ISSN: 2278-4632
Vol-10 Issue-5 No. 8 May 2020

DETECTION OF LEUKEMIA USING IMAGE PROCESSING

Sharon Jean F[1] **Rakshitha A N**[2] **Jinu Sara Rajan**[3]

Abstract
Leukemia is a broad term for cancers of the blood cells. The type of leukemia depends on the type of blood cell that becomes cancer and whether it grows quickly or slowly. Leukemia occurs most often in adults older than 55, but it is also the most common cancer in children younger than 15. In the recent years Image Processing mechanisms are used widely in several medical areas for improving earlier detection and treatment stages, in which time factor is very important to discover the disease in the patient as soon as possible, especially in various cancer cells. This paper is a study of Leukemia detection and the stages using various techniques such as image enhancement, segmentation, feature extraction and classification.
Keywords- leukemia; image processing; enhancement; segmentation

Introduction

Leukemia is a type of cancer that affects the leukocytes or white blood cells. Detection of leukemia starts with a complete blood count analysis. If the blood cell count is abnormal, the patient is suggested for a more detailed analysis. 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 present in the nucleus or cytoplasm of the cells. The clinical behavior of the disease can be predicted using this classification and accordingly treatment should be initiated to the patient. In leukemia, a large number of abnormal white blood cells are produced by bone marrow due to unknown cause. In pathology manual detection of leukemia is done which is time consuming as well as costly due to high cost pathology instruments. Hence, automatic technique is adopted for fast and accurate results. In this technique image of blood sample is processed using image enhancement, segmentation techniques, where images are trained based on the mean values and standard deviation values obtaining the count of RBC's and WBC's. These results are compared and finally cells are classified whether they are blast cells and classify into various stages of blood cancer.

Literature Survey

The diagnosis of leukemia frequently follows a routine blood test that results in an abnormal blood cell count. Once leukemia is suspected the doctor may take samples of bone marrow and blood to examine cell shape. Samples are also sent to pathology lab to identify proteins located on the surface and chromosomal and changes. This information is important for diagnosis of individual patients.

[1] . Mount Carmel College, Bengaluru.
[2] . Mount Carmel College, Bengaluru.
[3] . Assistant Professor, Dept of Computer Science, Mount Carmel College, Bengaluru.

 Copyright © 2020 Authors

ISSN: 2278-4632
Vol-10 Issue-5 No. 8 May 2020

Literature Survey

The diagnosis of leukemia frequently follows a routine blood test that results in an abnormal blood cell count. Once leukemia is suspected the doctor may take samples of bone marrow and blood to examine cell shape. Samples are also sent to pathology lab to identify proteins located on the surface and chromosomal and changes. This information is important for diagnosis of individual patients.

Existing Diagnosis Methods for Leukemia

Bone marrow test. Your doctor may recommend a procedure to remove a sample of bone marrow from your hipbone. The bone marrow is removed using a long, thin needle. The sample is sent to a laboratory to look for leukemia cells. Specialized tests of your leukemia cells may reveal certain characteristics that are used to determine your treatment options.

Physical exam. Your doctor will look for physical signs of leukemia, such as pale skin from anemia, swelling of your lymph nodes, and enlargement of your liver and spleen.

Blood tests. By looking at a sample of your blood, your doctor can determine if you have abnormal levels of red or white blood cells or platelets — which may suggest leukemia.

characteristics that are used to determine your treatment options.

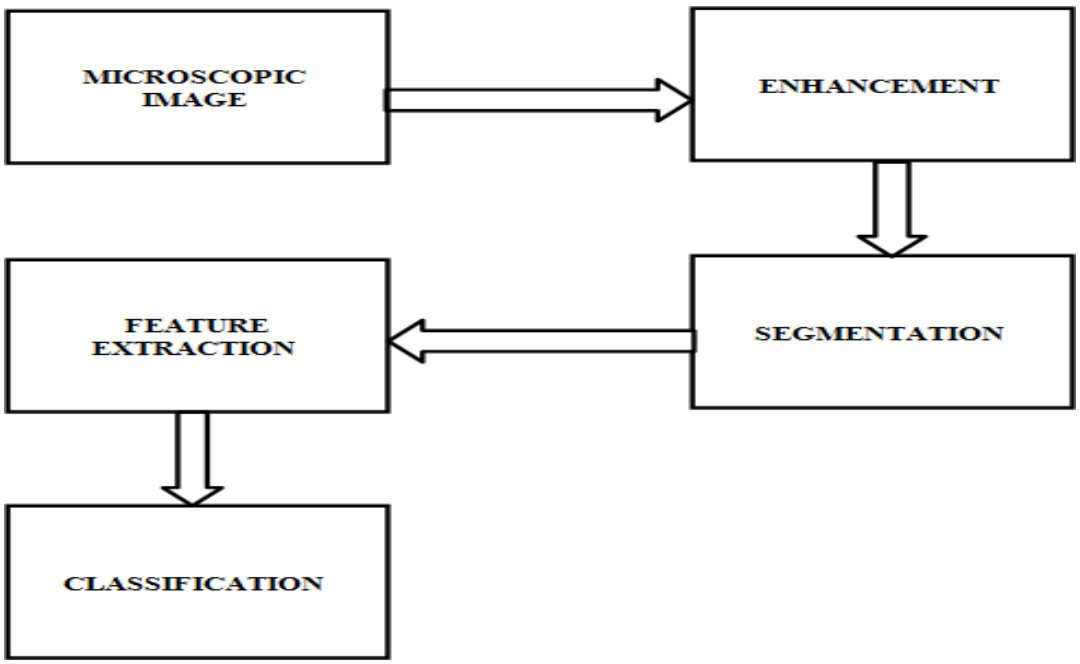
Region	Male Leukemia Avg. no. of cases/year (%)	Female Leukemia Avg. no. of cases/year (%)
North	12–239 (43.4–52.2)	5–148 (36.8–47.9)
South	15–28 (32.6–47.5)	10–24 (30.6–38.6)
Central	8 (24.2)	4 (17.1)
East	11 (36.7)	11 (37.9)
North-east	1–12 (33.3–41.5)	1–9 (14.9–49.2)
West (8)	2.7–58 (37.2–66.7)	0–35 (23.55–50.1)
All Regions	1–239 (24.2–66.7)	0–148 (14.9–50.1)

