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WHITE BLOOD CELLS PLATELETS USING CNN AND KNN TECHNIQUES

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Abstract—Evaluation1of blood smear1is a for the most part clinical test these days As a general rule, the hematologists are1charmed on white platelets (WBCs)1in a manner of speaking Propelled image getting ready framework scan1help them in their examination1and finding. For1example, sickness like extraordinary leukemia is recognized subject to the1entirety and1condition of the1WBC1The essential objective of this paper is to segment the WBC to its two over whelming parts: edge detection and k-means. The division is coordinated using a proposed division structure that contains a1joining of a couple electronic image taking care of calculations. Twenty tiny blood images were attempted, and the proposed framework made sense of how to procure 92% precision for center division and 78% for cytoplasm1division. The results1show1that the proposed framework can isolate the center and cytoplasm region1in a WBC image test.
Keywords1— White blood1cell1segmentation, Edge Detection, K-Means

I. INTRODUCTION

The fundamental object is to build up a robotized arrangement framework, which fragments and orders infinitesimal blood image from malignant growth and non-disease individuals. The three kinds of blood malignancy are Leukemia, Lymphoma and Myeloma Electronic examination of which platelets tumor illness, for example, Leukemia, Lymphoma and

Myeloma is a trying biomedical investigate point As indicated1by the World Health Organization (WHO) Cancer is thinking about as the subsequent driving reason for1death on the1planet and has killed 881million individuals1in 201, Attributed1to the demise of1almost one out1of six passings1around the world.1Finding those malady1in the beginning times1profoundly influences the1treatment time frame. Further more, a portion of the ailment sub-types are truly1befuddling to the1Doctors There is1 an incredible propensity for1symptomatic pathology to1 intensely depend on1mechanized frameworks which can help in the1determination. White1platelets malignancy illness like Leukemia, Lymphoma and Myeloma1compromise1individuals' life1now a days Leukemia is1discovered when1the bone marrow produces1unusual white1platelets, which don't work appropriately1It might be either intense or incessant1 shown in the figure 1.

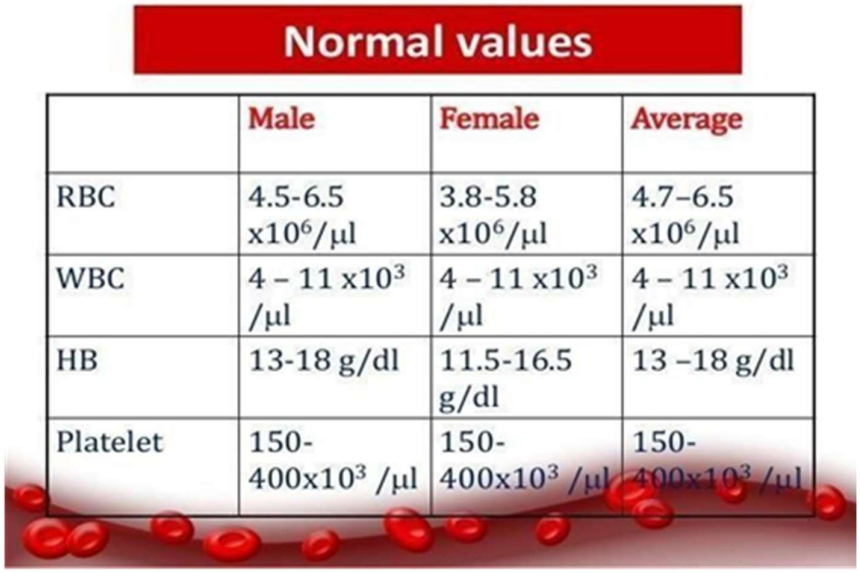


Figure 1 : Human1blood Ranges

II. Proposed1Framework

White blood cells is a deadliest compared to the other cancers because once the cancer cells is seen if it is not treated at the correct time that is it should be diagnosed in the 1st stage itself otherwise it will spread from one part of the body to other, it effects the whole white platelet cells present in the body very fast and leads to death The automated system is necessary to diagnose the white blood cells cancer, so this kind of system is in demand since many years it not only diagnose the white blood cells caners accurately, also it helps to find the new cases of platelet cancer.

