

# Blood Group Detection and WBC, RBC Cells Count

**Kritika.B.Soni<sup>1</sup>, Dr.Mrs.S.S.Lokhande<sup>2</sup>**

Department of Electronics & Telecommunication, SCOE, Pune, India<sup>1,2</sup>

**Abstract:** The blood enlightens us regarding the wellbeing. It conveys critical substances, for example, oxygen to different piece of our body. Subsequently recognition of blood classification is imperative. The blood of human includes the Red platelet, White Blood Cells, Platelets and Plasma. By and by, conventional procedures are utilized by Lab specialists to check cells of blood. In any case, this strategy is so repetitive, expends additional time and prompts the misguided results as a result of human bumbles. To beat the issues regarding time, precision and cost, a methodology is proposed in light of handling of pictures procured from lab. The picture preparing strategies, for example, speeded up hearty element (SURF) technique, Morphological tasks and Circular Hough Transform are utilized. Exactness of the framework is high with low execution time.

**Keywords:** Image Processing, Blood Group Detection, RBC, WBC, Circular Hough Transform, Speeded up Robust Feature

## I. INTRODUCTION

Blood assemble reveals to us what kind of blood a man has. Everybody may have differing blood get-togethers. These refinements in blood of Human get-togethers are an aftereffect of nonattendance and vicinity antigens and antibodies on the surface of platelets. Individuals have unmistakable mix of antigens and antibodies and thusly, they have masterminded blood get-togethers. The total blood tally [7] tells about the person's thriving and is use to see the disaster areas like lack, illness and leukemia. It has significance in fields of medicinal. Table I tells the Blood mean solid individual

Table I Blood Count for Healthy Person [7]

Cell type	Ladies	Gents	Unit
Red Blood Cell	4.0-5.0	4.5 - 6.0	(M/ $\mu$ L)
White Blood Cell	4.5 – 12.0	4.5 – 12.0	(K/ $\mu$ L)
Hemoglobin	12.0-15.0	14.0-17.0	(ml)
Hematocrit	36.0% to 45.0%	42% to 50%	(gm/100)
Platelets	150.0 – 450.0	150.0 – 450.0	(K/ $\mu$ L)

Blood consists of Red Blood Cell, White Blood Cell, etc. The full blood check joins tallying of these four sorts of cells. The count of these cells picks the cutoff of a living thing to repudiate a specific ailment and limit of the body framework. The simple count of these cells is unmistakable for men, ladies, and young people, so forth. WBCs are basic for resistant framework. It is utilized for shielding us from infections and microbes. Less count demonstrates presence of disease.

## II. RELATED WORK

Blood is a body liquid in people and differing creatures that passes on fundamental substances, for instance, oxygen to the phones and transports body waste things from those same cells. Along these lines it is imperative to perceive blood grouping. Blood contains Red Blood Cell and White Blood Cells to fight against different disorders. Various experts have done their examination for tallying platelets and recognizing blood bunch using different methodologies.

In [1] built up a framework that identifies the gathering of blood utilizing methods of picture handling. Space of picture preparing is propelling an impressive measure and has achieved huge perspectives. Various application such as security and remedial fields using Image processing for achieve their goals[1]

In [2] contemplated division strategies to check Red platelet. The strategies utilized by them are watershed calculation, veiling, morphological operator n and Ycbr shading change. The mix of morphological administrator and Ycbr shading change and deliver sectioned white platelet. At that point it is being utilized as a veil to expel White Blood Cell from the platelet picture. Then it is being utilized as a cover to expel WBC from the platelet picture. Morphological administrators include paired disintegration reduce little protest like platelet. They came about RBC division is going through marker controlled watershed calculation which handles covering cells. The change should be improved the

situation both division and covered cell dealing with to get better outcome later on [2]

In [4] grew quick and financially savvy creation of platelet check framework. The White Blood Cells and Red Blood Cells are checked by utilizing the dark thresholding calculation figuring with the manual strategy. This implies the quantity of White Blood Cells and Red Blood Cells are tallied from the five pictures of blood. This technique is done in light of the way that in manual tallying methodology, the cells are checked from the five squares the usage of picture handling energizes us in upgrading the photo quality and examination come closer from different application. It enhances the viability of the investigation in term of exactness, tedious [4]

There are a few frameworks which are created however no framework conveys the outcome on time. Along these lines in this paper we have recommended a framework which will check the Red Blood Cell and White Blood Cell and furthermore tells the blood classification in low time than existing entire frameworks.

