagnosis leads to patient's death so adequate steps are taken to make diagnosis accurate and to know the features. Effective usage of image tools and regions of infected part are extracted and detection of cancer based on respective growth of region is observed which is 91 accurate.

**KEYWORDS:** blood disorder detection, malignant neoplastic disease detection, linear distinction, bar graph equalizing.

## I. INTRODUCTION

Leukemia is usually ascertained in kids and adults. the results of blood cancer and its symptoms area unit weight loss and mental behaviour amendment, prolonged unwellness, delayed healing. The late symptoms conjointly play associate degree quantity of growth of cancer cells and that they area unit fever and pain. Prediction of presence of cancer mistreatment microscopic pictures needs the set of pictures and tools to accumulate a picture and supply sweetening to a part of image and when extracting the required options, next step is to represent the distinction between traditional cell and neoplastic cell. Then establish the areas of various regions of image and supported threshold estimation to notice the presence of cancer is analysed.

### A. Options of Red Corpuscle:

The operate of the red cell and its haemoglobin is to hold oxygen from the lungs or gills to any or all the body tissues and to greenhouse gas, a stuff of metabolism, to the lungs, wherever it's excreted. In invertebrates, oxygen-carrying pigment is carried free within the plasma; its concentration in red cells in vertebrates, so oxygen and greenhouse gas area unit changed as gases, is a lot of economical and represents a crucial organic process development. the red cells area unit sometimes spherical and a tiny low proportion area unit oval in traditional person.



Figure 1. Red Blood Cell

## B. Features of White Blood Cell:

White blood cell is also called as leukocyte and it contains nucleus and defends the body against infection. An abnormal increase in white cell number is leucocytosis. On the basis of their appearance under a light microscope, white cells are converted into lymphocytes, granulocytes and monocytes. White cell count may increase due to physical exertion, convulsions, certain disease states.

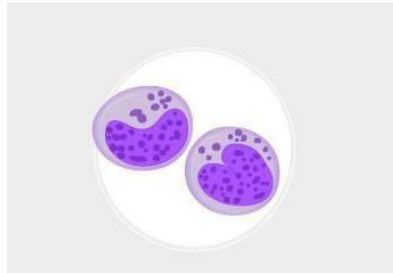


Figure 2. White Blood cell

## C. Types of Leukemia:

### 1. Acute Lymphocytic Leukemia (ALL)

All of men are the most common compared to women This exists in children 1-12 years of age and 40-year-old males. Here white blood cells are affected is known as ALL.

### 2. Acute Myeloid Leukemia (AML)

It occurs in patients of 1 year of age and old age. This myeloid d row is impaired by stem cells. The main signs of acute mye loid leukemia are elevated spleen and bone pain.

### 3. Chronic Lymphocytic Leukemia (CLL)

At an early stage, it does not show any symptoms. This happens in elderly patients suffering from diseases of old age. Lymphocytes are affected.

### 4. Chronic Myeloid Leukemia (CML)

Genetic modifications take place in myeloid cells at a preliminary stage. It occurs in middle age patients of age 35 45 years.

## II. PROPOSED WORK

Loading an image in MATLAB and performing enhancement and contrast stretching on image. Convert the image from rgb to grey and, then extracting the features based on thresholding and obtaining cancer parts and area, eccentricity, perimeter, length of infected part using region analysis. After identification of infected areas, set the threshold range to estimate the presence of cancer. Then by using morphological operations, set the background characteristics and perform operations to extract background and foreground.

Then utilize multiple images and classify cancer cell and non-cancer cell and analyse the outcomes efficiently using image tools and classifiers and pixel intensity, range can be known. Accuracy can be predicted based on the outcomes and measures to verify different shapes and sizes of cancer. Ostu's Thresholding plays a vital role in extracting features. The difference between cancer and non-cancer images are trained and tested.

Other module is to remove noise from the image and perform thresholding and background extraction and image segmentation using Sobel edge detection, hole filling to know areas.

### A. Steps of process

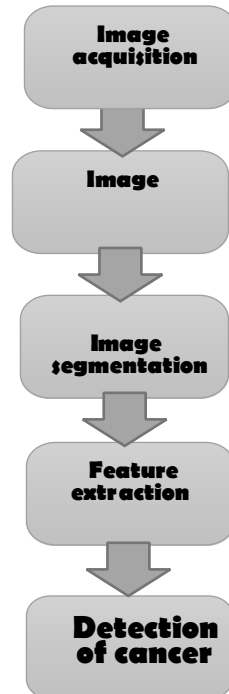


Figure 3. Pattern of steps for automatic

### B. Overview of Process

Figure 3 provides a detailed overview of the sequence of steps taken to detect and identify leukemia effectively.

#### 1) Image Acquisition:

Tiny pictures of platelets are procured with the assistance of advanced magnifying instrument. Computerized magnifying lens which has inbuilt camera inside it is in pattern to procure advanced pictures of cell.

#### 2) Image Pre-processing:

Microscopic images that are obtained are noisy due to massive stains and manual interference. Here, noise is primarily cells outlines. So, we're filtering images to eliminate undesirable noise. Some past examinations demonstrated that the picture upgrade method like contrast enhancement can improve therapeutic image quality. In this upgrade procedure, pictures are improved to make it appropriate for further phases of handling. Platelet pictures are upgrade with the assistance of straight difference improvement system. Well known complexity enhancement method is histogram equalization which changes the contrast and concentration of the image as needed.

#### 3) Image Segmentation:

Image segmentation of minuscule platelet images are done to find the WBCs structure which are unusual. Division of pictures implies parcelling the picture into a lot of pixels. An epic cell discovery strategy which utilizes both power and shape data of platelet to improve the core segmentation. Precision of highlight extraction of pictures is depending of legitimate division of white platelets. WBCs division implies segmentation of cores of anomalous cells. In leukemia persistent white platelets has irregular structure of cores.

