TABLE OF CONTENTS

SYNOPSIS

BLOOD GROUP DETECTION FROM IMAGE PROCESSING

This project aims at the blood-group detection by using image processing techniques. I could help a lab technician or a novice user with no prior knowledge to blood group detection. The system will be able to process the image of blood which id mixed with serum and gives the final result in no time that is the exact blood-group.

Disadvantages of old System

. Time consuming

. It is very tedious

. All information is not placed separately

. Lot of paper work

. Slow data processing

. Not user-friendly environment

. It is difficult to found records due file

Advantages of new system

In new computerized system we tried to give these facilities.

. Manual system changes into computerized system

. Friendly user interface & interactive

. Time saving

- Save paper work
- Give facility of different type of enquiry
- Formatted data
- Data's are easily approachable
- Avoid redundancy

Front end : Python

Back end : Microsoft SQL Server

2. INTRODUCTION

2.1 PURPOSE

This project aims at the blood-group detection by using image processing techniques. I could help a lab technician or a novice user with no prior knowledge to blood group detection. The system will be able to process the image of blood which id mixed with serum and gives the final result in no time that is the exact blood-group.

2.2 PRODUCT SCOPE

Various diseases have been identified using medical image processing techniques and thus have provided early phase detection and helped the doctors to cure the disease. Blood is one of the important fluid in human body. In the case of emergency if patient suffers from critical injury and large part of blood is loss, a blood transfusion is required. Before any blood transfusion, the exact determination of the blood type is important.

This process takes time and an expert to perform this procedure. Thus in disasters it is difficult to perform the task as experts are hard to find, thus in that situation an application based on image processing technique will be very useful and will provide accurate results. The system will be able to process the image and gives the final result in no time that is the exact blood- group. This can be used by a lab technician or a novice user with no prior knowledge to blood group detection.

2.3 DOCUMENT OVERVIEW

Section 1: Illustrates the introductory chapter which explains the purpose of the project, scope and references

Section 2: Illustrates the overall description of the product including the product perspective. Section 3: Illustrates the various functional requirements that are the product should have. Section 4: Illustrates the non-functional requirements of the product.

Section 5: Illustrates the conclusion.

SYSTEM ANALYSIS AND DESIGN

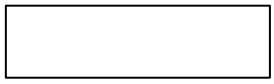
3. SYSTEM ANALYSIS AND DESIGN

System designs main aim is to identify the modules that should be in the system, and the specifications of these modules and how they interact with each other to produce the desired results. At the end of the system design all the major data structures, file formats and the major modules in the system and their specification are decided.

3.1 DATA FLOW DIAGRAM

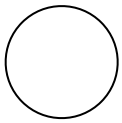
A DFD has the purpose of clarifying system requirements and identifying major transformations that will become programs in system design.

