# Leukemia Detection With Image Processing Using Matlab And Display The Results In Graphical User Interface

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*Abstract:* *Different approaches in Image Processing are widely used in the field of medicine and since health is the factor being considered, it must be vigilantly done. This study aims to develop a system that will apply the different techniques of Image Processing and Genetic Algorithm, specifically in automating the detection of Leukemia. The benchmarks in detecting Leukemia that are being used by the medical experts on a blood sample structure are taken into account. The researchers will create a system that will accept a blood image and process it using the said methods and added a Naïve Bayes Classifier in the detection process. A total of 100 blood images are used in evaluating the system. The system achieved a detection rate of 90.33%. The separation of overlapping cells is a great help for the image quantitative analysis and image recognition. Using an algorithm based on Watershed Algorithm to divide the overlapping cells from each other, the results show good findings for the overlapping cells. With that, a software application that can separate overlapping cells in the blood images for better detection of Leukemia was Developed*

*Keywords***:** *Leukemia Detection, Image Processing, Matlab, Graphical User Interface.*

## I. Introduction

Health is one of the important issue for every human being. A good health is essential for living a prestigious life. Also if the health is better then a person tend to be more active throughout the life. A threat to health is a serious and major issue. Leukemia with top ranked in Philippines is a dangerous disease. The most initial step is to detect the Disease as early as possible. If the detection process is carried in a medical laboratory, then it charges a reasonable amount of cost and consumes time for detection. This prototype model use Maltab software for the detection. The system calculates the percentage of White Blood Cells area in the image and classifies the image as either leukemia suffering case or else a normal case.

## II. Methodologies

**2.1 Image Processing:-**

An image is a 2-Dimensional array of pixels. These pixels are allotted different intensity levels. The image is mainly classified as Grayscale image and color image. Grayscale images are constituted by pixels of intensity levels between 0 and 1. Color image consists of pixels with RGB derived color intensities. Images are stored in hardware memory is digital formats such as JPEG(Joint Photographic Expert Group), TIFF(Tagged Image File Format), BMP(Bit Mapped), GIF(Graphical Interchange Format) by applying certain Image Transformation to compress the Image.

**2.2  Image Pre-processing:-**

In the raw image noise is the major disturbing element in the detection process. The noise my appear due to shadows and illuminations that makes the Region of Interest blurred. In this model our region of interest is White blood cells. Thus most crucial step is to extract white color features in the raw input image.

**2.3 Leukemia Blood Structure:-**
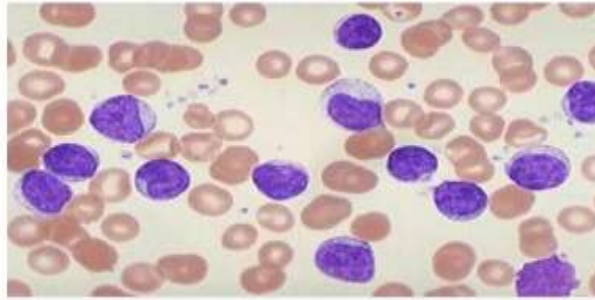


White Blood cells in human body are employed to protect the body from infections and outside attackers including viruses, bacteria or any other invaders.White blood cells are less in number as compared to the red blood cells per unit volume of blood. But when the white blood cells occupy more space in the blood it is the sign of leukemia.

The number of WBCs increases when the WBCs becomes immature and gets damaged. These WBCs do not die in the given period of time. Thus there is no space for Red Blood Cells to live due to increasing population of WBCs. The abnormal WBCs disturbs the activities of the normal WBCs. The Leukemia detection process is carried in medical laboratory by the hematologists.

**2.4 Histogram and Graphical User Interface:-**

Histogram is a Graphical Representation of an image which gives the number of pixels corresponding to each of the pixel intensities.
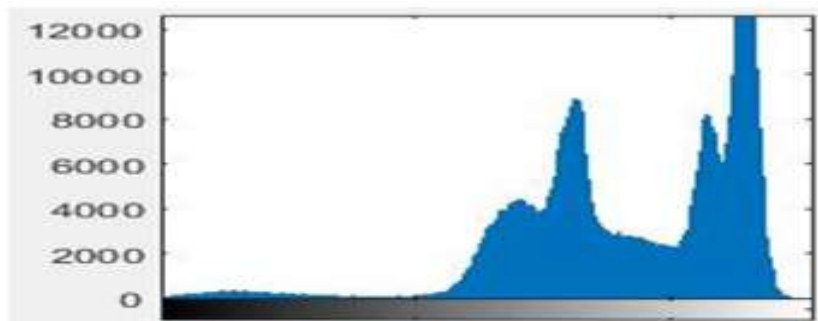


Graphical User Interface is a medium by which the users can communicate with the software by writing a code in the editor window. In this experiment the main tool in the GUI are "Push buttons", "Static Text", "Axes". The push buttons control the stimulation of the output which is displayed on Static Text and Axes.

