AUTOMATED DETECTION OF WHITE BLOOD CELLS CANCER DISEASES UPDATED IN IOT.

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***Abstract*- The two major white blood cancer diseases such as Leukemia and Myeloma are being very difficult to be automatically diagnosed in the biomedical field. This approach assists in diagnosing white blood cell diseases in a new form for the first time. Leukemia and Myeloma have similar symptoms and are further divided into categories respectively. Due to similar symptoms they result in misdiagnosis. Each approach undergoes various diagnosing techniques through image processing. The K-nearest neighbour is finally used in the final decision. After finding the cell classification the information is updated into the IOT. This approach mainly aims at detecting the white blood cells cancer at early stage by avoiding all the misdiagnosis.**

Index Terms– Image processing, white blood cells, KNN classification, IOT.

I. INTRODUCTION

The blood usually consists of cells that are special, called as plasma. Blood is made up of 55% of plasma and 45% of formed elements. A lot of important functions are performed by the blood. The erythrocytes contain hemoglobin which helps to carry oxygen to the tissues and also collect the carbon-dioxide. The blood also has other nutritive substances such as mineral slats, sugar, amino acid, etc. Generally, the more dreadful the disease is, the more time is taken for the diagnosis. Due to the

patients waiting time the chance of death is highly increased. Hence it is necessary to diagnose a disease in less time with more accuracy. The time taken for the results to come is only within a week. Diseases such as Ebola, Hepatitis and Corona take a lot time for detection. While these diseases should be treated immediately. And also, pathological tests are expensive and are sometimes not affordable to the patients. Hence the blood reports must be detected automatically in less time and should be cost effective. Thus, this approach deals with the automatic detection of white blood cells cancer diseases with less time and more accuracy using image processing with the help of MATLAB software.

Ⅱ. EXISTING SYSTEM

In this system the blood samples were detected using manual methods that is with the periodic inspection of blood sample using microscope. Each cell was segmented and observed. A sample threshold value was calculated for the normal cells previously. The cells which exceeded this sample threshold value of the normal cell were considered as defective cells. The different categories of WBC cancers were assigned with a reference value. The defective cells were compared with the reference cancer cells. The threshold value of the sample nearest to each of the cancer cells value were featured together and were assigned to which type of the cancer it belonged to. All these processes were executed manually, hence it was a time-consuming method which took approximately 1-7 days.

Ⅲ. PROPOSED SYSTEM

In this system health condition will be automatically updated to the internet for analysis by using image processing and MATLAB process. The previous existing system is done by manual methods but in this system, we are using KNN classification for detecting the type of cancer cells through image processing. Using MATLAB in Arduino platform the information are stored and the type of cancer is displayed in LCD and updated in IOT.

Ⅳ. DESIGN PROCESS OF THE SYSTEM

The cancer cell detection in white blood cells is done through several predefined set of parameters such as

- Pre-processing
- Segmentation
- Feature extraction
- KNN classification

1. Pre-processing

The pre-processing step is used for removing the unwanted noise effects from the sample image. It is primarily necessary to remove the noise from the image so as to proceed the next step. The noise is filtered by using the selective median filter and to isolate the accumulated noise the unsharp masking is used during image acquisition.

2. Segmentation

The technique of partitioning the image into segment can be defined as image segmentation. Considering the similar property, segmentation is implemented. This technique broadens the clustering algorithm by introducing repeated segmentation scheme which explores the centroid of each set in the segment and eventually re-segment the input based on the closest centroid. This technique provides the important image characteristics, based on which information can be easily perceived. The pixels in the image are given as labels using an approach called as thresholding. The algorithm works on the prior information about the smear images of the blood. The labels given to the images are adjusted with a shape detection method on large context to give a meaningful result.

3. Feature extraction

Feature extraction is used to reduce the dimensionality of the image in image processing and pattern recognition. Generally, when the input given for the process is too large it cannot be processed. Hence this step helps to reduce the representation of the features of the input image. This process is known as feature extraction. Instead of the full-size clustered image the extracted image is expected to extract the relevant information from the input image. It also simplifies the number of resources needed to describe a large set of data accurately. The major problem involved while performing the analysis is the stems from the large number of variables. A large amount of memory and computation power is required when the data is too large. This was one of the major disadvantages in the image processing step. To overcome these problems, we go for feature extraction for giving a data with sufficient accuracy.

