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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 MATLB 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) used. RBCs can be identified using standard RBC model based on SAM classification algorithm.

Andrea Loddo et.al [7] proposed an 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 sugar 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 an 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 a 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

Sr.No	Authors	Journals	Year of Publication	Implemented Algorithm
1	Dynaesh Varun D et.al	IEEE International Conference on Current Trends toward Converging Technologies, 978-1-5386-3702-9	March 2018	Automated Blood Cells Counting Software – Matlab
2	Vasundhary Acharya et.al	**Institute of Electrical and Electronics Engineers** 978-1-5090-6367-3	September 2017	Software – Matlab
3	Muhammd Sajjad et.al	**Institute of Electrical and Electronics Engineers** 2169-3536	December 2016	K – mean algorithm
4	Shubham Manik et.al	International Conference on Power Electronics. Intelligent Control and Energy Systems 978-1-4673-8587-9	July 2016	Artifical Neural Network Otsu Thresholding
5	Rakiball Ahasan et.al	International Conference on Informatics, Electronics and Vision (ICIEV) 978-1-5090-1269-5	May 2016	Watershed algorithm Software- Matlab
6	Jingyii Lou et.al	International Congress on Image and Signal Processing, Bio Medical Engineering and Informatics(CISP-BMEI) 978-1-5090-3710-0	October 2016	Spectral Angle Mapping (SAM) & Support Vector Machine (SVM)
7	Andrea Loddo et.al	International Conference on Signal-Image Technology & Internet-Based Systems 978-1-5090-5698-9	December 2016	Computer Aided System Support Vector Machine (SVM) & Circular Hough Transform
8	Sherif Abbas et.al	ELSEVIER	August 2015	Software – Matlab
9	Arti Taneja et.al	**Institute of Electrical and Electronics Engineers** 978-1-4673-7231-2	September 2015	Gaussian mixture model (GMM) K- means clustring
10	S.S.Savkare et.al	International Conference on Information Processing (ICIP) 978-1-4673-7758-4	December 2015	Watershed Transform K-mean clustring Sobel edge detection
11	Anjali Gautam et.al	**Institute of Electrical and Electronics Engineers** 978-1-4799-3080-7/14	September 2014	Otsu Thresholding
12	J Hari et.al	International Conference on Devices, Circuits and Systems (ICDCS) 978-1-4799-1356-5	March 2014	Canny Edge detection & Watersheding
13	Krishna Kumar Jha et. al	**Institute of Electrical and Electronics Engineers** 978-1-4799-4982-3	March 2014	Software - Matlab
14	Hemant Tulsani et.al	IMPACT 978-1-4799-1205-6	November 2013	Watershed Software- Matlab
15	Ms.S.S.Adagelle	IEEE International Conference on Computational Intelligence and Computing Research 978-1-4799-1597-2	December 2013	Pulse code Neural Network (PCNN)