The symbols used in DFD are shown below

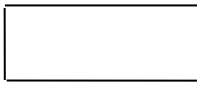


Source or destination of data

Data flow

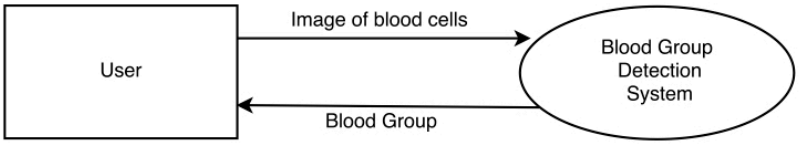


Process that transforms data flow

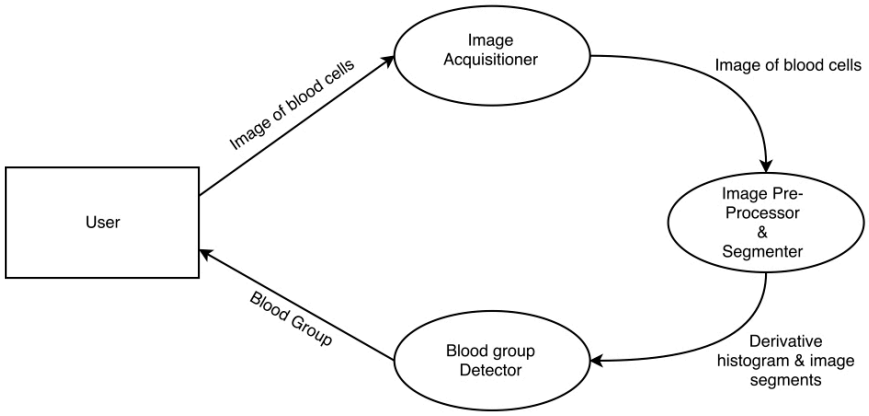


Data store

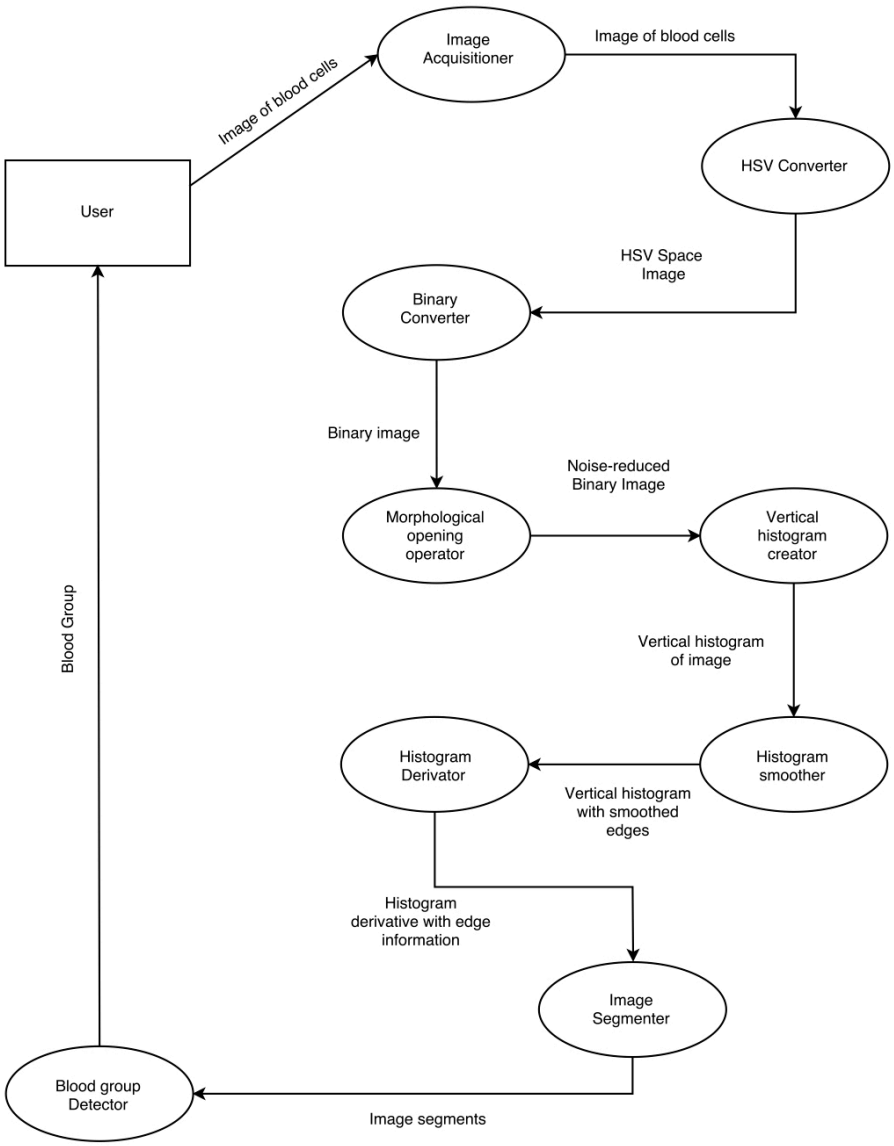
CONTEXT LEVEL



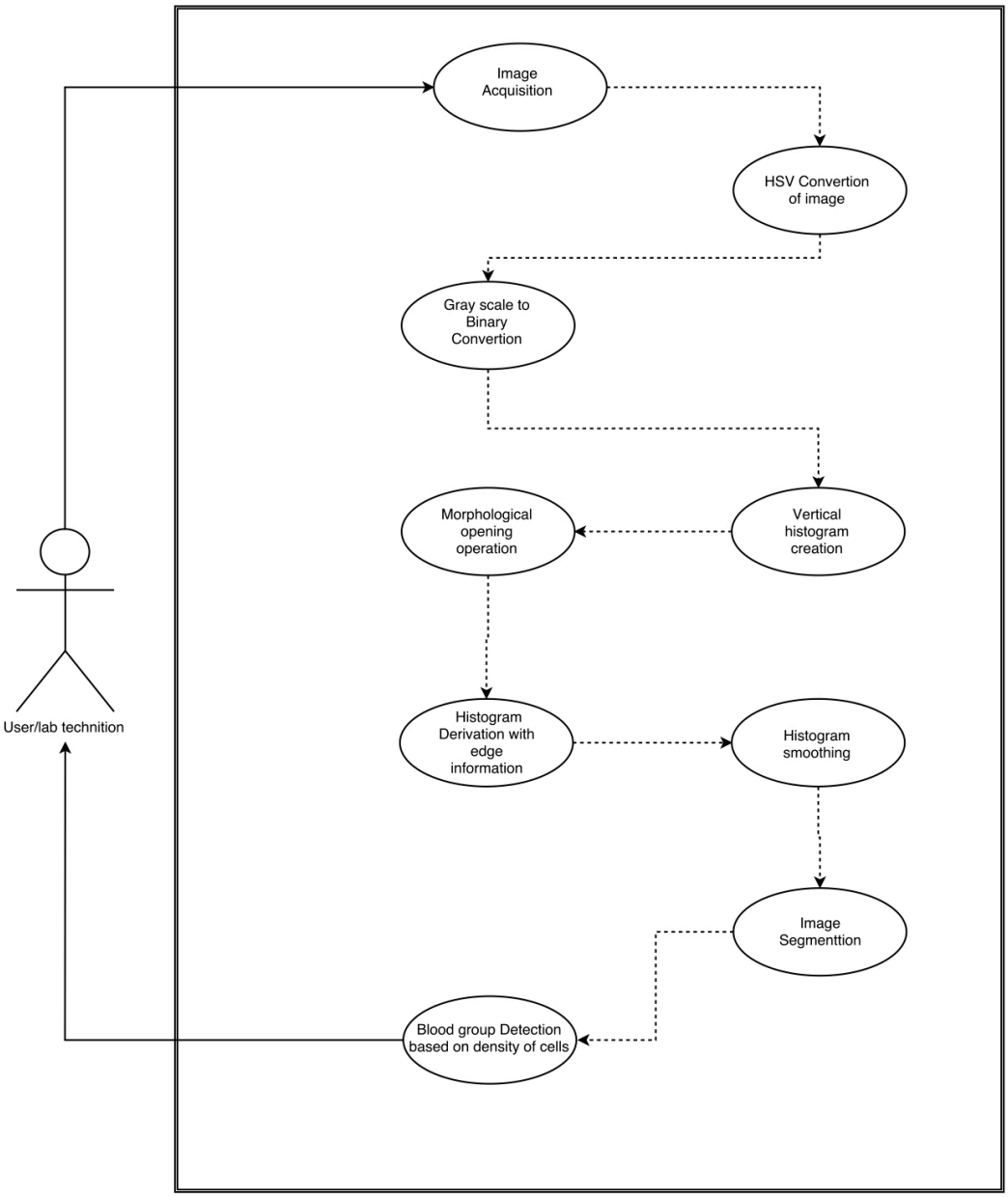
LEVEL 1- IMAGE PROCESSING



LEVEL 2 - BLOOD GROUP DETECTION



LEVEL 3- DETECTION PROCESS



LEVEL 4

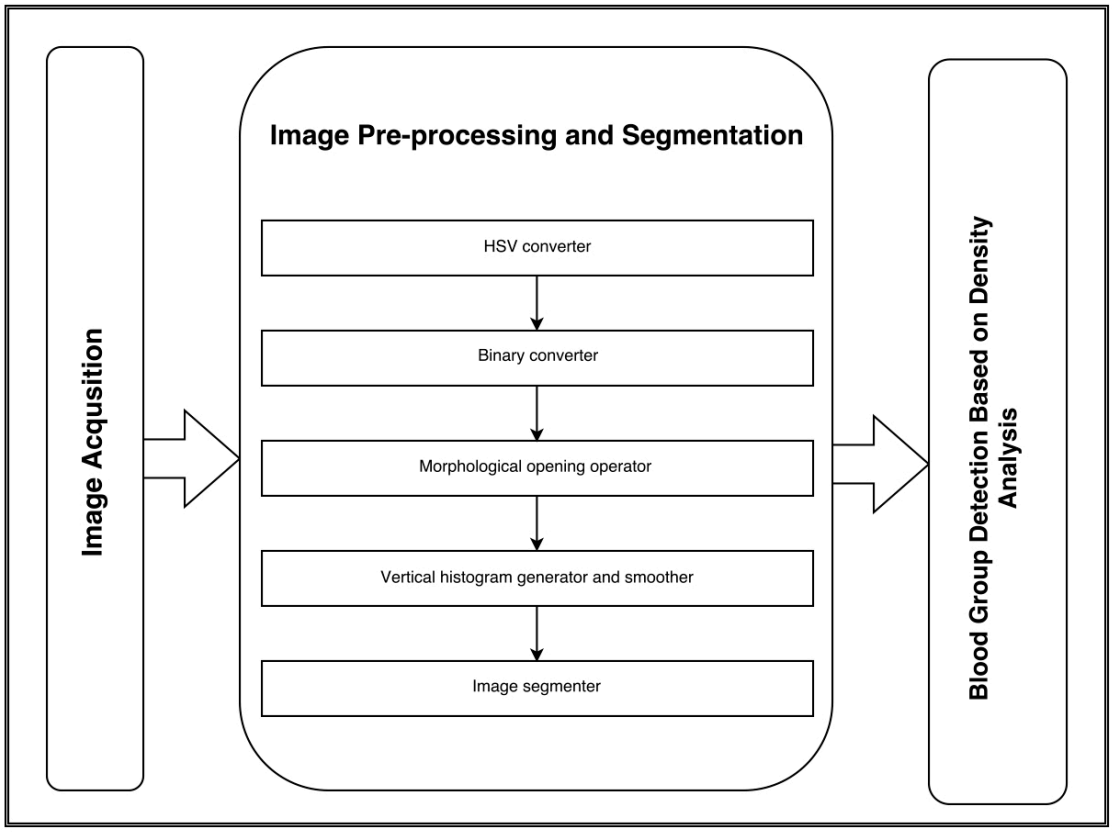


Image Acquisition
Image Pre-processing and Segmentation
HSV converter
Binary converter
Morphological opening operator
Vertical histogram generator and smoother
Image segmenter
Blood Group Detection Based on Density Analysis

3.2 TABLE DESIGN

The general theme behind a database is to handle information as an integrated whole. A database is a collection of interrelated data stored with minimum redundancy to serve many quickly and effectively. The database is a collection of stored data organized in such a way that all the data requirements are satisfied by the database.