The program also includes the Global Variable. A Global Variable is a variable which is recognized throughout the program. In this experiment our global variable would be the input image.
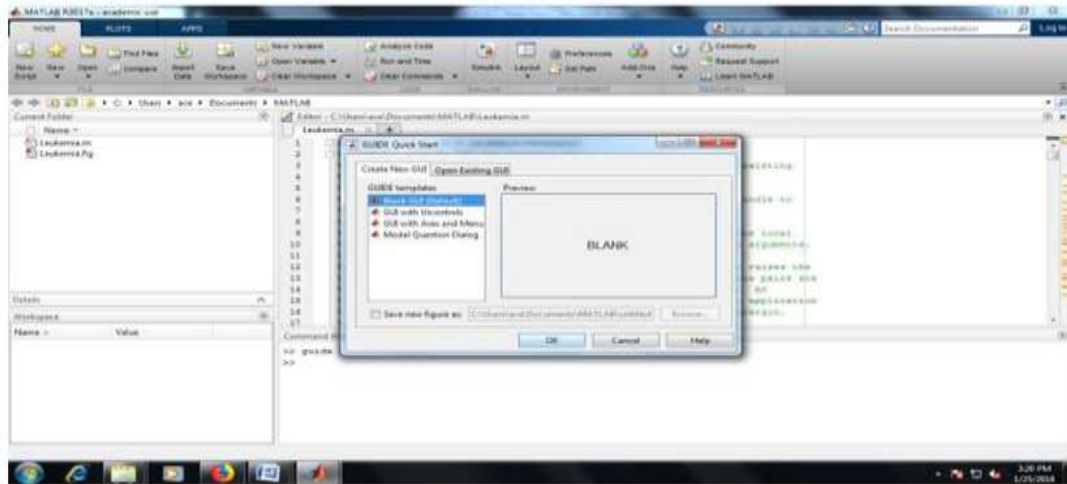
**2.5 System Development Architecture:-**

Following is the flow chart which describes the steps followed in the system. The input image is loaded from the database in the GUI display window. The color extraction is performed on the image. The very next step is the Thresholding of the image to remove the background of image and retaining the white blood cell area. The white blood cell area is represented by the high intensity pixels.

The area covered by the white blood cells is calculated by adding all the high level pixels. The decision of leukemia detection is made by setting a percentage level. If the calculated percentage is more than this level then the leukemia will be detected else the person is considered to be normal.
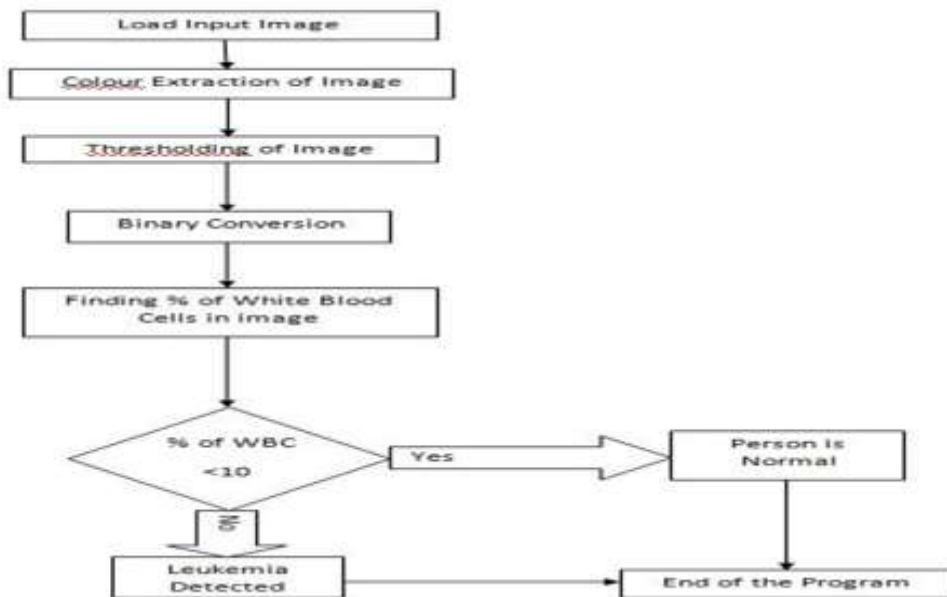