#### 4) Feature extraction

While investigating information, the serious issue emerges because of the quantity of factors included that require a lot of memory and calculation. This issue is overwhelmed by highlight extraction [8]. Feature extraction begins with an underlying arrangement of information and yields esteems that are enlightening and non-redundant, bringing about better human translations. The below are the features identified if leukemia is detected.

##### ▪ Geometrical

This encompasses geometric characteristics such as cell volume, perimeter, radius, eccentricity, symmetry and concavity.



▪ **Texture**

WBC cell texture characteristics include cell homogeneity, Correlation factor, entropy, contrast and power.

▪ **Statistical**

Mathematical factors such as mean, variance, standard deviation and skew of the object matrix histogram.

#### IV. ALGORITHM

1. Blood cell's initial microscopic image is obtained and inserted into the process.
2. Modification of the colour image of the RGB molecule to a grey image.
3. Undergo on image operation such as linear contrast enhancement and histogram equalization.
4. Addition of linear contrast image and histogram image.
5. Subtraction of linear contrast image and histogram image
6. Then add the two image which are output of step4 & step5.
7. Using thresholding method, the image of step6 is converted into binary image.
8. After that remove the noise by using the filters.
9. Perform the Sobel operation to the image of step8.
10. Hence, the blood cancer is detected.

Histogram Equalization is a PC picture preparing system used to improve differentiate in image. It achieves this by adequately spreading out the most regular power esteems, for example loosening up the power scope of the image.

#### V. SIMULATION RESULTS

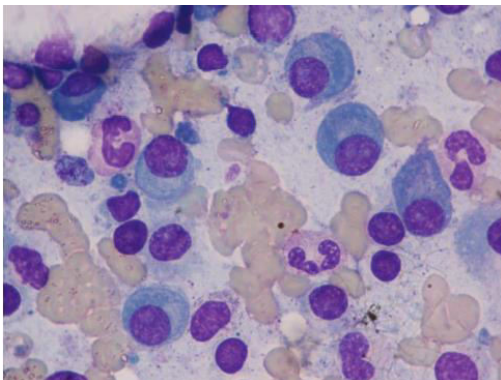


Fig 4: Original Image

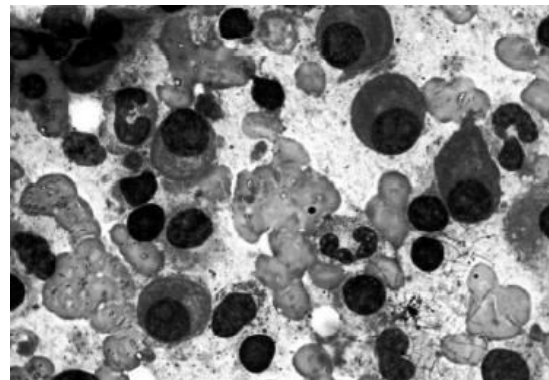


Fig 5: Histogram Equalization of original image.

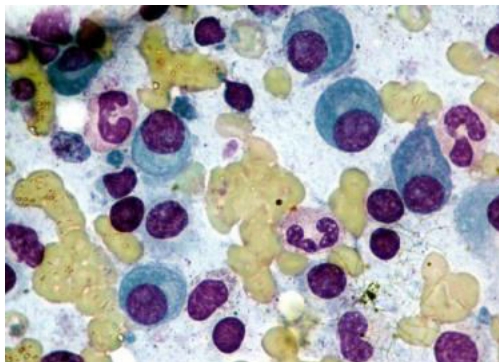


Fig 6: Contrast Stretching of original image

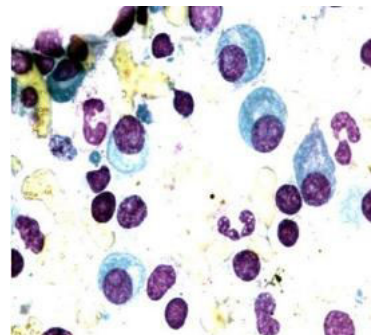


Fig 7: Adding of histogram equalization and Contrast Stretching.

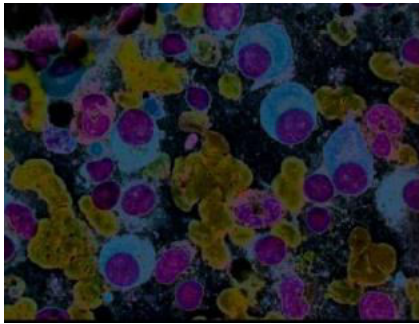


Fig 8:- Subtraction of histogram equalization and Contrast Stretching.

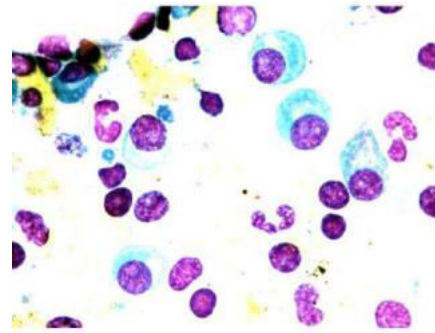


Fig 9: Adding of fig(7) and fig(8)

## VII. CONCLUSION

The motivation behind this paper was to actualize image processing methods in choosing nearness of leukemia in white platelet. Image segmentation of different leukemia types, for example, Acute Lymphocytic Leukemia (ALL), Chronic Lymphocytic Leukemia (CLL) are secured utilizing MATLAB which is 91 precise. image processing method for leukemia determination is efficient and less expensive as contrast with the old research centre testing strategy.

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