

Computer Aided Diagnostic Solution for the Detection of Childhood Leukemia

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Abstract--Prompt and accurate diagnoses of Leukemia are the main keys to control and cure this disease effectively. The most economic and reliable diagnosis done is based on microscopic examination of thin blood smear. The manual recognition method is time consuming and effortful. The images captured through the microscope may have their own weaknesses such as blurred images or low contrast. Therefore, fast and efficient methods are required for detection of leukemia parasites in order to prevent the false diagnosis of Leukemia. It's important to diagnose childhood leukemia as early as possible and to determine the type of leukemia, so that treatment can be tailored to provide the best chance of success. This paper proposes a digital image processing approach for prompt and accurate diagnoses of Leukemia in children's.

Keywords-- CT,MRI, Leukemia,Blood Smear.

1. 1 INTRODUCTION

Digital image processing has become one of the most important visualization and interpretation methods in biology and medicine over the past decade. This Time has witnessed a tremendous development of new powerful instruments for detecting ,storing, transmitting, analyzing, and displaying medical images. This has led to a huge growth in the application of digital image processing techniques for solving medical problems. At the moment, identification of blood disorders is done through visual inspection of microscopic images of blood cells. From the identification of blood disorders, it can lead to classification of certain diseases related to blood. One of the most feared by the human disease is cancer. About 500 billion blood cells are made each day. When the marrow is invaded with cancer cells, it cannot produce enough normal blood cells to meet the constant demand for them, and the numbers in the blood cell counts become severely depleted.

Leukemia is a type of blood cancer, and if it is detected late, it will result in death. Very effective methods and tests are available for classification of acute leukemia types and subtypes [1]. The classification methods are not available in most developing countries. The

morphological classification of acute leukemia where bone marrow cell images are analyzed is an inexpensive and alternative way to the complex methods[2].

2 LEUKEMIA SYMPTOMS IN CHILDREN

Most of the signs and symptoms of childhood leukemia are more likely to have any enlarged lymph nodes, areas of bleeding or bruising, or possible signs of infection over the eyes, mouth, and skin and a nervous system . The abdomen will be felt for signs of an enlarged spleen or liver.

Still, it's important to let your child's doctor know about such symptoms right away so that the cause can be found and treated, if needed. Exams and tests will be done to determine the cause of the symptoms[3-6]. If leukemia is found, further tests will be needed to help tell what type it is and how it should be treated. It's important to diagnose childhood leukemia as early as possible and to determine what type of leukemia it is. So that treatment can be tailored to provide the best chance of success[7].

3 LAB TESTS USED TO DIAGNOSE AND CLASSIFY LEUKEMIA

If the doctor thinks your child might have leukemia, samples of cells from your child's blood and bone marrow will need to be checked to be sure of the diagnosis.

Blood tests:- The first tests done to look for leukemia are blood tests.

Bone marrow aspiration and biopsy:- A bone marrow biopsy **confirms the leukemia.**

CT (computerized tomography) scans: - These can show enlarged lymph nodes.

MRI (magnetic resonance imaging) scans:- To locate the position of tumors.

Ultrasound:- To see if your spleen has been affected by anemia.

Imaging tests:-These images can show abnormal body structures and functions caused by diseases like cancer.

4 LIMITATIONS OF THESE TESTS

These tests are used to diagnose leukemia and may be repeated later to tell if the leukemia is responding to treatment. In fact, it takes millions of cells to make a tumor big enough for an area to look abnormal on an imaging test[8][9]. Imaging tests can find large collections of cancer cells. But no imaging test can show a single cancer cell. This is why doctors sometimes recommend treatment even when cancer cells can no longer be seen on an imaging test. Even one surviving cancer cell can grow and over time, become a tumor.

5 Need of Image Processing

Recent leukemia detection techniques, leads to improper diagnosis of disease due to human errors in observing the peripheral sections under microscope. The process is time consuming and tiring. The process require human expert and prone to errors due to emotion disturbance. Human physical capability that is of course has its own limit. Moreover, it is difficult to get consistent results from visual inspection. Visual inspection can only give qualitative results for further research. Also numbers of steps are involved in detection is unbearable by children. During all this process infants may suffer a lot.

The most efficient method to overcome all these drawbacks of present cancer detection techniques is use of image processing. These techniques remove the human errors in detection. Hence number of steps involved is also reduced. And more importantly it is cost effective.

The microscopic sample image of blood smear is reproduced accurately, to avoid faulty results.

It is a technique in which the data from a microscopic image of blood smear are digitized. To digitally process an image, it is first necessary to reduce the image into a number that can be manipulated by the computer. Each number represents the brightness value of the image of blood smear.

Image acquisition plays an important role in detection of leukemia. This includes adjusting the brightness and contrast of the previously digitized image. The average of the images is taken to reduce image noise. Further the image is corrected for illumination of non-uniformities. Once the image is acquired; the features of the image are enhanced. In order to create an enhanced images more useful; various mathematical operations are applied to the data. An image is usually interpreted as a 2-D array of brightness values. The sharpening of the image features is done, such as contrast, boundaries, edges, etc. This increases the information content of the image data and improves the image quality. This will help doctors to diagnose the childhood leukemia at the early

stage. And it will help children to recover childhood leukemia in early stage. If this method is executed the pain of children will also be reduced. As they need not to undergo too many tests for repeated cycles.

6 Conclusion

This system is proposed to reduce the expenses and to improve the capability of radiologist in interpretation of medical images. The aim of the systems is to help radiologists to detect and locate abnormalities in microscopic images. This will help doctors to diagnose the childhood leukemia at the early stage. And it will help children to recover childhood leukemia in early stage. If this method is executed the pain of children will also be reduced. As they need not to undergo too many tests for repeated cycles.

7 References

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