Traditional restorative strategy comprise following advances

- Tests of blood are kept on test slides
- Anti-serum and blood tests are kept with a stick
- Anti-serum and blood tests are combined
- Then sit tight for the come about by viewing at the yield

As traditional process is more time consuming, implemented method fulfill this purpose in less time

### III. PROPOSED METHOD

The structure is distributed three essential stages: Blood assemble affirmation, Redbloodcell checks, WhiteBloodCell tallying. Figure 1 shows general square chart of mechanized picture preparing. From control driving gathering of structure we need to pick another choice to perform required test i.e. Blood assemble zone, Red Blood Cell tallying, White Blood Cell check. After this one window will show up from which we need to pick an information picture. Every single one of the photographs are secured by the name of patients. By then picture experiences some photograph arranging techniques as decided underneath and we get the outcome in Graphical user interface modify window. Figure 1 demonstrates general square chart of Image Processing

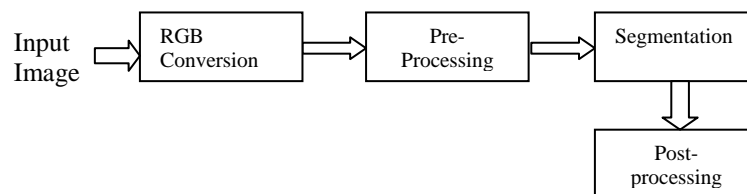


Fig. 1: Process flow for Image Processing

#### A. Stage I: Blood Group Detection

Figure 2 shows main part of framework i.e. Blood Group recognition. In this framework blood aggregate identification is talked about utilizing picture handling strategy that might be utilized by client with no learning of method. We need to put blood on the white plate and blend it with hostile to serum lastly take the picture. The framework will process the picture and gives result that identifies blood gathering. Figure 2 demonstrates stream of blood aggregate identification.

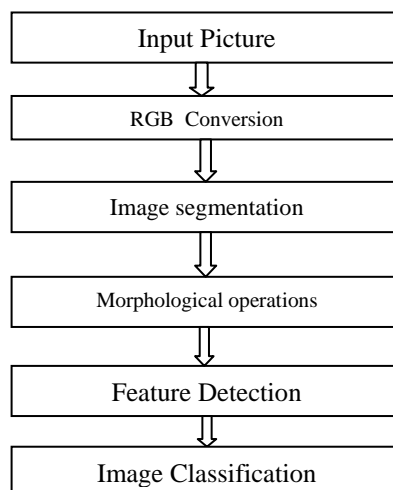


Fig. 2: Flowgraph for Detection of blood gathering

1) Database

We increased shaded pictures of blood on glass slide made up of three cases of blood mixed with unfriendly to serum. Fundamentally a glass slide with blood test is put on a white paper and image is taken by utilizing a camera of phone ie 12MP

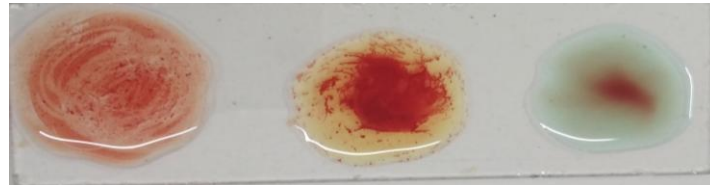


Fig. 3: Picture caught utilizing Camera during test of blood at research center

2) Pre processing

In Pre Processing methodology consolidates change of picture from RGB to diminish scale. Resulting stage is to recognize Speeded Up Robust Feature incorporates that work on diminish pictures. In PC vision, speeded up healthy features [6] is an area incorporate identifier and descriptor. Here we have used Speeded up Robust feature to distinguish the coagulation encircled in a photo. In the wake of perceiving coagulation molded in a photo, we are recognizing blood get-togethers.

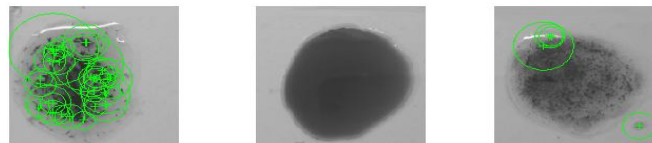


Fig. 4: Output Image of Blood Group Detection

B. Stage II: Red Bood Cell Counting

Figure 5 shows process flow of Red Blood Cell counting which the result of second stage is. It includes Image Acquired from database, After the conversion of input image into RGB format only Green Color is Extracted. Then Circular Hough Transform to detect green circles and Finally Green circles are counted.