## III.    Observation

The results are displayed in GUI window by using different push buttons in the display each push button is in relation with one or more Static Text Tools and Axes Tools. So, each push button can handle more than one tools at a time.
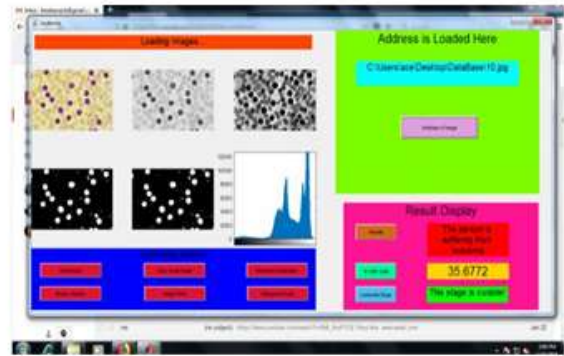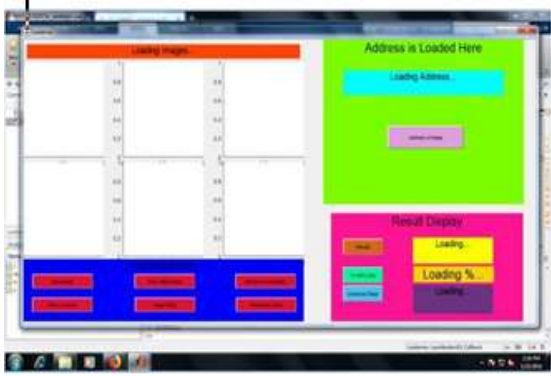
### 3.1 Steps:-

The Blue plane is extracted from the RGB plane of raw image. The color extracted image (3D) is then converted into binary image. After dilation some pores may appear in the image. To clear these pores the binary image is dilated to give clear image.
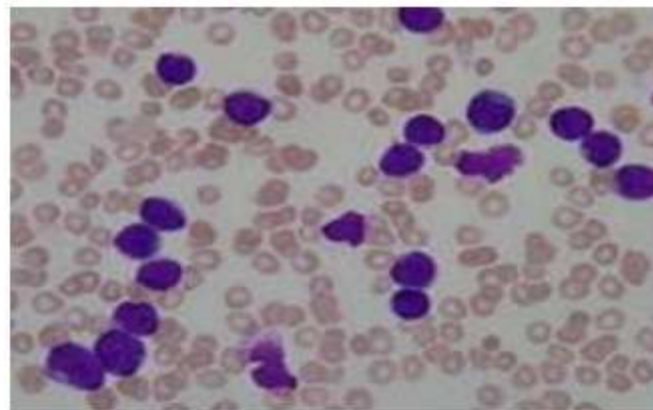


After dilation some pores may appear in the image. To clear these pores the binary image is dilated to give clear image.



The white blood cells in the image is recognized by all the high level pixels in the image. The percentage of white blood cells can be calculated by using following method.

% of WBC = (sum of all high level pixels / total numbers of pixels) * 100

### 3.2 Accuracy Of System:-

Accuracy can be defined as the percentage of successful outputs to the total outputs. If the accuracy level suits the medical tests the process is evaluated for detection process. The following Table specifies the different accuracy judgements on the basis of percentage of WBC cells in input image.

**Table 1: Accuracy Table**

| Range(%) | | Accuracy Conclusion |
|----------|---|---------------------|
| 95-100 | | Experiment is successful |

| 85-95 | | **Experiment is very good** |
|---|---|---|
| 75-85 | | **Experiment is good** |
| 65-75 | | **Experiment is average** |
| 55-65 | | **Experiment is bad** |
| <55 | | **Experiment is failed** |

## IV.    Conclusion

Total 50 samples were studied under this experiment and the following result was evolved.

**Table 2: Result Table**

| System Result(% of samples giving correct results) | Biomedical Test results |
|---|---|
| 78% | 100% |

This type of innovation in Bio-technological field will bring immense change in quick detection ,easier method for detection of Leukemia. This Process requires zoomed image of Blood Cells, a computer for Processing the Operation in a dedicated Software (Matlab) supporting image Processing. These three Component when put all together and doing the required algorithm step by step based on Image Processing.

The concept doesn't require any medical component or a person skilled in medical field . Requires less Man power .The convenience provided bt this method over conventional method is so high. This can be use for detection of many other image related diseases and related applications.

## References

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