The aim of database design is to improve the existing system situation. A number of database files were designed to hold the data requirements for running their systems.

DATABASE : BLOOD GROUP DETECTION

Table 1 : user

Primary Key: patient_id

Field name	Data type	Width	Description
image	varchar	max	blood image
patient_id	varchar	10	patient id
patient_name	varchar	30	patient name
gender	varchar	8	gender
dob	date		date of birth

3.3 INPUT DESIGN

Input is the process of converting user inputs computer based format. The project requires a set of information from the user to prepare a report. In the order, when organized input data are needed.

In the system design phase, the expanded DFD identifies logical data flow, data stores and destination. Input data is collected and organized into groups of similar data. The goal behind designing input data is to make the data entry easy and make it free from logical error. The input entry to all type of clients is the username and password. If they are valid the client is allowed to enter into the software. Refer Appendix 9.1.

Objectives

- ➢ To produce a cost-effective method of input
- ➢ To achieve the highest possible level of accuracy.
- ➢ To ensure that the input is acceptable and understandable

3.4 OUTPUT DESIGN

Outputs are the most important direct source of information to the user and to the management. Efficient and eligible output design should improve the system's relationship with the user and help in decision making,

Output design generally deals with the results generated by the system i.e., reports. These reports can be generated from stored or calculated values. Reports are displayed either as screen window preview or printed form. Most end users will not actually operate the information system or enter data through workstation, but they will use the output from the system.

Outputs from computer systems are required primarily to communicate the results of processing to the user. They are also used to provide a permanent copy of these results for later consultation.

3.5 MENU DESIGN

Menus are designed for the manipulation of the screen. Men are universal interface for any type of environment. The menu allows the user's choice of response but reduce the chances of error in data.