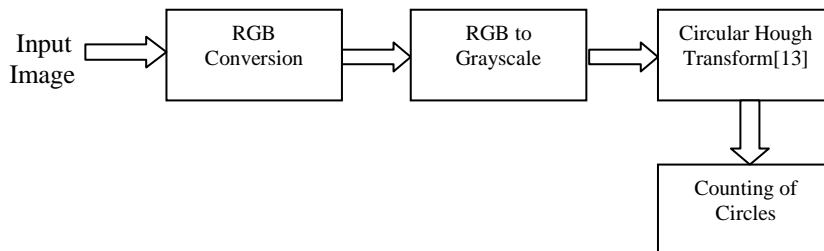


Fig. 5: Process Flow for RBC Count

Thin glass slides are used in order to observe the RBCs and WBCs from acquired image. The Red, Green and Blue in DIP, which contains shading information in pictures. The green portion contains over the top regard along these lines it is expelled. In [5] recommend roundabout Hough change as a method which takes a shot at the chief of recognizing round items based on span run. There are diverse advances used by CHT with a particular true objective to recognize round protest. Initially any of the edge location method is utilized like edge detection like prewit, vigilant, sobel or other activity like morphology. Next it draws the hover on wanted span go at each edge point. Roundabout Hough change takes a shot at two cases which is recognizing a hover with known span and obscure range. In like manner, using this strategy makers get 91% exactness in perceiving platelets.

C. Stage III: White Bood Cell Counting

In following figure 6 describes the process for WBC counting.

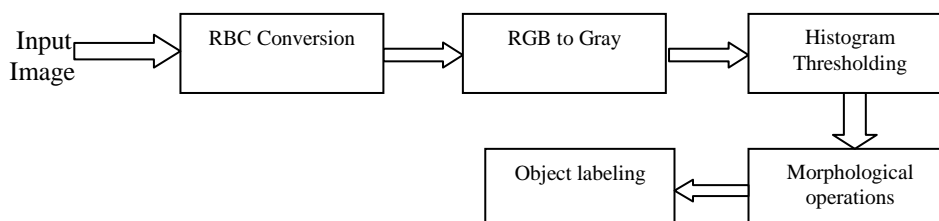


Fig. 6: Process for WBC Counting

In the event that the power of pixel is more unmistakable than some settled consistent T, at that point each pixel is supplanted with dark pixel else if the photo force is not as much as some settled steady, every pixel in a photo is supplanted with a white pixel. In this way, pixel named as 0 relates to object and pixel named as 1 compares to background. The Complement of that picture is taken in the wake of thresholding task. Furthermore, facilitate morphological task like disintegration and dillussion performed to smoothen the photo and to fill the holes and gaps.

IV. RESULT

A. Result of Blood Group Detection

This chapter presents the results obtained by using SURF and Circular Hough Transform technique for Blood Group Detection and RBC/WBC Count respectively. Following table shows recognition rate of Blood group detection.

Table 1: Recognition Rate of Blood Group Detection

Blood Group	No. of samples	No. of samples	Recognition Rate%
A Positive	5	5	100
A Negative	2	2	100
B Positive	5	5	100
B Negative	2	2	100
AB Positive	5	5	100
AB Negative	2	2	100
O Positive	5	5	100
O Negative	2	2	100

