A Review on Blood Cells counting using Image Processing

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Abstract: The human blood contains the RBCs, WBCs, Platelets and Plasma. To count the blood is very important because they indicate the state of health. Counting of Complete Blood Count (CBC) includes all the cells that determines person’s health and diagnose the diseases. There are various techniques of blood cells counting which involves conventional as well as automatic techniques. This paper gives review on different techniques applied to obtain the blood cells counting. Image Processing involves Image Acquisition, Pre Processing, Image Segmentation, Image Post-Processing and cell counting Algorithm.

Index Terms - Complete Blood Count, Image Processing, Red Blood Cells, White Blood Cells, Platelets

I. INTRODUCTION
The complete blood count (CBC) is that Biopsy accustomed. In the blood cells white and red are the important part of immune system. Red Blood Cells (RBC’S) are also known as erythrocytes and function of RBC’s are to carry oxygen and collects carbon dioxide from a lungs to the cells of body. They contains protein called hemoglobin. White Blood Cells (WBC’S) are known as a leukocytes. WBC’s are protects body by removing viruses and bacteria in a body. Platelets are also called as thrombocytes. The function of the platelets is to stop bleeding by clumping and clotting blood vessel injuries. Complete Blood Count involves blood testing to determine the healthiness of the major components of blood which are platelets, red blood cells and white blood cells. Abnormalities of result based from references of normal count indicate the person health and they required the medical condition that needs further evaluation. By using various algorithm that will help counting of blood cells that produce accurate result. There are various image processing algorithm is used for calculating the blood cells like Watershed algorithm, K-mean algorithm, Edge detection algorithm etc.

II. RELATED WORK
Dyanesh Varun D et.al. [1] the RBC and WBC count using Digital Image Processing (DIP) from blood images captured through a compound microscope. a method to digitally analyzer the image of blood cells and found the RBC and WBC count values from the blood smear microscopic images. Circular Hough transform was performed for RBC count whereas edge detection used for WBC count.

Vasundhara Acharya et.al [2] proposed an image processing technique for RBCs count which processed the blood smear image to count RBCs along with the identification of normal and abnormal cells. They used the MATLAB software for identify and RBC’s cell classification using Computer Aided System.

Muhammad Sajjad et.al [3] illustrated a mobile-cloud assisted framework is presented for segmentation and classification of leukocytes into their corresponding five different classes. For segment the WBC’s from blood smear images they used color K-means Algorithm. Then, a set of texture, geometrical, and statistical features were extracted from the segmented region. Due to the diverse nature of blood smear images, a single classifier was almost impractical. Therefore, they considered an EMC-SVM for classification of leukocytes.

Shubham Manik et.al [4] proposed an method for counting and classification of white blood cells using Artificial Neural Network (ANN). Nucleus enhancement by finding the intensity maxima improves the detection and classification of Leukocytes and then classified based on various features extracted from segmented images. ANN was used to classify and confirm the white blood cells.

Rakibul Ahasan et.al [5] explained traditional white blood cell counting was a long process and contributes some inaccuracy. If more accuracy in white blood cell counting would like to obtain, an expensive haematological analysing machine is needed. Hence, microscopic images of blood stained peripheral blood film for leukemia and normal condition was presented. It involved color space conversion, color thresholding, filtering, marker controlled watershed technology.
Jingyi Lou et.al [6] proposed a method to count red blood cells (RBCs) automatically by analyzing blood cell images collected from a microscopic hyperspectral imaging system. In segmenting blood cell image, spectral angle mappings (SAMs) and support vector machines (SVMs) were used. RBCs can be identified using standard RBC model based on SAM classification algorithm.

Andrea Loddo et.al [7] proposed a clinical decision support system for cells counting and classification. A computer aided system simulated a human visual inspection to automate process of detection and determination of WBCs and RBCs from blood smear smears. They used method which was based on a machine learning approach for segmentation and Support Vector Machine techniques.

Sheirf Abbas et.al [8] presented a method for counting the RBC was developed using RBC light microscopic images and Matlab software. The mask of the RBC was used to count the number of RBC in a blood smear. It involved separation of color components in the image, then histogram was performed. Thresholding was done after the histogram. If object area was greater than the desired value, area from the image corresponding to the triple line square is then extracted. Finally, number of RBCs will be counted from the extracted area of the image.

