

Review Leukemia Detection and Types using Digital Image Processing

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Abstract— Leukemia is a very varied cancer of the hematopoietic system. Since its main reason consists of genomic defects in the hematopoietic stem and predecessor cells and given the high difficulty of the hematopoietic system, it may seem an imperative task to investigate the transcriptomic correspondences and differences between leukemia subtypes and hematopoietic cells. Haematopoiesis is considered by a rapid, continuous turnover of cells. Blood cancer is a form of cancer which amounts the blood, bone marrow, or lymphatic system. It is diagnosed with a blood test in which specific types of blood cells are counted by haematologist. We considered only acute myelogenous leukemia, which is one of the blood cancer type which categories under acute leukemia and it mostly comes among adults. Need for automatic diagnosis of leukemia rises when doctors identify cancers under a microscope which has complete manual work and it's not good for the patient.

Key words: Leukemia, Red Blood cell, white blood cell and Hematopoietic System

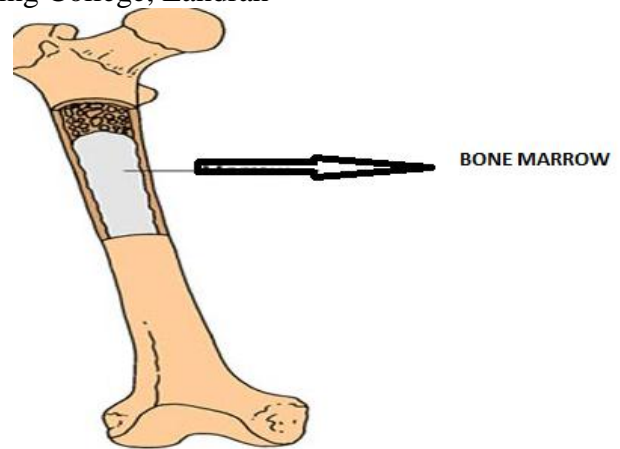


Fig. 1: Bone Marrow

The cells in the bone marrow start changing and they get infected and become leukaemia or infected cells. These leukaemia cells are having strange properties than the normal cells.

Their development is irregular and existence time is more than the normal cells. They interrupt normal cells to bring out their work. After a definite amount of time normal cells die while leukaemia cells don't. The old leukaemia cells last for a long time and new leukaemia cells produce in an abnormal way. The rate at which the leukaemia cells progress is different according to the type of leukaemia.

I. INTRODUCTION

The term leukemia creates from the Greek word "leukos" meaning "white" and "aim" meaning "blood". It refers to the cancer of the blood or the bone marrow where blood cells are shaped. The Leukocytes which play a major role in the diagnosis of different diseases.

Leukemia is the cancer of the blood. It starts in the bone marrow, it is the area where blood cells are made. When patient have leukaemia, the bone marrow starts to make a lot of abnormal white blood cubicles, called leukaemia cells. They don't do the exertion of normal white blood cells. They grow faster than normal cells, and they don't break increasing when they should. Over time, leukaemia cells can crowd out the normal blood cells. This cans chief to serious difficulties such as anaemia, bleeding, and infections. Leukaemia cells can also spread to the lymph nodes or other organs and origin bulge or pain.

There are numerous different types of leukaemia. In general, leukaemia is collected by how fast it gets poorer and what kind of white blood cell it affects.

The microscopic images of the blood cells are experiential to find out numerous diseases. Variations in the blood condition show the development of diseases in an individual. Leukaemia can central to demise if it is left unprocessed. Based on some statistics it is found that the leukaemia is the fifth cause of death in men and sixth cause of death in women. Leukaemia originates in the bone marrow. Each bone comprises a thin substantial inside it which is also known as a bone marrow which is shown in the fig. 1.

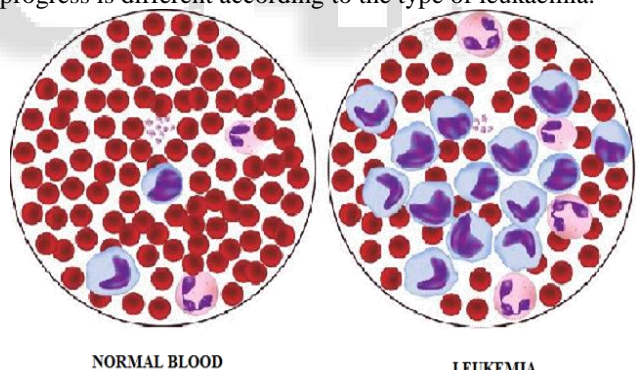


Fig. 2: Normal Blood and Leukemia

II. TYPES OF LEUKEMIA

Leukemia can be secret based upon how fast it becomes simple. Leukemia is classified as chronic or acute.