IV.BLOCK DIAGRAM

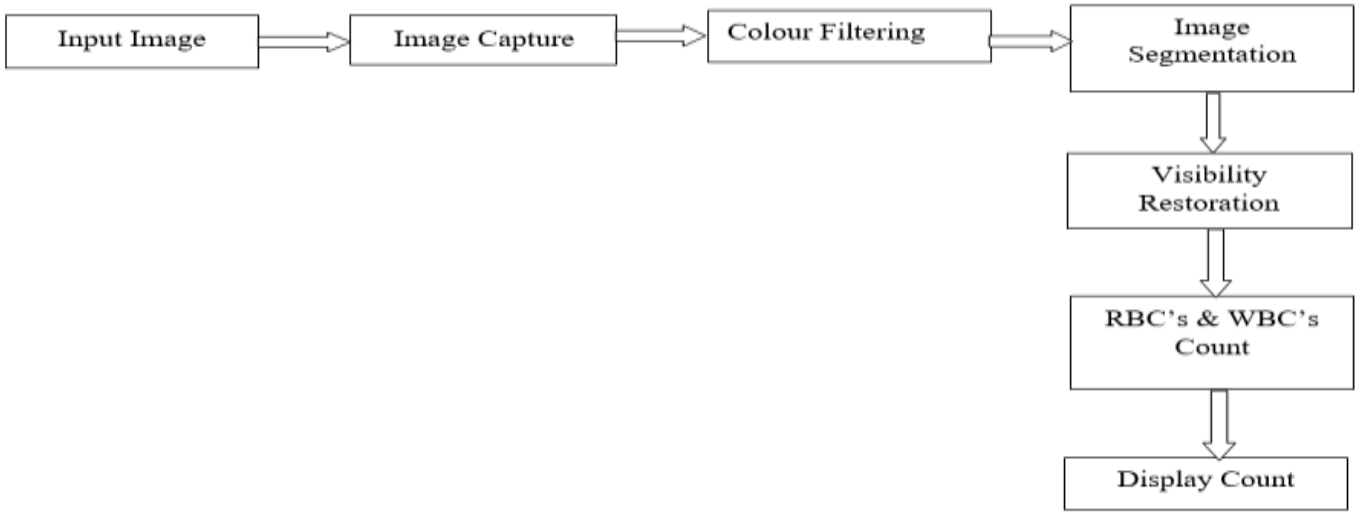

Fig 1. Block Diagram

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

[1] Dyanesh Varun D. , Kandhuri Reddy , Lakshmi Priya S, "Blood Cell Count using Digital images Processing" proceeding of 2018 IEEE International Conference on Current Trends toward Converging Technologies , Coimbatore 2018.

[2] Acharya V., Kumar P, "Identification and red blood cell classification using Computer Aided System to Diagnose Blood Disorders" ,Med. Biol. Eng. Computer .IEEE 2017.

[3] M. Sajjad, S. Khan, Z. Jan, K. Muhammad, H. Moon, J.T. Kwak, S.Rho, Seungmin, W. Sung I. Mehmood, "Leukocytes Classification and Segmentation in Microscopic Blood Smear: A Resource-Aware Healthcare Service in Smart Cities", IEEE Access 2016.

[4] S. Manik, Lalit, M. Saini, N. Vadera , "Counting and Classification of White Blood Cell using Artificial Neural Network (ANN)", 1st IEEE International Conference on Power Electronics. Intelligent Control and Energy Systems (ICPEICES-2016).

[5] R. Ahasan, A.U. Ratul, A.S.M. Bakibillah, "White blood cells nucleus segmentation from microscopic images of strained peripheral blood film during leukaemia and normal condition", 2016 5th International Conference on Informatics, Electronics and Vision ,ICIEV 2016.

[6] J. Lou, M. Zhou, Q. Li, C. Yuan, H. Liu, "An automatic red blood cell counting method based on spectral images", 2016 9th International Congress on Image and Signal Processing, Bio Medical Engineering and Informatics (CISP-BMEI), 2016.

[7] Loddo, Andrea, Putzu, Lorenzo, Ruberto, Cecilia DI, Fenu, Gianni,"A Computer-Aided System for Differential Count from Peripheral Blood Cell Images", Proceedings - 12th International Conference on Signal Image Technology and Internet-Based Systems, SITIS 2016.

[8] S. Abbas, "Microscopic images dataset for automation of RBCs counting", Data in Brief 5 2015.

[9] Arti Taneja, Priya Ranjan, Amit Ujjlayan. "A Performance Study of Image Segmentation Techniques". IEEE Conference Publications,DOI:10.1109/ICRITO.2015.

[10] S.S. Savkare, S.P.Narote. "Blood Cell Segmentation from Microscopic Blood Images". IEEE 2015 ICIP, pp. 502-505, 2015.

[11] Anjali Gautam , Harvindra Bhadauria "Classification of white Blood Cells Based on Morphological Features ".IEEE 2014.

[12] J. Hari , A.S. Prasad, S.K. Rao, "Separation and counting of blood cells using geometrical features and distance transformed watershed ", Proceedings of the IEEE International Caracas Conference on Devices, Circuits and Systems, ICCDCS 2014.

[13] K.K. Jha, B.K. Das, H.S. Dutta, "Detection of abnormal blood cells on the basis of nucleus shape and counting of WBC", Proceeding of the IEEE International Conference on Green Computing , Communication and Electrical Engineering, ICGCCEE 2014.

[14] Tulsani , Hemant , Gupta, Rashmi , Kapoor, Rajiv, "An Improved Methodology for Blood Cell Counting", IEEE Impact 2013.

[15] Ms. S.S Adagale, S.S. Pawar , "Image Segmentation using PCNN and Template Matching for blood cells counting ", IEEE 2013.