Number of leukemia Cases Detected in India

 Copyright © 2020 Authors

ISSN: 2278-4632
Vol-10 Issue-5 No. 8 May 2020

Proposed Method



Steps involved in automatic detection of leukemia

Techniques Used in Detection

- Training the Images Using Deep Learning Classification

Images are being trained in which the mean, standard deviation and class label is being stored in the database in which the end results are being compared with the database to **classify the images**

- **Image Enhancement**

Image enhancement is the process of adjusting microscopic images so that the results are more suitable for display or further image analysis. For example, you can remove noise, sharpen, or brighten

- **Image Segmentation**

Image segmentation is a process of dividing an image into its sub components, the RGB image is Converted into gray scale image for further analyses.

- **Feature Extraction**

Key features of RBC's and WBC's are obtained and classifying them into respective cell type is done using bounding box method.

- **Obtaining blood cell count**

Complete count of RBC's and WBC's is from the microscopic biopsy image obtained using the same procedure for both. Based on blood cell count it is classified as

 Copyright © 2020 Authors

ISSN: 2278-4632
Vol-10 Issue-5 No. 8 May 2020

presence of cancer or not if the patient is affected by cancer its further divided into stages of cancer.

Result and Discussion

More than 200 images have been trained in order to get the mean, standard deviation and class label which is stored in the database this algorithm is based on the deep learning classification algorithm which is shown in Fig(a)

Fig.(a)Training of images using Deep Learning Classification

Images are being tested to determine if the correct class label is being detected and if the desired accuracy is being obtained which is shown in Fig(b)

Fig.(b)Testing of images using Deep Learning Classification

Image is being fed into the system which goes through image enhancement, segmentation, feature extraction, classification, comparing the database to determine the class label. The number of wbc's and rbc's count is being obtained after which the percentage of wbc's and rbc's is obtained and the ratio of both are determined to understand id the input blood sample has cancer or not. This is being showed in fig(c).

 Copyright © 2020 Authors

ISSN: 2278-4632
Vol-10 Issue-5 No. 8 May 2020

Fig.(c) Final Output of the Image Processing System

Conclusion

The main aim of this paper is image enhancement and segmentation followed by feature extraction to detect leukemia .The result shows that the proposed statistical parameter such as mean and standard deviation based image segmentation and bounding box technique produced good segmentation performance using which the blood smear images are classified into cancerous or non-cancerous there by classification of cancer into 4 stages is done.

References

[1] Nur Alom Talukdar, Automated Blood Cancer Detection Using Image Processing Based on Fuzzy System, Volume 4, Issue 8, August 2014

[2] Ms.Chandni Yadav, Automatic Blood Cancer Detection Using Image Processing, IJRTER-2018

[3] Ashwini Rejintal , Leukemia Cancer Cell Detection using Image Processing , International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering An ISO 3297: 2007 Certified Organization Vol. 5, Special Issue 6, July 2016

[4] Athira Krishnan and Sreekumar K, A Survey on Image Segmentation and Feature Extraction Methods for Acute Myelogenous Leukemia Detection in Blood Microscopic Images, Vol. 5 (6) , 2014, 7877-7879.

[5] S.Jagadeesh, IMAGE PROCESSING BASED APPROACH TO CANCER CELL PREDICTION IN BLOOD SAMPLES, International Journal of Technology and Engineering Sciences Vol.1 (1) 2013, ISSN: 2320- 8007

[6] Fauziah Kasmin, Anton Satria Prabuwono and Azizi Abdullah, Detection of Leukemia in Human Blood Sample based on Microscopic Images: a study, 31st December 2012.

 Copyright © 2020 Authors

ISSN: 2278-4632
Vol-10 Issue-5 No. 8 May 2020

Vol. 46No.2

[7] Deepika N. Patil1 and Uday P. Khot2, IMAGE PROCESSING BASED ABNORMAL BLOOD CELLS DETECTION, International Journal of Technical Research and Applications e-ISSN: 2320- 8163, www.ijtra.com Special Issue 31(September, 2015)

[8] Mouelhi A., Sayadi M, Fnaiech F, Mrad K, Romdhane K.
B. , Automatic image segmentation of nuclear stained breast tissue sections using color active contour model and an improved watershed method, Biomedical Signal Processing and Control. 2013;8(5):421–436

[9] Huang P.-W., Lai Y.-H., Effective segmentation and classification for HCC biopsy images Pattern Recognition 2010;43(4):1550–1563.
Doi: 10.1016/j.patcog.2009.10.014.

[10] Bhagyashri G. Patil and Prof. Sanjeev N. Jain, Cancer Cells Detection Using Digital Image Processing Methods, International Journal of Latest Trends in Engineering and Technology (IJLTET), Vol. 3 Issue 4 March 2014

 Copyright © 2020 Authors