There is a main window, which contain main menu. By using the appropriate menu option we select screens or windows for input data entry. Access protection is achieved through the password. The user can enter into main window only by giving the correct user name and password.

Menu provides a set of options on the screen. Cursor movements can select the options. The application consists of number of data manipulation screens.

4. THE OVERALL DESCRIPTION

4.1.1 PRODUCT PERSPECTIVE

This project is for automated blood-group detection using image processing techniques that may be used by a lab technician or a novice user with no prior knowledge to blood group detection technique. All they need to do is to put the blood on the white plate and mix it properly with anti-serum and finally take an image. The system will be able to process the image and gives the final result in no time that is the exact blood-group.
The main steps involved in this application will be as follow

1. Image Acquisition
2. Image Pre-Processing and Segmentation
3. Detection of Blood Group Type

During image acquisition, the slide containing blood sample will mix with anti-serum.

Then the images of test slides will be taken using a camera inside the machinery or directly from the slide. The image will be loaded into the system further processing.

Preprocessing step includes resizing of the image to bring it into a specific format. It includes conversion of image from RGB to HSV, HSV to gray scale, gray scale to binary image and then segmentation of processed image into region for post-processing by using advanced morphological operations.

HSV conversion will be based on color characteristics as purity, family and intensity (or tint, shade and tone). Then this HSV image will converted to binary image. Then system will calculate a global threshold level which is used to convert the grayscale image into binary image. Then using some basic morphological operation on the binary image, imperfections will be removed and reform

the image for better further processing. Imperfections include spurs, noise and outliers. Then system will crate the vertical histogram of the image being processed. This histogram will give the information regarding the regions of blood samples in the image. Then the histogram will be used for cropping the region of each blood mixture(smoothing). To get the information regarding the coordinates of the edges of histogram, system will take the first derivative of the histogram. By Using this information of region starting and ending coordinates

system will crop the region of interest (Blood mixture region) by using simple loop operation and can segment the processed image for further processing. By calculating the density of white pixel of each segmented region (area consist of white pixels) and calculating the total number of objects (elements) in each segmented image the could clearly, system could clearly define that blood region which is distorted must have less white pixels (means less red components) and should have more number of elements in the image. Based on these values the blood group can be found.

4.1.2 PRODUCT FUNCTION

1. Image Acquisition
2. Image Pre-Processing and Segmentation
    - HSV conversion
    - Binary Conversion
    - Morphological opening operation
    - Vertical histogram creation
    - Derivative of Histogram and spike removal
    - Segmentation
3. Detection of Blood Group Type

4.1.3 OPERATING ENVIRONMENT

The operational environment should satisfy the minimum hardware and software requirements.

HARDWARE REQUIREMENT

The minimum hardware requirement of computer is

- Processor
- Hard Disk
- RAM
- intel core i5 processor
- 500 GB
- 4 GB

SOFTWARE REQUIREMENT

- Operating system : Ubuntu 10.04
- Coding Language : Python
- Tool Kit : PythonToolKit(PTK)
- IDE : Pychram

4.1.4 DESIGN AND IMPLEMENTATION CONSTRAINTS

The main challenge is to do image pre-processing and segmentation in an effective way. Also the finding the detect the distorted part in the segmented image acurrately based iin the density is challenging.

4.1.5 USER DOCUMENTATION

The users are provided with a brief user manual which includes the method of installation and the functionalities offered by the system.

4.2 EXTERNAL INTERFACE REQUIREMENT

4.2.1 HARDWARE INTERFACE

- PC with Ubuntu 10.04 or higher
- Image fetching camera

4.2.2 SOFTWARE INTERFACE

- Operating system: The chosen OS is Ubuntu 10.04 or higher operating system for its best support.

- Python : Chosen python language because its opensource, wide library etc..