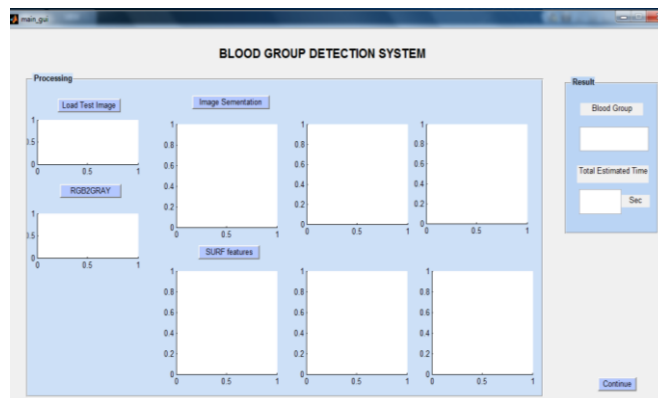


Fig 7: GUI Representation of Blood Group Detection

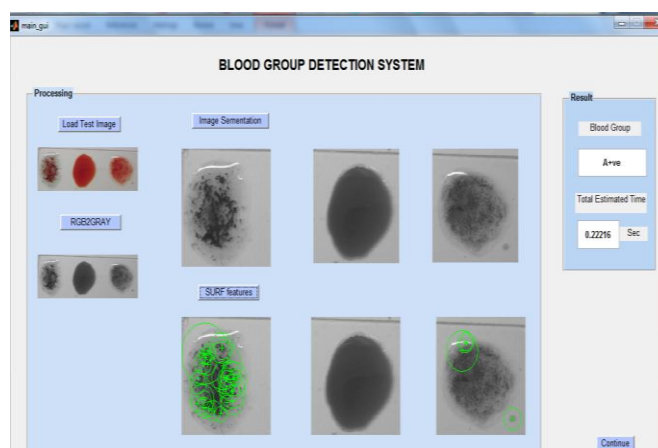


Fig 8: GUI Output of A Positive Blood Group Detection

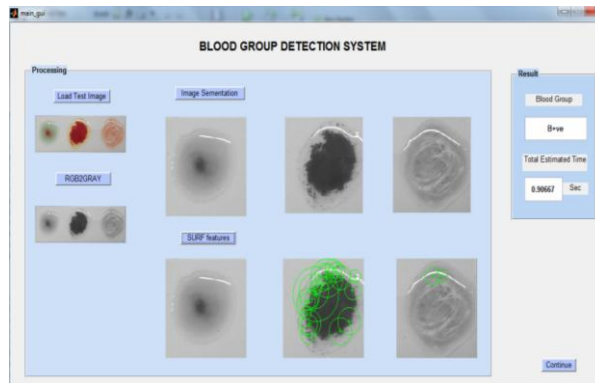


Fig 9: GUI Output of B Positive Blood Group Detection

B. Result of RBC/WBC Count using Circular Hough Transform

a. Formula for Counting RBC

$$N = \frac{C}{A} \times 10000 \quad 4.1$$

Where,

N= no of RBC count in milion cubic mm

C= no. of cell counted in an image

A= Area of an image

b. Formula for Counting WBC

$$N = C \times 3000 \quad 4.2$$

Where,

N= no of WBC count in milion cubic mm

C= no. of cell counted in an image

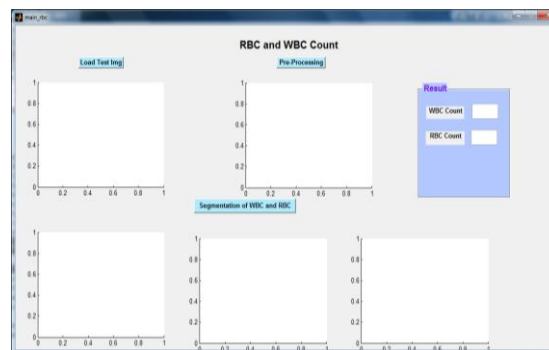


Fig 10: GUI Representation of RBC/WBC Count

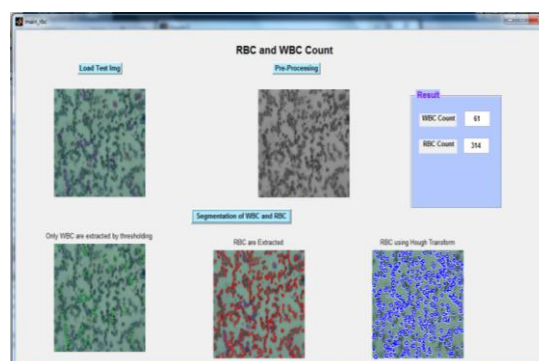


Fig 11: GUI Output of RBC/WBC Count



### DISCUSSION

The methodology presented in this work, based on Image Processing, allows determining, safely, the blood type of a patient, as they have results within a short time so able to be used in emergency situations. This is an innovative approach, being an added value to commercial solutions. It presents a software based solution for counting the blood cells as well. This method of cell counting is fast, cost effective and produces accurate results. It can be easily implemented in medical facilities anywhere with minimal investment in infrastructure. This method can also recognize the overlapping cells and counts them. We have also created the Graphical User Interface to perform three phases (Blood group Detection and RBC/WBC count). The interface aids the user in easy access and displays the results of every step. The project currently works efficiently for Detecting Blood Group and counting of blood cells, in future researchers can work upon the detection of various disorders (Leukemia, anemia and likewise) related to the abnormal blood cell count. Researchers can also work upon GSM technology, to send a message to the mobile of technician of the laboratory in order to avoid unnecessary travel.

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