REDUCTION OF HUMAN INTERVENTION BY PERFORMING THE ABO AND RH TEST AUTONOMOUSLY USING DEEP LEARNING IMAGE PROCESSING

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ABSTRACT

Knowing your blood type is crucial before giving a blood transfusion in an emergency currently, these tests are performed manually by lab staff, which may be time-consuming and result in mistakes when working with a large number of samples. With the use of an image processing algorithm based on the ABO and Rh blood type systems, the proposed system aims to create an embedded system that conducts blood testing. The recommended approach minimizes human involvement and runs the test entirely on its own, from antigen addition through result generation. The proposed system aims to deliver findings as quickly as is practical while preserving precision and accuracy, and it also stores the information for later use. The technology allows us to identify a person's blood type, obviating the need for traditional transfusions based on the universal donor concept, lowering the risk of transfusion reactions, and storing the results without human mistake.

INTRODUCTION

The most important step in ensuring the safety of blood transfusions is blood crew identification. It is crucial for the patient's life in the event of an emergency blood transfusion that the type of blood is quickly identified. The blood crew that a person has is essentially determined by a blood typing instrument. The most vital and necessary activity is blood detection. The presence or absence of certain protein molecules known as antigens or antibodies is what causes variances in each individual's blood group.

The antigen is any overseas substance that motives an immune response both by myself or it types a complicated with a massive protein molecule. Antibodies are the proteins produced with the aid of the immune gadget to protect in opposition to the overseas supplies that may additionally purpose damage to our body, therefore, theyare the guards of our body. The ABO blood team machine islocated and recognized as the first human blood crew gadget via Austria Rand Steiner in early nineteenth Century. There are four essential blood agencies primarily based on presence or absence of antigen on the floor of RBC (Red Blood Corpuscles) . Blood agenciesare divided into 4 sorts i.e. A, B, AB and O. ABO blood team detection follows the agglutination approach and then it goes for a computer recognition. The agglutination response skill thatbefell response between the antibody and the antigen, indicatingthe presence of the antigen. Group A has solely the A Antigen on the blood cellsGroup B has solely theB antigen on the blood cells. GroupAB has each Antigen A and Antigen B on their blood cells. Group O has neither Antigen A nor Antigen B on their blood cells. Based on the compatibility of blood agencies the blood transfusion is done. Not all the blood organizations are well matched with every other. So for protected transfusion of blood finding out the blood crew is mandatory. Nowadays blood team detection is achieved manually by using lab technicians however there are somedrawbacks of this ordinary approach like this method consumes greater time. Also insome instances if fabulous blood team is now not detected then itmight also end result in the dyingof an man or woman.

LITERATURE SURVEY

Selvakumari, T.M. (2011).Blood Group Detection Using Fiber optics, American Journal of Physics, vol.4, issue 3, pp.165-16. Determining of blood types is very important during emergency situation before

administering a blood transfusion. Presently, these tests are performed manually by technicians, which can lead to human errors. Determination of the blood types in a short period of time and without human errors is very much essential. A method is developed based on processing of images acquired during the slide test. The image processing techniques such as thresholding and morphological operations are used. This paper based on literature survey of different types of blood group determination method. The developed automated method determines the blood type using image processing techniques. Also we discuss the methodology & advantages of human blood group determination using SIFT, SVM classifier. The developed method is useful in emergency situation to determine the blood group without human error. Before the blood transfusion it is necessary to perform certain tests. One of these tests is the determination of blood type and this test is essential for the realization of a safe blood transfusion, so as to administer a blood type that is compatible with the type of receiver. There is certain emergency situation which due to the risk of patient life, it is necessary to administer blood immediately.

Mehdi HasanTalukder, Md. Mahfuz Reza, Mahbuba Begum, Md. Rabiul Islam, Md. MahmudulHasan, "Improvement of Accuracy of Human Blood Groups Determination using Image processing Techniques", (MBSTU) Santosh, Tangail,Bangladesh IJARCCE Vol. 4, Issue 10, October 2015.

Determining of blood types is very important during emergency situation before administering a blood transfusion. Presently, these tests are performed manually by technicians, which can lead to human errors. Determination of the blood types in a short period of time and without human errors is very much essential. A method is developed based on processing of images acquired during the slide test. The image processing techniques such as thresholding and morphological operations are used. The images of the slide test are obtained from the pathological laboratoryareprocessed and the occurrence of agglutination are evaluated. Thus the developedautomated method determines theblood type using image processing techniques. These papers discuss the methodology& result discussionof work. The developed method is useful in emergency situation to determine the blood group without human error. Before the blood transfusion it is necessary to perform certain tests. One of these tests is the determination of blood type and this test is essential for the realization of a safe bloodtransfusion, so as to administer ablood type that is compatible with the type of receiver.There are certain emergency situation which due to the risk of patient life, it is necessary to administer blood immediately.