5. FUNCTIONAL REQUIREMENT

5.1 ACQUISITION FUNCTIONS

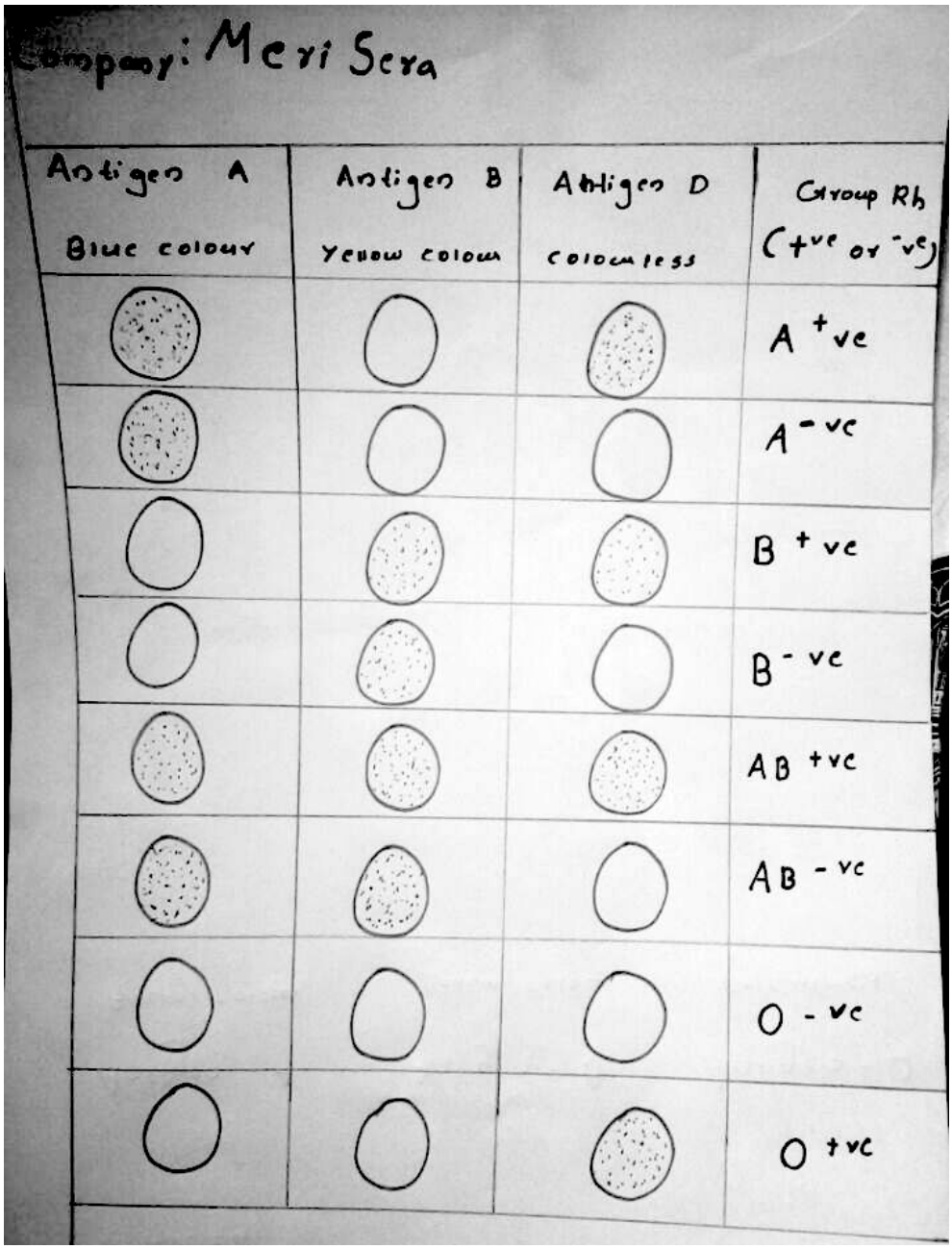
- Get image of sample mixed with antiserum
- Ensure clarity of image
- Make it available for further processing

5.2 PREPROCESSING AND SEGMENTATION FUNCTIONS

- HSV conversion of image
- Binary conversion of image
- Morphological opening operation
- Creating histogram
- Derivative of histogram
- Segmentation

5.3 DETECTION FUNCTIONS

- Density calculation of white pixel in segment
- Calculation total number of elements in each segment



6. NON-FUNCTIONAL REQUIREMENTS

6.1 PERFORMANCE REQUIREMENTS

- Speed: The system must be capable providing result faster.

- Accuracy: Accuracy needs to be maintained in generating result.

6.2 QUALITY REQUIREMENTS

The most important quality requirements that the system should satisfy are

6.2.1 RELIABILITY

The software will meet all of the functional requirements with out any unexpected behavior.

6.2.2 AVAILABILITY

The software will be available at all times on the user's PC, as long as the device is in proper working order.