4. KNN classification

The KNN is a binary classification involving two classes which is given for more accurate data classification. The K is selected as the odd number to avoid the irregular data. The object which is classified through the selection stream of neighbour, with the determination assigned occurrence for most mutual class among

its k-nearest neighbour. Euclidean distance is used as the metric distance; however, this is suitable only for the variable that are endless. K-nearest neighbour is a new process where its categories the novel cases on the evaluation quantity such as distance functions and also delivers all available cases. It is a process that works on a minimum distance from the interrogation instance to the training samples. There are numerous attributes used in KNN procedure for categorizing variables. The main advantage of KNN is it can be applied to any dimension scale ranging from insignificant to a measurable scale.

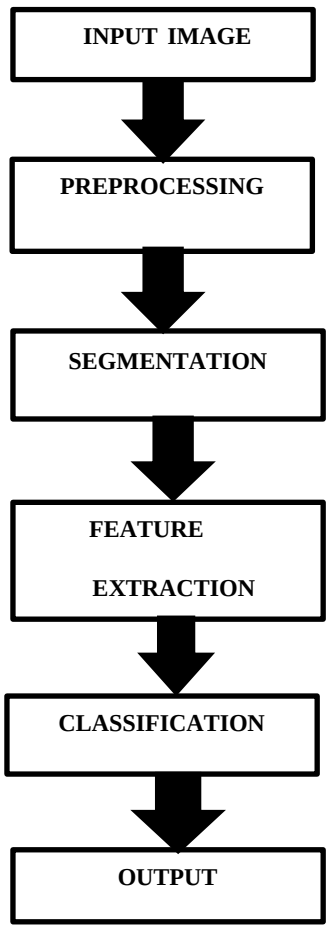

Fig. 1. Flowchart of steps in image processing.

V. WORKING PRINCIPLE

The system has implemented using the Arduino uno (ATmega328P) platform. White blood cancer cells are detected by image processing with predefined set of parameters. The image processing is automatically done through the computer itself using following steps such as processing, authentication and recognition. The computer is connected to the Arduino through a serial port called MAX232. Arduino is connected to temperature sensor, heart beat sensor, buzzer and LCD for automated detection of white blood cells cancer diseases updated in IoT. Temperature and heartbeat of the patient can be monitored by heart rate sensor and temperature sensor. The power supply given to the Arduino of about 5 to 7V. The Arduino acts as a microcontroller through which the MATLAB program is loaded. The program sends the start and stop command to the computer for executing image processing technique. Based on the image processing which type of cancer disease whether it is Leukemia or Myeloma will be revealed using KNN classification. The alarm will be produced using buzzer if any threshold value increases that indicates the cancer cells are founded in white blood cells. The type of cancer is displayed in LCD. All the

information's are monitored and stored in IOT.

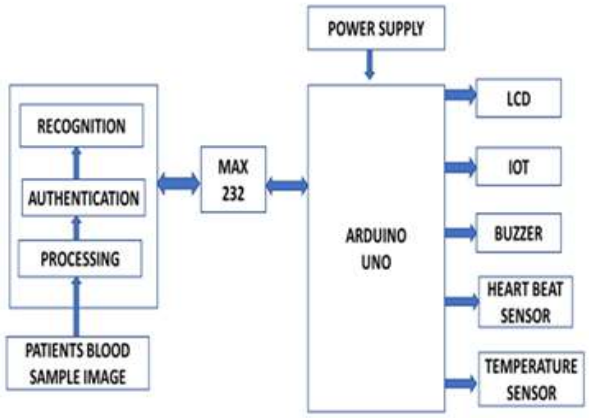

Fig. 2. Block diagram of proposed system.

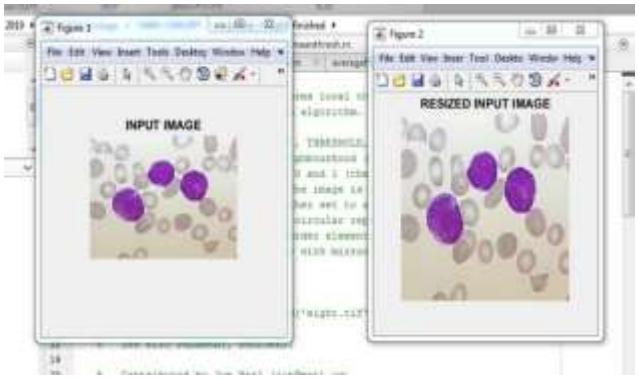

Fig. 3. Input image and resized input image.