Ryszard S, Romaniu and Jerzy Gajda (2013). LASER Technology and Application 2012, International Journal ofElectronics and telecommunications,vol.59,pp.195-202.

The lookup and technical achievements in the place of lasers are summarized each and every three years via the National Symposium on Laser Technologyheld in the Baltic See Resort Swinouj ´scie close to Szczecin, Poland. The paper affords a overview ´ of the major symposiumtopics tracks debated all through this key countrywide laser tournament in September 2012. There are proven improvement dispositions of laser substances andapplied sciences and laser relatedbranches of optoelectronics in this country, which includes the efforts of academia, governmental institutes, lookup groups and industry. The symposium work are divided to two branches:improvement of lasers and laser applications, the place the laser structures operators and laser customers current theirachievements. Topical tracks of the assembly are presented, as nicely asthe keynote and invited topics delivered by way of key representatives of the laser industry. The STL 2012 used to bea jubilee assembly held for the Xth time. VERY three years the employer group of then Technical University of Szczecin and now West Pomeranian University of Technology in Szczecin duly prepares a cyclic National Symposium on Laser Technology(STL). The 2012 STL used to be held in Swinouj ´scie close to Szczecin in September. ´The Symposium is deliberately held as acountry wide match to allow a free alternate of research, technology, development and software thoughts.

Matthew V. Bills, Brandon T.Nguyen, and Jeong-Yeol Yoon ,"Simplified White blood cellDifferential: An inexpensive,smartphone – and paper based blood cell count", September 15,2019

Sorting and measuring blood by cell type is extremely valuableclinically and provides physicianswith key information for diagnosing many different disease states including: leukemia, autoimmune disorders, and

bacterial infections. Despite the value, the present methods are unnecessarily costly and inhibitive particularly in resource poor settings, as they require multiple steps of reagent and/or dye additions and subsequent rinsing followed by manual counting using a hemocytometer, or they require a bulky, expensive equipment such as a flow cytometer. While direct on- paper imaging has been considered challenging, paper substrate offers a strong potential to simplify such reagent/dye addition and rinsing. In this paper, three-layer paper-based device is developed to automate such reagent/dye addition and rinsing via capillary action, and separating white blood cells (WBCs) from whole blood samples. Direct on-paper imaging is demonstrated using a commercial microscope attachment to a smartphone coupled with a blue LED and 500 nm long pass optical filter. Image analysis is accomplished using an original MATLAB code, to evaluate the total WBC count, and differential WBC count, i.e., granulocytes (primarily neutrophils) versus agranulocytes (primarily lymphocytes). Only a finger-prick of whole blood is required for this assay. The total assay time from finger-prick to data collection is under five minutes. Comparison with a hemocytometry-based manual counting corroborates the accuracy and effectiveness of the proposed method. This approach could be potentially used to help make blood cell counting technologies more readily available, especially in resource poor and point-of-care settings.

Lina Zhao; Chengyu Liu, Shoushi Wei, Changchun Liu Jianging Li , "Enhancing Detection Accuracy for Clinical Heart Failure Utilizing Pulse Transit Time Variability and Machine Learning",January 25,2019

Physiological signal variability can offer important insight into cardiovascular activity and clinical cardiovascular diseases. Heart rate variability (HRV) and pulse transit time variability (PTTV) are two important time series variabilities. However, combining HRV and PTTV can enhance the classification accuracy for heart failure which is unknown. In this paper, a simultaneous analysis of HRV and PTTV performed on both normal subjects and heart failure patients, was carried out, aiming to investigate the improvement of HRV-based heart failure detection with the assistant of PTTV analysis. Forty normal subjects and forty heart failure patients were enrolled. Standard limb lead-II electrocardiogram and radial artery pressure waveforms were synchronously recorded. HRV and PTTV analysis were performed on the acquired RR and PTT time series using the standard time- (MEAN, SDNN, and RMSSD),
frequency- (LF, HF, and LF/HF), and non-linear (SD1, SD2, sample entropy, and fuzzy measure entropy) domain indices. The results showed that all HRV indices except MEAN ($P = 0.1$) and LF/HF ($P = 0.9$) showed significant differences (all $P <;0.01$) between the two group, while only MEAN in PTTV significantly decreases in heart failure patients ($P <; 0.01$). Moreover, when combined the HRV, PTTV indices, and the predicted probabilities generated from the distance distribution matrix-based convolutional neural network models, the highest classification performances were achieved by a support vector machine classifier, outputting a sensitivity of 0.93, a specificity of 0.88, and an accuracy of 0.90. This paper demonstrated the potential of PTTV analysis for the detection of clinical heart failure.