This white platelets cancer is being increasing these days compared to the other type of cancers The microscope blood images will be used for diagnosing and detecting white blood cells cancer by pre-processing like Noise removal, Enhancement of images, Segmentation, Extraction of features and Classification of cancer white platelets by taking microscope blood image for testing The microscope blood images are viewed by the physicians to diagnose the disease there is a chances of false prediction by the doctors because if the image is not clear and if there is some abstractions in the image will result in the false prediction But , in this

project that are obtained from segmentation and classification, so this method gives the a accurate results and there will be no chance of failure of false prediction by the doctors.

III. OBJECTIVE

The main objectives of the Detection, counting of white blood cell cancer disease are:-

- To provide patient care that is appropriate, and effective for the treatment of cancer
- To provide consistent approach towards detection of cancer
- To define the threatment procedure for the patient who will undergo microscope
- To detect whether cancer has spread or not
- To detect the white blood cell cancer in early stages
- To provide better accurate result by classifying the white blood cell cancer by using CNN algorithm

IV. METHODOLOGY

It provides information about each component used in a proposed method with a complete architecture diagram it provides a module wise explanation of the propose work with use case diagram for each module, flow of each modules using data flow diagram the overall explanation of each module is the output of high level design module These means are appeared in Figure 2.

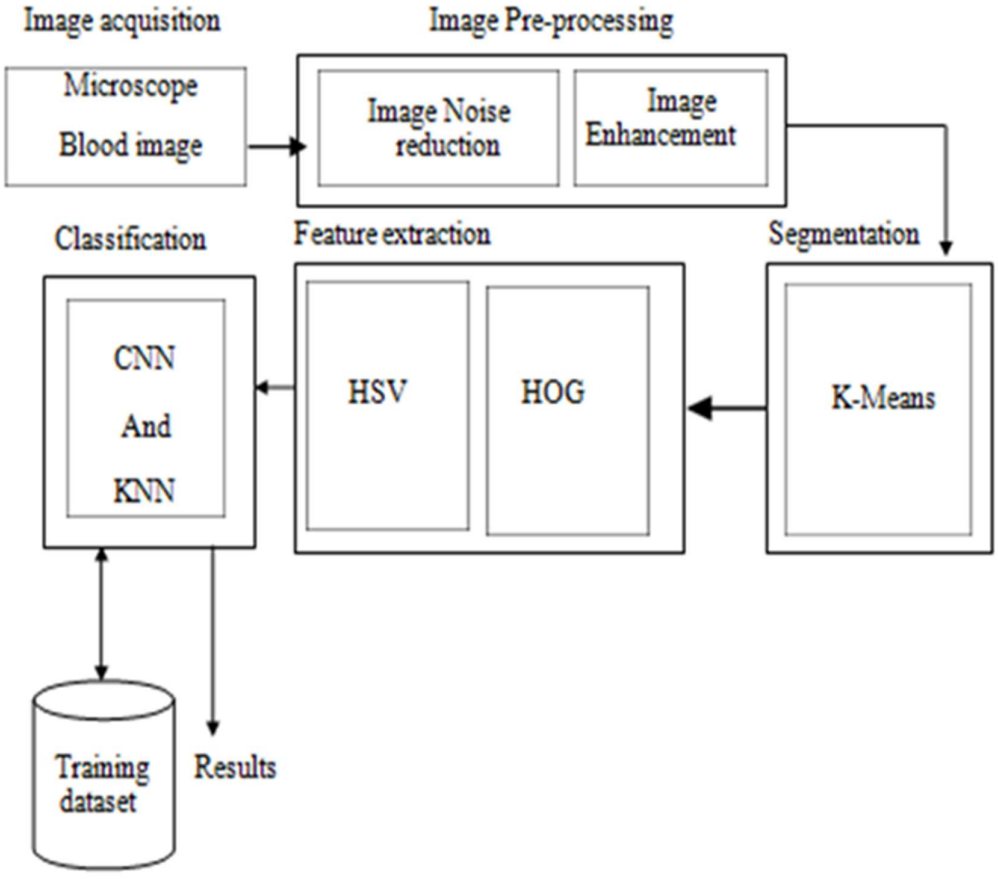


Figure 2: Framework for1White Blood Cells identification1and counting

The design considerations of "Automated detection ,counting of white blood cell cancer disease and classification using CNN " are:-