- 1) Chronic Leukemia: Infested white blood cells perform like normal white blood cells and gradually it increases and becomes severe.
- 2) Acute Leukemia: Diseased white blood cells do not perform like normal cells and they increase quickly in count and become severe.

We can also sub categorize it based upon the stem cells created from the bone marrow.

- a) Acute Lymphocytic Leukemia
- b) Acute Myeloid Leukemia
- c) Chronic Lymphocytic Leukemia

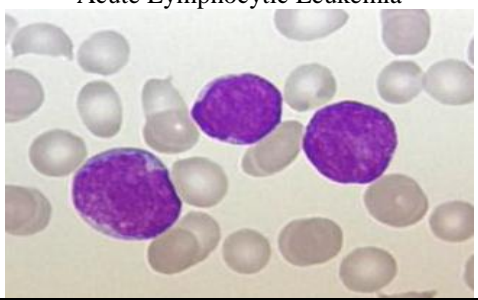
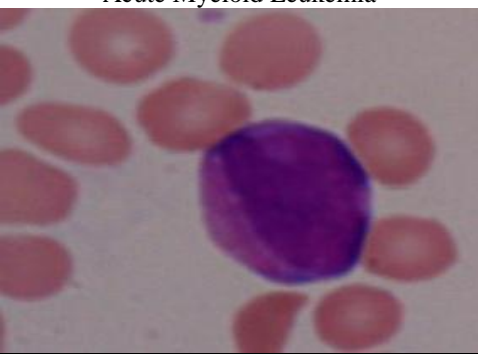

d) Chronic Myeloid Leukemia	
<p>Acute Lymphocytic Leukemia</p> 	<p>It grows in young children mostly. It is also found in adults having age more than 60.</p>
<p>Acute Myeloid Leukemia</p> 	<p>It occurs in children as well as adults.</p>
<p>Chronic Lymphocytic Leukemia</p> 	<p>It mostly occurs in adults. A small number of cases are found in children also.</p>

Table 1: Types of Leukemia

III. RELATED WORK

Wenlong Tang et.al,2011 [6] in this paper described as, a novel compressive sensing based method for the subtyping of leukaemia. The CS method is an emerging method in statistics and mathematical signal analysis, which permits the reconstruction of signals from a small set of incoherent projections. They developed a CS based indicator to classify ALL and AML, based on ours selected genes out of 7129 samples. This work demonstrates that the CS method can be successfully used to detect subtypes of leukaemia subjects, implying improved accuracy of diagnosing leukaemia patients. Subrajeet Mohapatra et.al, 2011 [7] in this Paper planned as the general nature of the signs and signs of ALL often leads to wrong diagnosis. Diagnostic confusion is also postured due to simulated of similar signs by other disorders. Careful microscopic inspection of stained blood mark or bone marrow enunciates is the only way to operative diagnosis of leukemia. Techniques such as fluorescence in situ hybridization, immune phenol-typing, cytogenetic examination and cytochemistry are also employed for specific leukemia finding. The need for mechanization of leukemia detection arises since the above detailed tests are time consuming and costly. Yong Jiang

et.al, 2011 [8] in this purposed as learning was to study the extract of Rumex root which had an inhibitory action on the cell propagation of human leukemia cell line THP-1. The combination of percolation and abstraction was used to separate and quotation the main chemical configurations of Rumex; MIT was used to assay the curve of inhibition ratio. N.H.Abd Halim et.al,2011 [9] In this paper described as, a global contrast stretching and segmentation based on Hue, Saturation, Intensity colour space will be used to improve the image quality. Image improvement is very important to increase the pictorial aspect of blast cells. Hayan T. Madhloom et.al, 2012 [10] presented and application of feature extraction, selection and cell organisation to the acknowledgment and differentiation of normal lymphocytes versus irregular lymphoblast cells on the image of peripheral blood smears. This is considered as a very beneficial procedure in the initial behaviour process of leukemia patients. A computerized appreciation system has been developed, and the results of its mathematical verification are presented and discussed. R. Hassan et.al, 2012 [11] presented the study on blasts categorising in acute leukemia into two chief forms which was acute myelogenous leukemia and acute lymphocytic leukemia by using k-NN. 12 main features that represent size, colour-based and shape were extracted from acute leukemia blood images.

IV. CONCLUSION

The survey of this paper is nucleus segmentation surveyed by feature extraction to detect Leukemia. Shape features of nuclei such as area, boundary, etc. are considered for better exactness of detection. The consequences show that the proposed statistical limitation such as mean and standard deviation based image segmentation and Otsu's thresholding based produced good segmentation presentation. In addition, the fully segmented nucleus can be better achieved by algorithm because it is less sensitive to input image differences.

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