Identification of Human Blood Group in Emergency Situation

P.T.Janani [1], S. Jagir Hussain [2], A. Kumar [3]
[1, 2, 3] Assistant Professor, Dhanalakshmi College of Engineering, Chennai – 601301.
janani.pt@dce.edu.in, jagirhussain.s@dce.edu.in, kumar.a@dce.edu.in

***Abstract*:** In this paper we are going to determine the blood group using image processing. Performing the tests by humans can lead to errors. Here we are focussing the blood types to be determined easily and without error.In the proposed system we are going to evaluate the blood sample with the computed image. First step taking the photo of the sample blood and compare it with the computed image. The main goal of the system is to save the life of the patient in emergency situation without the help of experts. In this paper the blood sample image is compared using image processing using the algorithm gray scale, binary and canny edge.

Index Terms*: *Gray scale, binary and canny edge.

I. INTRODUCTION

Blood identification is most important activity for blood transfusion. First the blood sample will be collected and the image of the blood sample is copied and compared with the images already saved. Blood samples are compared based on the presence or absence of inherited antigenic substances on the surface of red blood cells. The human blood is classified based on antigens and antibody. The different types of blood groups are namely A, B, AB and O. In that AB is universal acceptor and O is universal donor. The images of all the blood groups are already saved and the patient's blood sample image will be compared to determine the blood group. For collecting blood sample and identifying the blood group without any experts help is the main advantage. In this paper we are focusing on parallel processing that is we can identify the blood group for multiple persons at one time more rapidly.

II. LITERATURE SURVEY

Blood group detection using fibre optics. In this technique, the transmitter is used to generate pulses. The frequency range of the pulse is 10KHZ, then these pulses are fed to the Light Emitting Diode [LED], LED will convert electrical into optical.

Secondly the microscopic colour images. In this the blood group can be identified by microscopic colour images. In the microscopic colour images Equalization and colour correction and then colour space conversion has to be performed.

Blood Group Analysis with Biosensors. In this type of analysis, a coating is provided on the gold surface of QCM biosensors for the immobilization of antibodies against blood group antigens A and B which permits the identification of the blood groups with two measurements.

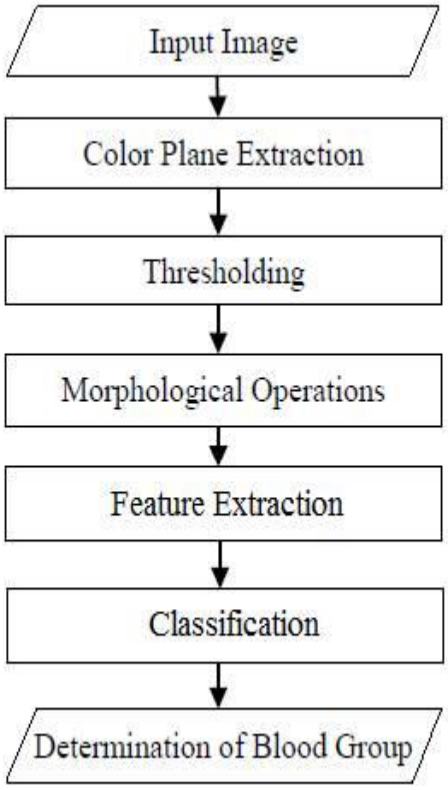
Determining blood type using image processing technique. In this system, the blood group can be determined using image processing technique. Here the image of that blood sample is captured after the slide test is performed which detect the occurrence of agglutination reaction.

III. PROPOSED SYSTEM

The images of blood samples are obtained from the patient consisting of a colour image composed of three samples of blood and reagent. These images are processed using image processing techniques .The steps involved in image processing are shown in the Fig.1.1 First the blood sample is collected and converted into input image. Then the input image is converted to colour plane extraction and then the image from extraction is given to thresholding .The morphological operations to be performed on the image from thresholding.The feature will be separated from feature extraction. Classification of different blood groups is identified from feature extraction. Finally the blood group is identified.