- The algorithm can accept the image file of various extensions such as jpeg, png, bmp, tiff, gif type of images either color or gray
- Resizing of the image or the image enhancement can be done by doubling the1original image, and also it can be done by decreasing or increasing the blurred image, which will increase the quality of the image Pre-processing technique is applied
- Edge detection is done in order to observe all the boundaries of the WBC to detect the WBC cancer in which part it is affected by using the technique canny edge detector
- K-means segmentation technique will be used for the segmentation of WBC cancer for the Counting the white blood cells
- Feature extraction will be applied for the extraction of the texture of WBC in order to see how much the cancer is spread
- CNN classification is applied in order to check whether it is cancerous or non-cancerous, if it is cancerous will determine at which stage the WBC cancer is present

V. Results and Discussion

This page include the button to load WBC microscope blood images data, add noise, noise removal by filtering techniques, segmentation, feature extraction, classification such as classes 3, 4 , 5 is used for WBC cancer microscope blood images to see whether it is a normal image represented by class1, and to see whether it is a cancerous image if it is with stage one which is represented by class 2, the stage two image is represented by class 3 and if the WBC cancer is in the third stage then it is represented by class 4 then clear all and exit The microscope blood image

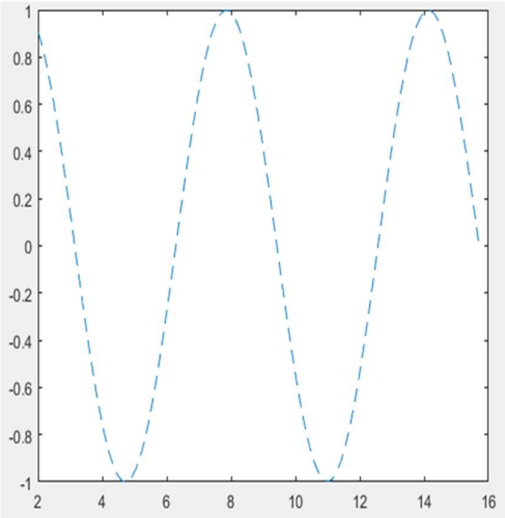


Figure 3: CNN

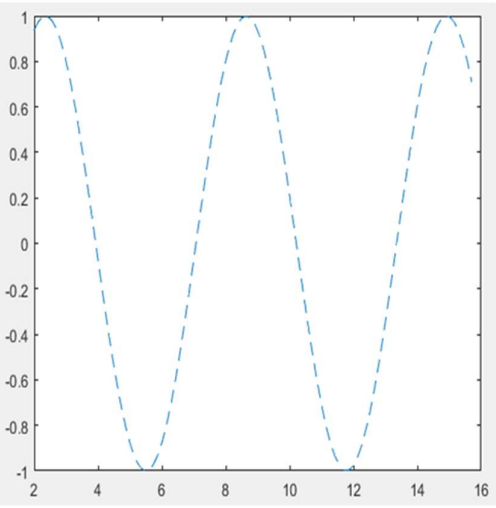


Figure 4:KNN

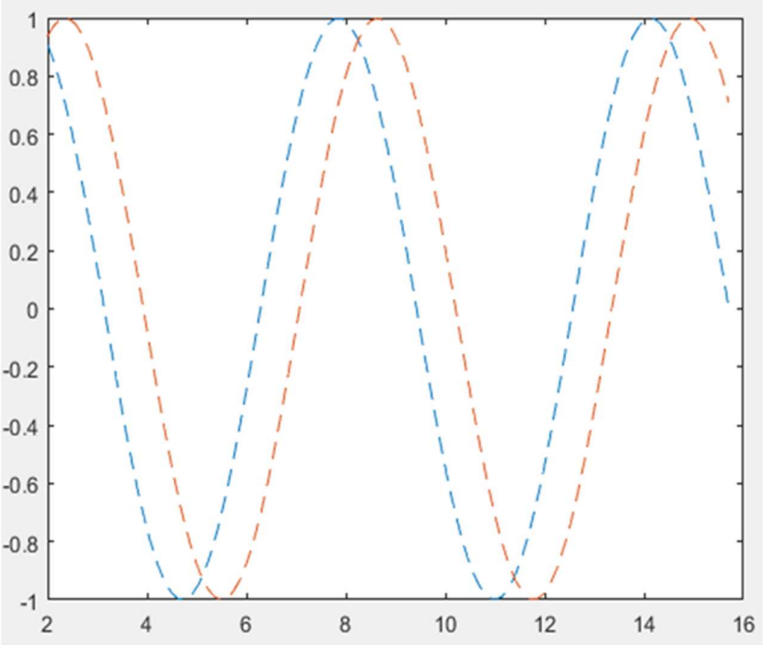


Figure 5: Analysis of CNN and KNN

As shown in Figure 5, WBC cancer microscope blood image, after the edge of the WBC are detected, then segmented of WBC cancer region will be obtained by applying the K- means segmentation technique algorithm which segments the similar and dissimilar characters from the WBC region in the form of clusters, in which foreground and background separation is done compare to the other segmentation techniques this k-means clustering gives the better result to differentiate the bone region between the normal and the cancerous WBC image which will be useful for the feature extraction and classifier to easily predict whether it is cancerous or non- cancerous. image segmentation for WBC cancer detection. In the proposed method

median filter and gradient operations are used for the segmentation. Initially median filter operations are implemented on the grey scale. Microscope blood images to perform segmentation abnormal regions and counting the white blood cells. The proposed system uses CNN classifier for classification.

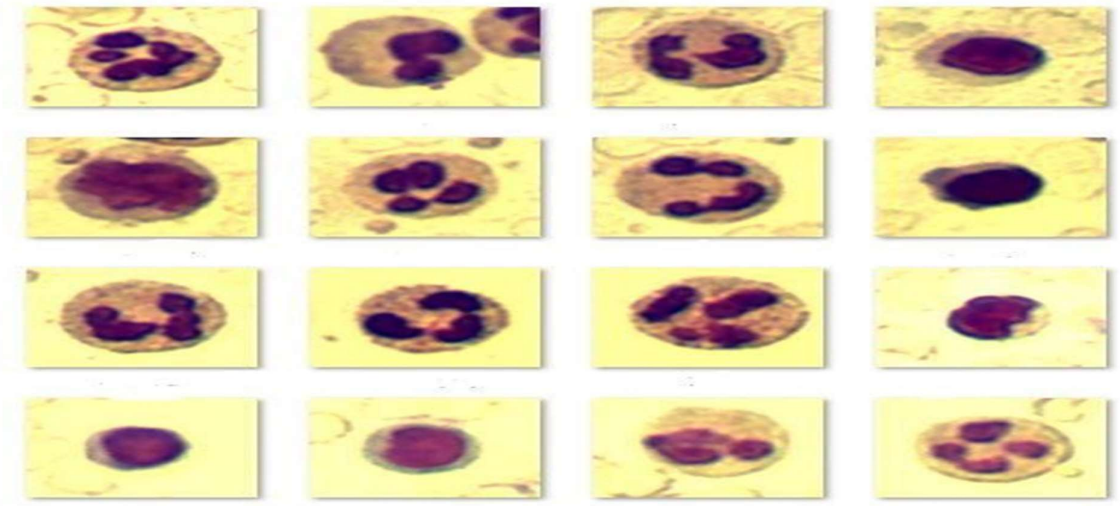
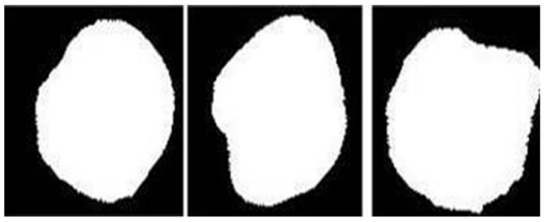
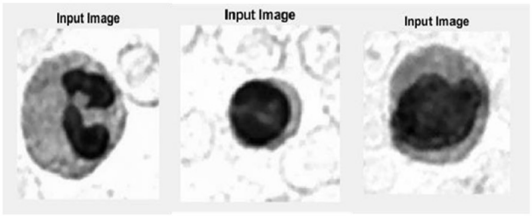