PROPOSED SYSTEM

The point of this framework is to give an outcome inside the most brief conceivable time with exactness and precision alongside capacity of result for additional utilization[55]. The framework utilizes picture handling calculation to performed blood test dependent on ABO blood composing framework. The picture of the plate area is divided and distinguished naturally. At that point, the middle channel is utilized to smother the clamor to get the best estimation of the first picture.

At that point, the trademark parameters of ABO blood bunch are removed by the dark level dissemination of the picture. At long last, joined with the agglutination response among antigen and immunizer, the last blood bunch was resolved [56]. Along these lines this framework is useful in a crisis circumstance to decide blood bunch without human mistake
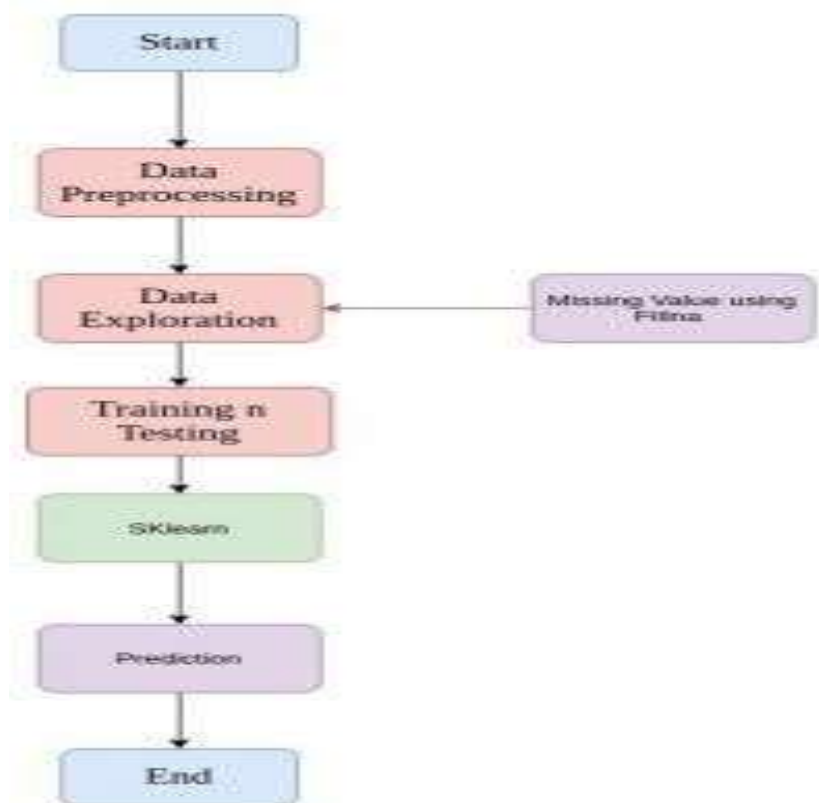
Fig 1:Flow Chart

RESULTS AND DISCUSSIONS

Data segmentation strategies are as often as possible carelessly controlled, nearing to dislodged values extraordinary data fuses, mislaid characteristics, etc. Looking at data that has not been designedly shielded for such issues can make misleading conclusion. Consequently, the likeness and attributes of data is in particular previously functioning an assessment. Regularly,information preprocessing is the most significant period of an AI venture, particularly in computational science. Image pre-processing, an orderly term for errands with images at any estimated consistency of estimating, data and output abide potential images. The acknowledged images are a comparable benevolent as the leading data drawn by the sensor, with impulse images for the most part consigned by a matrix of image work note. Purpose of pre-processing is the augmentation of image statistics which smothers hesitant twists or redesigns few image appearances noteworthy to extra adaptation, even for which congruous adjustments of the image is described amidst pre-processing systems therefore analogous procedures endured. Intention to segment, is for improvising or possibly diverse the likeness of an image which is logically critical and more straightforward dismembered. Image segmentation is generally passed down into determine possessions and cut off the count. Even more unquestionably, imagesegmentation is route in giving out a agnomen to every pixel in an image to an analogous degree, which pixels with a comparable agnomen and contribute assert characteristics