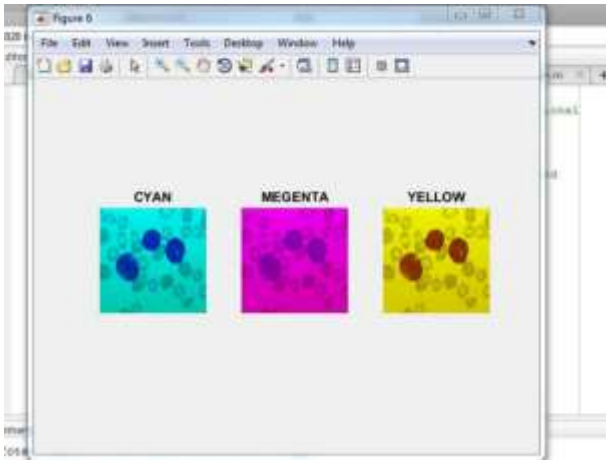

Fig. 4. RGB to YCBCR colour space image.

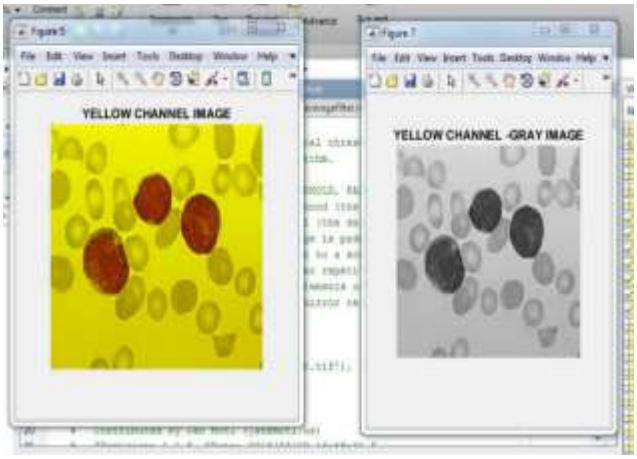

Fig. 5. Selected Y-channel and gray converted Y-channel.

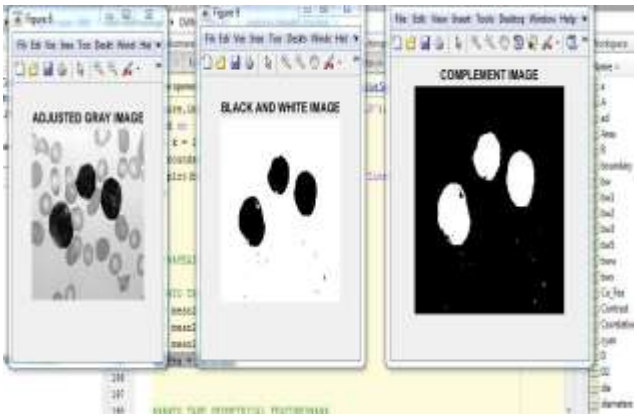

Fig.6. Adjust, Black & White and complement images.

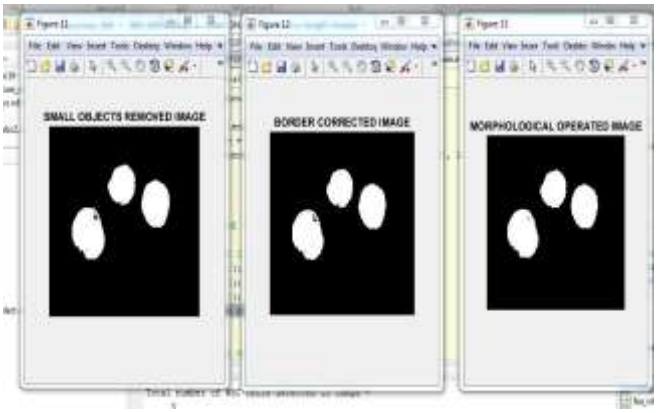

Fig.7. Morphologically operated images.