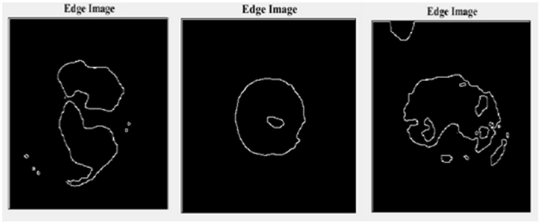
Figure 6:- Cells segmentation procedure a. Input image b. Edge detection c. segmented part 1 d. segmented part 2 e.segmented part 3 f. Hole filling g. nucleus extraction



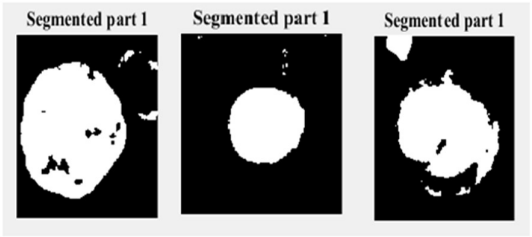
a. Input Image



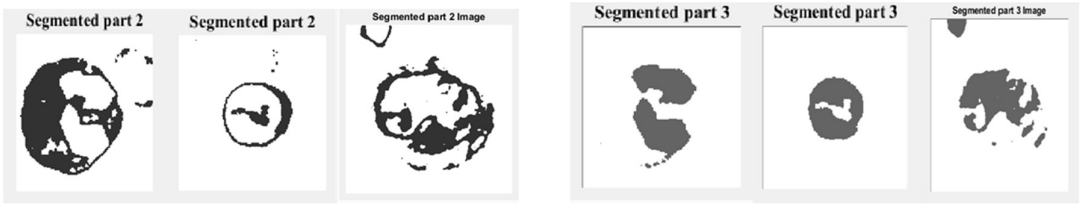
b Image for Edge detection



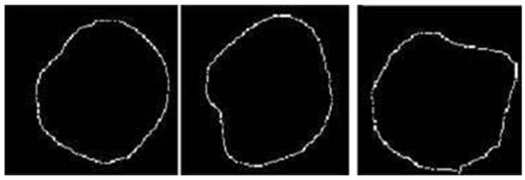
c. Image for Segmented part 1



d Image for Segmented part 2



e Image for Segmented part 3 f Hole filling



g Nucleus extraction

The comparison graph and performance graph for CNN and KNN classifier in WBC cancer analysis system and identifys the number of1cells. In the above comparison graph, X-axis will represents the KNN and CNN classifiers. Y-axis will represents the percentage of classifiers accuracy for detecting the WBC cancer. In the above graph blue line indicates KNN classifier and green line indicates the CNN classifier. In the feature extraction phase numerical data's will be extracted, then it will be passed as a input parameter to CNN classifier. Test data are termed as the extracted features. K-nearest neighbour is used to detect the WBC cancer accurately whether the cancer is at the 1st stage, 2nd stage or 3rd stage else normal. This CNN classifier gives the good accuracy of 98.18% for detecting the WBC cancer where the KNN fails by giving the accuracy of 85.71%, so the CNN classifier is the best method for detecting the WBC cancer.