In the block diagram using MATLAB software first the input image is converted into gray scale then from gray scale is converted into binary. After binary conversion the image will be segmented and the given to canny edge detection. Gray scale images can be the result of measuring the intensity of light at each pixel according to a particular weighted combination of frequencies (or wavelengths), and in such cases they are monochromatic proper when only a single frequency (in practice, a narrow band of frequencies) is captured. The frequencies can in principle be from anywhere in the electromagnetic spectrum (e.g. infrared, visible light, ultraviolet, etc.).The canny edge detection image is given to numerically edge computation. Canny edge detection is a technique to extract useful structural information from different vision objects and dramatically reduce the amount of data to be processed. It has been widely applied in various computer vision systems. Canny has found that the requirements for the application of edge detection on diverse vision systems are relatively similar. Thus, an edge detection solution to address these requirements can be implemented in a wide range of situations. The general criteria for edge detection include:

1. Detection of edge with low error rate, which means that the detection should accurately catch as many edges shown in the image as possible
2. The edge point detected from the operator should accurately localize on the center of the edge.
3. A given edge in the image should only be marked once, and where possible, image noise should not create false edges. Now the final result is obtained.



.

Fig.1.1 Steps of Determination of Blood types using Image Processing

In our proposed model, first of all images are converted to Gray scale and Binary Inversion on the image to get desired small bit output image. A gray scale image (also called gray-scale, gray scale, or gray-level) is a data matrix whose values represent intensities within some range. MATLAB® stores a gray scale image as an individual matrix, with each element of the matrix corresponding to one image pixel. By convention, this documentation uses the variable name I to refer to gray scale images. Then Segmentation Method of image processing to part the image into three segment. Then after the end of Segmentation stage, we apply Canny Edge Detection algorithm to detect the clotting edges from the image.

Edge detection is an image processing technique for finding the boundaries of objects within images. It works by detecting discontinuities in brightness. Edge detection is used for image segmentation and data extraction

in areas such as image processing, computer vision, and machine vision. Finally we implement that efficient Canny Edge Detection algorithm by using MATLAB.

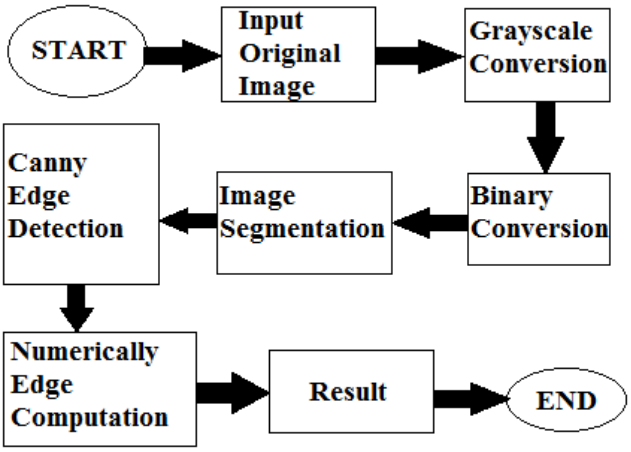


Fig.1.2 Block Diagram of Proposed Processing Method using Canny Edge Detection

IV.BLOOD TYPE

Blood types are identified based on the presence and absence of antibodies and the antigens on the surface of red blood cells. Depending on the image of different blood group system the antigens and antibodies are separated Antigens are molecules capable of stimulating an immune response. Each antigen has distinct surface features, or epitopes, resulting in specific responses. Antibodies (immunoglobins) are Y-shaped proteins produced by B cells of the immune system in response to exposure to antigens. Each antibody contains a paratope which recognizes a specific epitope on an antigen, acting like a lock and key binding mechanism. This binding helps to eliminate antigens from the body, either by direct neutralization or by 'tagging' for other arms of the immune system.The images of different blood groups are already stored as image format like A,AB,B,O.The image is given below

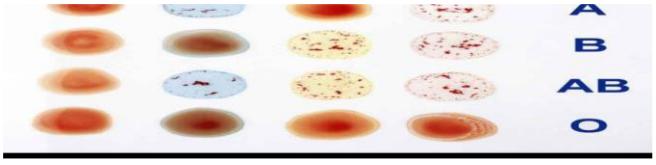


Fig.1.3 Blood types

V.IMAGE PROCESSING

Image processing is a method to convert an image into digital form and perform some operations on it, in order to get an enhanced image or to extract some useful information from it. It is a type of signal dispensation in which input is image, like video frame or photograph and output may be image or characteristics associated with that image. Usually Image Processing system includes treating images as two dimensional signals while applying already set signal processing methods to them. It is among rapidly growing technologies today, with its applications in various aspects of a business. Image Processing forms core research area within engineering and computer science disciplines too.Image processing basically includes the following three steps. Importing the image with optical scanner or by digital photography. Analyzing and manipulating the image which includes data compression and image enhancement and spotting patterns that are not to human eyes like satellite photographs.

