OVERVIEW OF DETECTING DENGUE FEVER WITH PLATELETS COUNT

Using Image Processing Techniques

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Abstract : Dengue fever is one of the viral diseases and has become a point of concern in many developing countries, like India. The target objective of this paper follows to survey the papers on dengue fever so that we will be able to come up with a mechanism to detect dengue fever based on platelets count.

IndexTerms **- platelets, viral**

I. INTRODUCTION

Dengue fever is a mosquito-borne tropical disease caused by the dengue virus. Dengue is spread by several species of mosquito of the *Aedes* type, principally A. aegypti. The virus has five types of infection where one type usually gives lifelong immunity to that type, but only short-term immunity to the others. Consequently, getting prone different type of infection increases the risk of dengue fever. A number of tests are available to confirm the diagnosis including injecting antibodies to the virus or its RNA. Dengue has become a global problem since the second World War and is common in more than 110 countries. Each year between 50 and 528 million people are infected and approximately 10,000 to 20,000 suffer death. The earliest descriptions of an outbreak date from 1779. Its viral cause and spread were understood by the early 20th century. Apart from eliminating the mosquitoes, work is ongoing for medication targeted directly at the virus. It is classified as a neglected tropical disease. In this paper we are going to brief out about the overview of the work that are done so far along with our proposed mechanism for dengue prevention.

II. LITERATURE REVIEW

A complete blood count (CBC) is a blood test used to assess the complete health and diagnose a wide series of disorders, including anemia, infection and leukemia etc. CBC test gathers data about the kinds and numbers of cells in the blood such as Red Blood Cells (RBC), White Blood Cells (WBC) and Platelets. This blood cell count gathers data about the disorders in contrast to normal healthy blood cell count using the technique of automatic RBC and WBC counting using computer vision which helps to perform the counts exactly using image-based analysis from which the blood smear image taken by the digital camera attached with the microscopic structure.

There are several steps involved in the process of approximating the Red blood cells and White Blood cells. These are input image acquisition, preprocessing, segmentation, feature extraction, RBC and WBC counting. In the pre-processing step, the original blood smear image taken under microscope is converted into saturation image. Segmentation is done by histogram thresholding and morphological operations. Subsequent step is feature extraction which is through morphological operations to discriminate between different cells i.e., Red Blood Cells, White Blood Cells, Platelets and background image. The last step is to find out the number of Red Blood Cells and White Blood Cells from the blood smear image by using Hough Transform.

The blend of morphological operations, logical operations and Hough Transform is used to segment RBC and WBC. Relative to manual counting, it is of ease operation and less time consuming. This approach discovered for RBC and WBC counting, can be explored for complete blood cell counting such as Platelets count [1]. The other method was developed to analyze microscopic images of blood smears by segmenting and counting both WBCs and RBCs. The segmentation is built on thresholding and morphological operations and then counting is done on the circularity feature of the blood cells extracted using an iterative structured circle detection algorithm. A novel technique for binary images based on the basics of RCD has been proposed and used for counting RBCs and WBCs. The following segmentation and counting accuracies were achieved using the proposed method: PR = 89.7%, RC = 98.4%, and *F*-measure= 93.9% for WBC and PR = 95.3%, RC = 97.5%, and *F*-measure=96.4% for RBCs [2].

An image captured by CCD camera setup at microscope is completely transformed and then divided into cropped images of *m x n* blocks with known size. This image is then transformed into binary image. The images which are microbial and below pre-specified pixels are measured noise in the binary image and are detached from the binary image. Morphological filters and the area openings are used for smoothing procedure. Several enhancements were made to the RCD algorithm, including an initialization step to find 8-neighbor connected components. Additionally, the proposed model features an enhanced probability of selecting the correct circle from four candidate circles, the capability to detect irregular cells, the use of dynamic number of iterations, and improved finding of overlapping cells [3].

Another approach of detecting Platelets decided to use the Support Vector Machine technique. The basic idea of the Support Vector Machine (SVM) is to construct a hyperplane as the decision surface in such a way that the margin of separation between positive and negative examples is maximized and this approach agrees to save time and effort of laboratory technicians, while preserving low error rate [4]. Image processing technique to detect and count the platelets is helpful magnificently. Compared with the manual counting of platelets, this system takes less time. Despite with these advantages there is a problem in counting overlapping cells [5]. In this, the WBCs and RBCs are counted by using the gray thresholding algorithm calculating with the manual method. This means that, the number of WBCs and RBCs are counted from the five blood images. This procedure is done because in manual counting method, the cells are counted from the five squares. After counting the number of WBCs and RBCs from these five squares, these counts are then applied to the formula to count the normalized count. So, this same technique is done to calculate the number of WBCs and RBCs in this project. The use of image processing helps in improving the image quality and analysis approach from unlike other application. It improves the effectiveness of the analysis in term of accuracy, time consumption and so on.

There is a solution. Digital image processing can be used to face this challenge. Segmentation methods and morphological operations are incorporated to calculate the number of Platelets which is then used to detect dengue infection using blood smear's microscopic image. A morphological operation named 'flood fill' is used to detect Platelets with their size. In many primary health care centers in India, blood cell counting is typically done manually, which is very difficult and requires expert lab technician.

The above described procedure needs a digital camera attached with traditional microscope where the advanced camera is connected with a computer [6]. Laboratory examination is used to diagnose dengue infection and to monitor disease advancement. Hematology tests, such as Platelets count, are used for timely recognition of the development of severe dengue. To address this challenge, developing an automatic platelet counter for primary health care and resource-poor settings was a good idea. The technology is based on a conventional microscope equipped with a digital camera linked to a computer, which can capture and analyze microscope images of blood samples. To evaluate the accuracy of the technology, it was compared to platelet counts performed manual by an experienced laboratory technician. Statistical analysis shows no difference between the techniques with a kappa coefficient of 0.6 [7].

III. Proposed Methodology

Based on the above review techniques, we have come up with a project where molecular testing detects the genetic material of the dengue virus in blood within the first week after symptoms appear in fever. The platelets are calculated using various segmentation methods and operations of morphology, and with the help of the platelets count, dengue fever infection is detected.

IV. Conclusion

Molecular testing detects the genetic material of the dengue virus in blood within the first week after symptoms appear in fever. The platelets are calculated using various segmentation methods and operations of morphology, and with the help of the platelets count, dengue fever infection is detected. By adopting above used techniques we are going to design an automated solution for dengue fever detection.

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