The outcome of segmentation is great deal of parts in which inside and outescalate total image, or tons of format is removed from the image. All of the pixels in an area are practically identical concerning some trademark or prepared property, such as, concealing, power, conversely shallow. Adjoining locale ona very basic level exceptional with respect to the equal attributes. The dual images may comprise of various glitches. Peculiarly, equal areas made beyond essential inception are ravaged past uproar and apparent. Etymological images dealing with looks for the destinations of clearing these disfigurement and speaking to the structure and structure of the image. The frame works can be loosened up to grayscale images. Etymology image taking care of is a combination of non- direct undertakings related to the shape or etymology of features in an image. As demonstrated, etymological assignments rely only on accustomed

mentioning of pixel regards, adversely the analytic characteristics, and accordingly are especially fit to the treatment of twofold images. Etymological undertakings can be applied to grayscale images with the ultimate objective in which their light trade limits are dark also the absolute pixel regards are of no or minor interest. Etymological frameworks analyzes an image with a minor pattern or design termed as an arranging segment. The sorting out part is formed at outright probable regions in the image and is differentiated and the depict near of pixels. A set of task assesses whether the segment fits within the region, at the same time further evaluation if it hits or meets the zone. Fundamental activities in scientific morphology work on two sets: the first is the picture, and the subsequent one is the organizing component (in some cases likewise called the portion, in spite of the fact that this wording is generally saved for convolutions). The organizing component utilized by and by is commonly a lot lesser than the picture, frequently a 3x3 grid. The Morphological sifting of a paired picture is led by considering compound tasks like opening and shutting as channels. They may go about as hannels of shape. The size of the organizing component is generally critical to dispose of boisterous subtleties show ever not to harm objects of intrigue. The gap drive so unlimited commodity as seen in the closer perspective on an image, framing all of it far out, whereas closing empties limited voids in the foreground zone, framing few areas of establishment into bleeding end. These techniques, in manner, used to find definite shapes of an image. The aperture, to find facts for which a specific sorting out segment be adapted.
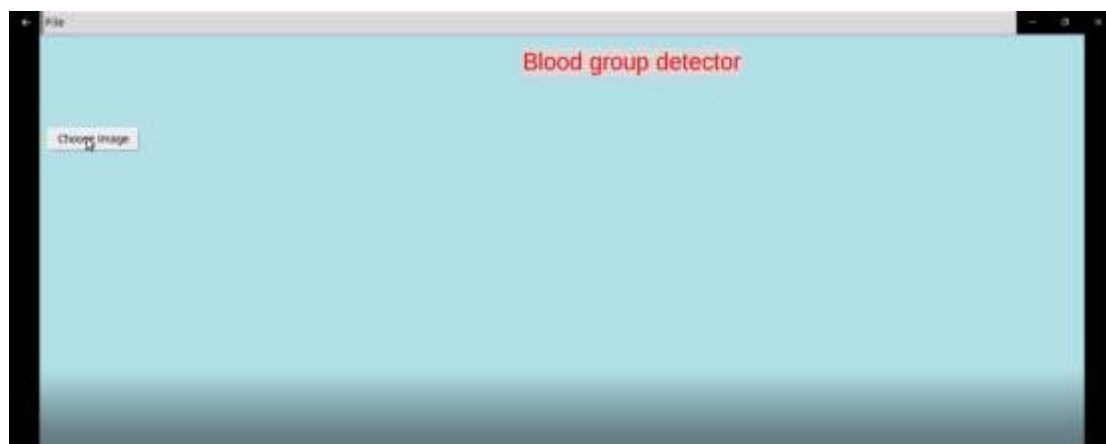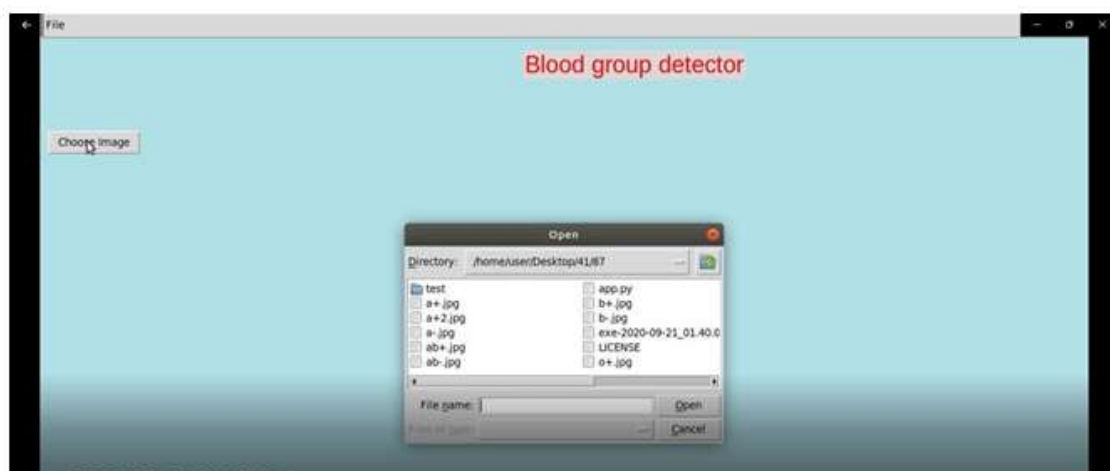