SUBTRACTION METHOD	CNN	KNN
ACCURACY	85.71 %	98.18%

TABLE 1:- Average counting accuracy for each disease

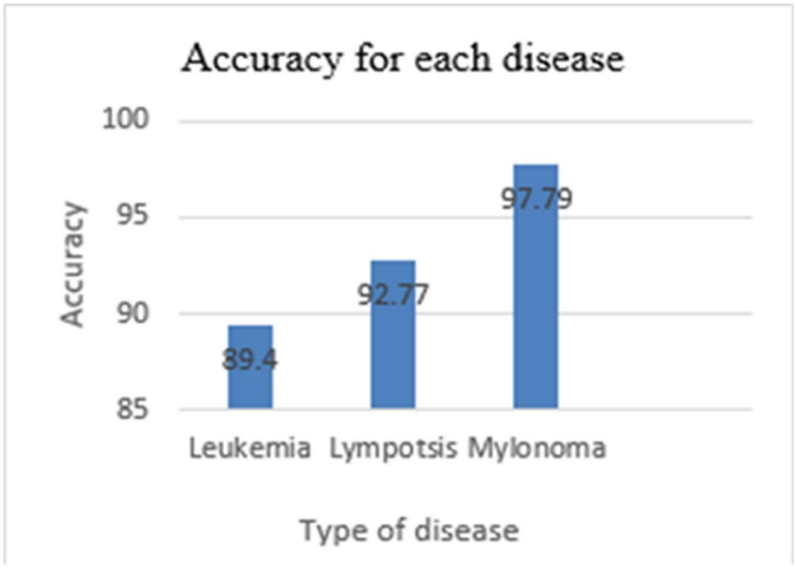


Figure 7 : Accuracy for each disease

VI. CONCLUSION

White blood cells cancer in human beings is the most deadliest disease where the symptoms of this disease will not notices in the earlier stages. To prevent the death rate, it is very important for detecting the WBC cancer in the early stages and needs exact determination for the people who are suffering from this disease. The WBC cancer comes from other cancerous diseases like RBC, WBC cancer etc., which will widely spread to the WBC. The proposed method will utilizes computed Tomography for the investigation of WBC cancer stages growth in the microscope blood images.CNN classification technique is used for the WBC cancerous tumour detection in the images of Microscope blood images. In pre-processing method noise removal, auto contrast and edge detection are performed, K- means segmentation technique will be used for the segmentation of the WBC region. Using HOG and HSV approach is taken for the feature extraction. CNN classifier will be used as a classification technique also count the white blood cells for every image, for different kinds of images this method has been tested, and proven that CNN classifier has achieved 98.18% accuracy.

REFERENCES

(1) Sumeet Chourasiya, G Usha Rani, “Automatic Red blood corpuscle Counting using Watershed Segmentation”, International Journal of computing and knowledge Technologies, Vol 5 (4) , pp 4834- 4838,2014

(2) Samir K Bandyo padhyay, “Method For blood corpuscle Segmentation”, Journal of worldwide Research in computing, Volume 2, No 4,pp130– 135, April 2011

(3) Rajesh R, etal, “Modern Hematology: Clinical and Biology Management”, 2nd ed, Humana Press, NewJersey,2007

(4) Hemanth Saransh “Segmentation using or Counting Blood Cells”, International Journal of Computer Applications & Information Technology Vol 2, Issue III Apr-May2013