A.MORPHOLOGY

Morphological image processing is a collection of non-linear operations related to the shape or morphology of features in an image. According to Wikipedia, morphological operations rely only on the relative ordering of pixel values, not on their numerical values, and therefore are especially suited to the processing of binary images. Morphological operations can also be applied to grey scale images such that their light transfer functions are unknown and therefore their absolute pixel values are of no or minor interest. Morphological techniques probe an image with a small shape or template called a structuring element. The structuring element is positioned at all possible locations in the image and it is compared with the corresponding neighbourhood of pixels. Some operations test whether the element "fits" within the neighbourhood, while others test whether it "hits" or intersects the neighborhood.

B. Apply Grayscale Conversion

the RGB color model and gray scale format in our tutorial of Image types. Now we will convert an color image into a grayscale image. There are two methods to convert it. Both has their own merits and demerits. The methods are Average method and Weighted method or luminosity method.

I. AVERAGE METHOD

Average method is the most simple one. You just have to take the average of three colors. Since its an RGB image, so it means that you have add r with g with b and then divide it by 3 to get your desired grayscale image.Its done in this way.

Grayscale = (R + G + B / 3)

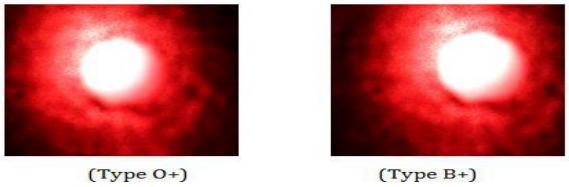


FIG 1.4 CAPTURED IMAGE FOR PROCESSING

VI. SYSTEM DESIGN

The determination of persons blood by gray scale algorithm and canny edge detection .The system design consist of hardware and software. The system will automatically determines the blood group of a patient. The system requires that the blood and the reagents are Manually introduced, in slides, by the user. Blood sample is placed on the first slide the reagent anti-A, in second reagent anti-B, in third reagent anti-D and in the fourth slide a sample without adding any antigen is taken.

VII. MODULES

1. Antigen mixing process
2. Motor arrangement
3. Image capturing process
4. Image processing methods

Modules Description

1. Antigen Mixing Process

Glutination is the process that occurs if an antigen is mixed with its corresponding antibody called isogglutinin.This increases the efficacy of microbial elimination by phagocytosis as large clumps of bacteria can be eliminated in one pass, versus the elimination of single microbial antigens.

2. Motor Arrangement

The DC motor is used to mix the reagents and the blood. 3. Image Capturing Process

In image capturing process the pi camera is used to capture the image of each tube. for future use. A raspberry pi microcontroller is used to control the whole system. The digital images of blood samples are obtained..

VIII. CONCLUSION

The method is suitable and helpful in emergency situations to determine the blood group in short span of time. In future it is intended to improve the system developed by making it smaller so that it can be portable and incorporate GSM technology, This system has appreciable advantages like small in size, lower in cost, no side effects, less time consumption, overcomes the present difficulties of manual process and also no problem of bleeding, since it does not make use of blood sample.

REFERENCES

1. Cressiers/Morat, “Datasheet of Diamed Diaclon Anti-A, Diaclon Anti-B, Diaclon Anti- AB,” 2008, Available: http://diamedil.info/diamed/Inserts/100910.pdf [Available on February 2016].
2. Robert I. Handin, Samuel E. Lux, Thomas, and Blood: Principles and Practice of Hematology, Volume 1
3.NaziaFathima.S.M. (2013).Classification of blood types by microscopic colour images,International journal of machine learning andcomputing.vol 3, no. 4, pp.376-379.
4. Satoh K, Itoh Y (2006), Forensic ABO blood grouping by 4 SNPs analyses using an ABIPRISM 3100 genetic analyzer, International Congress Series 1288 (2006) 49-51.
5.Selvakumari, T.M. (2011). Blood Group Detection Using Fiber optics, American Journal of Physics, vol.4, issue 3, pp.165-168
6. NaziaFathima.S.M. (2013).Classification of blood types by microscopic colour images, International journal of machine learning and computing.vol 3, no. 4, pp.376-379.
7. Mehdi HasanTalukder, Md. Mahfuz Reza, Mahbuba Begum, Md. Rabiul Islam, Md. Mahmudul Hasan, “Improvement of Accuracy of Human Blood Groups Determination using Image processing Techniques”, (MBSTU) Santosh, Tangail,angladesh .
8. S Vijayanand & Shantha Selvakumari, R. (2018). Noninvasive method of epileptic detection using DWT and generalized regression neural network. Soft Computing. 23. 10.1007/s00500-018-3630-y.