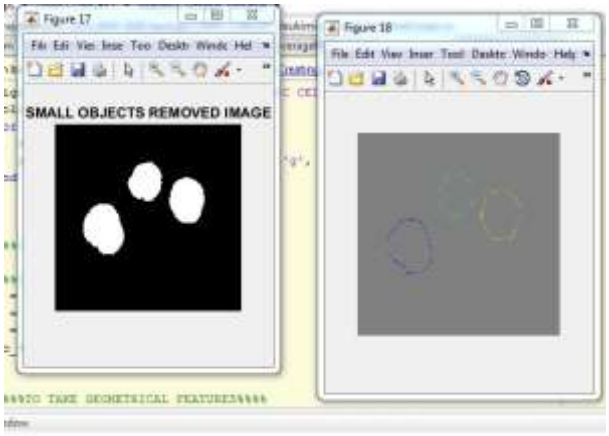

Fig. 8. Result of morphologically operated images.

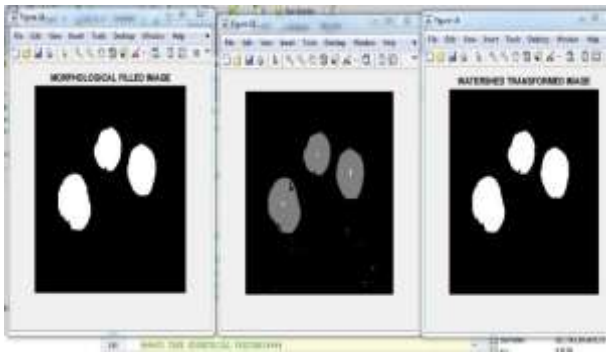

Fig. 9. Watershed Transformed image.

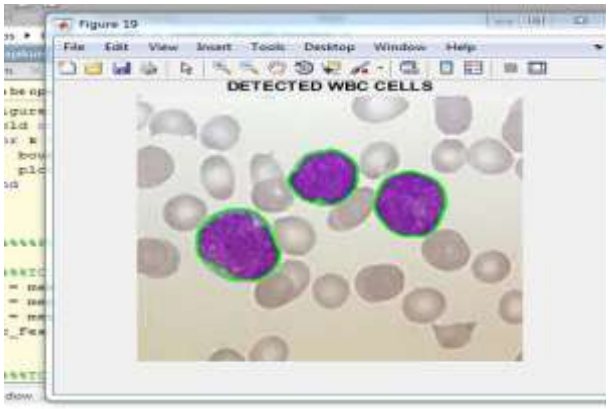

Fig. 10. Segmented image.

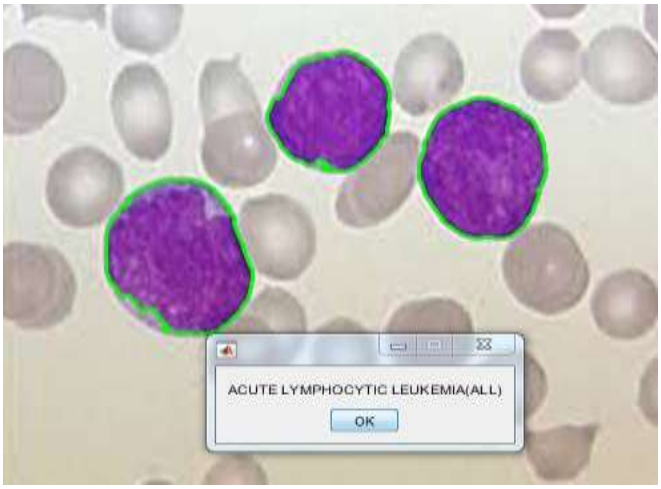

Fig. 11. Final output image.

VI ADVANTAGE

By using this method, the cancer cells are identified even at laboratories with limited human resources. And also, this system has the advantage of reducing time than other cancer detecting methods. The processing steps are less hence skilled labour is not required.

VII DISADVANTAGE

Though this project has many advantages it still has few drawbacks such as the result cannot be obtained for untrained cancer images. Only the trained images can be diagnosed.

VIII FUTURE SCOPE

This paper overcomes the drawbacks of previous existing system in a successful manner still it has few drawbacks. These drawbacks of obtaining the results for only the trained images have to be overcome in

near future so that the detection of cancers of various kinds can be implemented by this method. By using this paper as a reference advance technology for cancer detection can be researched and the future advancement in the field of biomedical can be obtained.

Ⅸ. CONCLUSION

In this paper, the detection and counting of white blood cell cancer is done. The sample image is processed by image processing technique. KNN classification is used to compare and detect cancer in 4 to 5 images at the same time and also the SVM classification is used to detect cancer in two images at the same time.

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