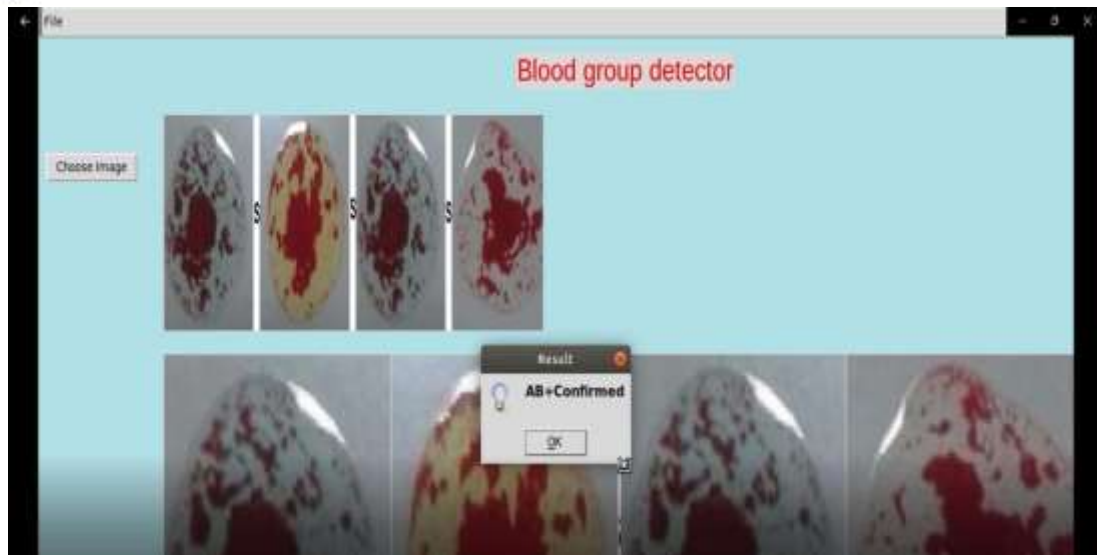Fig 4.1 Choose image

Fig 4.2 Upload image

Fig 4.3 Blood group detected

Fig4.4 K-means Cluster

CONCLUSION

an cheaper technique which helps This assignment allows blood kind detection except the use of invasive techniques like syringes, needles, etc. This can without difficulty be used for in-home requirements. It is in rapid and right get right of entry to to blood detection. It helps to keep away from ailments like Hepatitis, HIV, etc. It is exceptional for human beings who have concern of needles. This assignment comes accessible for instances the place speedy blood detection is urgently required for emergency cases. As the world is transferring in the direction of science in each and every field, this undertaking takes a primary step in shifting in the direction of it . There are three levels concerned in the project- photo acquisition, preprocessing, binary conversion in conclusion. All we want is a Logitech webcam digital camera to take the photo of a finger-tip of a human body. The preprocessing stage eliminates the undesirable noises from the photo and converts it to an infrared image. The filter used in preprocessing stage is median filter which is a non-linear digital filtering technique. There are different sorts of filtering methods like suggest filter, gaussian filter, adaptive filter, etc. however the purpose we use median filter is that is it is much less touchy to boundary values as in contrast to different filters and so can retain it whilst disposing of undesirable noises. For entire elimination of noises, we first add some noise to it so that all hidden and unhidden noises are removed.

The picture is resized and the photo in the subsequent stage the place its pixels are used to derive positive elements which assist in segregating the blood groups. The characteristic extraction is achieved with the assist of GLCM or Gray Scale Co-occurrence matrix. Once the elements are derived the blood businesses are labeled in to quite a number sorts namely,O+,A+,B+,AB+,O- , A-, B-, AB-. The terrible and tremendous values are decided by way of the presence or absence of an antigen known as rhesus in positive blood groups.

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