Arti Taneja et.al[9] presented various image segmentation techniques. Image based applications such as target tracking, tumour detection, texture extraction requires an efficient image segmentation process. Various segmentation techniques like edge, threshold, region, clustering and neural network were involved in the effective image analysis.

S.S.Savkare et.al [10] proposed an segmentation of the blood component from microscopic images was important in differential blood count as well as detect of blood disease. In this paper they used method for blood cells segmentation K-Mean clustering, to reduction of noise and laplacian filter used the median filter. And sobel edge detection was utilized for edge enhancement in grayscale image.

Anjali Gautam et.al [11] proposed morphological features of cells which counted white blood cells. The extraction of nucleus of WBC provided information about different kinds of diseases. After contrast stretching and histogram equalization of image, segmentation of nucleus from blood smear images using Otsu’s thresholding technique was applied.

J Hari et.al [12] explained separation and counting of blood cells using geometrical features and distance transformed watershed techniques. The proposed method operated on binary images taken from initial segmentation and consists of several detailed steps. Canny edge detection, the most popular edge detection, was done in the image.

Krishna Kumar Jha et.al [13] proposed abnormalities in white blood cells using digital image processing. presented is fast and inexpensive that can detect kind of diseases like Chronic Obstructive Pulmonary Disease, Immune system disorders, Neutropenia, HIV/AIDS, Lymphocytopenia, leukemia etc. There are two proposed framework presented in the paper the first framework determined the types of nucleus in WBC and the second framework is the counting of WBC and abnormal nucleus in the WBC.

Heman Tulsani et.al [14]. explained the counting of blood cells from blood smear test using Matlab simulations. also eliminated the major problem of overlapping cells while counting by segmentation using morphological watershed transformation.

Ms.S.S.Adagale et.al [15] presented a to segment and count overlapped red blood cells image. It used the combination of Pulse Coupled Neural Network (PCNN) and template matching algorithm. The steps done are converting the image from RGB to gray, segmentation using PCNN, eliminating unwanted objects, segmentation using template matching, count isolated blood cells, count overlapped cells and final counting.
### III. LITERATURE REVIEW TABLE

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<td>Institute of Electrical and Electronics Engineers 978-1-5090-6367-3</td>
<td>September 2017</td>
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<td>3</td>
<td>Muhammd Sajjad et.al</td>
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<td>December 2016</td>
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<td>4</td>
<td>Shubham Manik et.al</td>
<td>International Conference on Power Electronics. Intelligent Control and Energy Systems 978-1-4673-8587-9</td>
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<td>5</td>
<td>Rakiball Ahasan et.al</td>
<td>International Conference on Informatics, Electronics and Vision (ICIEV) 978-1-5090-1269-5</td>
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<td>9</td>
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<td>Gaussian mixture model (GMM) K- means clustering</td>
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<td>10</td>
<td>S.S.Savkare et.al</td>
<td>International Conference on Information Processing (ICIP) 978-1-4673-7758-4</td>
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<td>Watershed Transform K-mean clustering Sobel edge detection</td>
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<td>11</td>
<td>Anjali Gautam et.al</td>
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<td>12</td>
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<td>International Conference on Devices, Circuits and Systems (ICDCS) 978-1-4799-1356-5</td>
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<td>14</td>
<td>Hemant Tulsani et.al</td>
<td>IMPACT 978-1-4799-1205-6</td>
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<td>Watershed Software- Matlab</td>
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<td>15</td>
<td>Ms.S.S.Adagelle</td>
<td>IEEE International Conference on Computational Intelligence and Computing Research 978-1-4799-1597-2</td>
<td>December 2013</td>
<td>Pulse code Neural Network (PCNN)</td>
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IV. BLOCK DIAGRAM

Fig 1. Block Diagram

V. CONCLUSION

This Review Paper propose a various method to counting of red blood cells, white blood cells and Platelets. By using these techniques they are calculate the blood cells automatically using software. This a software based solution for counting the blood cells. By using image processing to calculate the blood count is accurate reliable results.

References