(5) 4 Samir K Bandyo padhyay, "Method For blood corpuscle Segmentation", Journal of worldwide Research in computing,
(6) Volume 2, No 4, pp130 – 135, April 2011
(7) Nasution, AMT, EK Surya "Comparison of Red Blood Cells Counting using Artificial Neural Network", IEEE Photonics Global,2008
(8) J Poomcokrak and C Vanit, "Red Blood Cells Extraction and Counting", The 3rd International Symposium on Biomedical
(9) Kumar BR, Joseph DK and Sreenivasc TV (2002) Teager energy based blood cell segmentation Digital Signal Processing DSP 2002 14th International Conference on, vol 2:619–622
(10) Zack G, Rogers W, Latt S (1977) Automat- ic measurement of sister chromatid exchange frequency J Histochem Cytochem 25:741–753
(11) Prewitt JMS (1970) Object enhancement and extraction Picture Processing and Psychopictorics, pp 75–149
(12) Roberts LG (1965) Machine perception of 3-D solids Optical and Electro-Optical Information Processing, pp 159–197
(13) Canny J (1986) A computational approach to edge detection IEEE Trans Pattern Anal Mach Intell, pp
(14) Monika Mogra, Vivek Srivastava, "Comparative Analysis of Detection of RBCs and WBCs Using k-Means Clustering Algorithm", International Journal of Engineering Research and General Science Volume 2, Issue 5, pp670 – 674, August-September,2014
(15) Pooja R Patil, , Gauri Anand gaonkar, "Counting of WBCs from Blood Images Using Gray Thresholding", International Journal of Research in Engineering and Technology, Volume 3 Issue 4,Apr-2014
(16) CompleteBloodCount-
http://wwwaidsinfonetorg/fact_sheets/view/121[viewedon,8thOct‟14]
(17) Medicine Health–
http://wwwmedicinehealthcom/leukemia/articlehtml[viewedon,6thSept‟14]
(18) Sumeet Chourasiya, G Usha Rani, "Automatic Red blood corpuscle Counting using Watershed Segmentation", International Journal of computing and knowledge Technologies, Vol 5 (4) , pp4834-4838,2014
(19) Samir K Bandyopadhyay, "Method For blood corpuscle Segmentation", Journal of worldwide Research in computing, Volume 2, No4, pp130
– 135, April 2011
(20) Rajesh R, etal, "Modern Hematology: Clinical and Biology Management", 2nd ed, Humana Press, NewJersey,2007
(21) Hemanth Saransh "Segmentation using or Counting Blood Cells", International Journal of Computer Applications & Information Technology Vol 2, Issue IIIApr-May2013
(22) 4 Samir K Bandyo padhyay, "Method For blood corpuscle Segmentation", Journal of worldwide Research in computing, Volume 2, No 4, pp130 – 135, April2011
(23) Nasution, AMT, EK Surya "Comparison of Red Blood Cells Counting using Artificial Neural Network", IEEE PhotonicsGlobal,2008

(24) J Poomcokrak andC Vanit, “Red Blood CellsExtractionandCounting”,The3rd International Symposiumon Biomedical
(25) M J Macawile, V V Quiñones, A Ballado, J D Cruz and M V Caya, "White blood cell classification and counting using convolutional neural network," 2018 3rd International Conference on Control and Robotics Engineering (ICCRE), Nagoya, 2018, pp 259-263
(26) I Leukemia and Lymphoma Society- ―Facts and Statistics‖ [online] Available: https://wwwllsorg/http%3A/llsorgprodacquiasitescom/facts-and-statistics/facts-and-statisticsoverview/facts-and-statistics
(27) Zhao, J, Zhang, M, Zhou, Z et al Med Biol Eng Comput (2017) 55: 1287
(28) Advantages and Disadvantages of Automated Hematology Analyzer [online] Available: https://wwwscribdcom/document/224004525/Advantages-and-Disadvantages-of-AutomatedHematology-Analyzer-20140514-153329
(29) Dennis B DeNicola, Advances in Hematology Analyzers, Topics in Companion Animal Medicine, Volume 26, Issue 2, 2011, Pages 5261, ISSN 1938-9736
(30) Igor Kononenko, Machine learning for medical diagnosis: history, state of the art and perspective, Artificial Intelligence in Medicine, Volume 23, Issue 1, 2001, Pages 89-109, ISSN 0933-3657, https://doiorg/101016/S0933-3657(01)00077-X
(31) Tamalika Chaira, Accurate segmentation of leukocyte in blood cell images using Atanassov's intuitionistic fuzzy and interval Type II fuzzy set theory, Micron, Volume 61, 2014, Pages 1-8, ISSN 0968-4328
(32) LeCun Y, Bengio Y (1995) Convolutional networks for images, speech, and time series In: Arbib MA (ed) The handbook of brain theory and neural networks MIT Press, Cambridge, MA, USA, pp 255–258