6.2.3 PORTABILITY

This software will be designed to run on all famous platforms.

6.2.4 TESTABILITY

The proposed system should be properly tested under various circumstances in order to assure its reliability.

SYSTEM TESTING AND IMPLEMENTATION

7. SYSTEM TESTING AND IMPLEMENTATION

Software testing is a critical element of software quality assurance and represents the ultimate reviews of specification, design and coding. Testing present an interesting anomaly for the software. Testing is vital to the success of the system. Errors can be injected at any stage during development. System testing makes a logical assumption that if all the parts of the system are correct, the goal will be successfully achieved.

During testing, the program to be tested is executed with set of test data and the output of the program for the test data is evaluated to determine if the program is performing as expected. A series of testing are performed for the proposed system before the system is ready for user acceptance testing.

7.1 SYSTEM TESTING

7.1.1. UNIT TESTING

Unit testing focuses verification effort on the smallest unit of the software design, the module this is known as module testing. Since the proposed system has modules the testing is individually performed on each module.

Using the details description as a guide, important control paths are tested to uncover errors within the boundary of the modules. This testing was carried out during programming stage itself. In this testing step each module is found to be working satisfactorily as regards to the expected output from the module .

7.1.2. INTEGRATION TESTING

Data can be test across an interface; one module can have adverse effect on another, sub function when combined may not produced the desired function. Integration testing is a systematic technique for constructing the program struc-

ture while at the same time conducting test to uncover errors associated within the interface.

The objective is to take unit tested modules and built a program structure that has been dictated by design. All modules are combined in this testing step. The entire program is tested as a whole. Correction is difficult at this stage because the isolation of causes is complicated by the vast expense of the program. Thus in the integration testing step all the errors uncover are corrected for the next testing step.

7.1.3 VALIDATION TESTING

At the culmination of integration testing, software is completely assembled as a package. Interfacing errors have been uncovered and corrected and a final series of software test-validation testing begins. Validation testing can be defined in many ways, but a simple definition is that validation succeeds when the software functions in manner that is reasonably expected by the user. Software validation is achieved through a series of tests that demonstrate conformity with requirement. After validation test has been conducted, one of two conditions exists.

- The function or performance characteristics confirm to specifications and are accepted.
- A validation from specification is uncovered and a deficiency created.

Deviation or error discovered at this step in this project is corrected prior to completion of the project with the help of the user. Thus the proposed system under consideration has been tested by using validation testing and found to be working satisfactorily.

7.2. IMPLEMENTATION

Implementation is the stage in the project where the theoretical design is turned into a working system and is giving confidence on the new system for the users that it will work efficiently and effectively. It involves careful planning, investigation of the current system and its constraints on implementation, design of methods to achieve the change over, an evaluation, of change over methods.

Implementation is the final and important phase. The most critical stage in achieving a successful new system and in giving the users confidence that the new system will work and be effective. The system can be implemented only after thorough testing is done and if it found to working according to the specification. This method also offers the greatest security since the old system can take over if the errors are found or inability to handle certain type of transactions while using the new system.

At the beginning of the development phase a preliminary implementation plan is created to schedule and manage the many different activities must be integrated into plan. The implementation plan is updated throughout the development phase, culminating in a changeover plan for the operation phase. The major elements of implementation plan are test plan, training plan, equipment installation plan and a conversion plan.

There are three types of implementation:

- Implementation of a computer system to replace a manual system.
- Implementation of a new computer system to replace an existing one.
- Implementation of a modified application to replace an existing one, using the same computer.

CONCLUSION

8. CONCLUSION

The system proposed capable of detecting the type of blood group using image processing algorithms. Colored image taken from a digital camera will uploaded in to application and will converted to HSV format V channel was used for the conversion. Then threshold technique will be applied and image will rendered leading to the development of histogram then taking the derivative and focusing the area of the blood image. And then using this processed image blood group will be classified. In future a small hardware device can be made like diabetes checking machine that we see in our daily life and that small machine could be used by novice users in disaster or other remote areas where expert staff is not available.

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9.BIBLIOGRAPHY

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Knight, B d Simpson, J. "The automated identi cation of tubercle bacilli using image processing and neural computing
techniques." IC N 98. Springer London, 1998. 797-802.

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"Characterization of Blood S ples Using age Processing Techniques", Sensors & Actuators: A. Physical (impact factor: 1.674).

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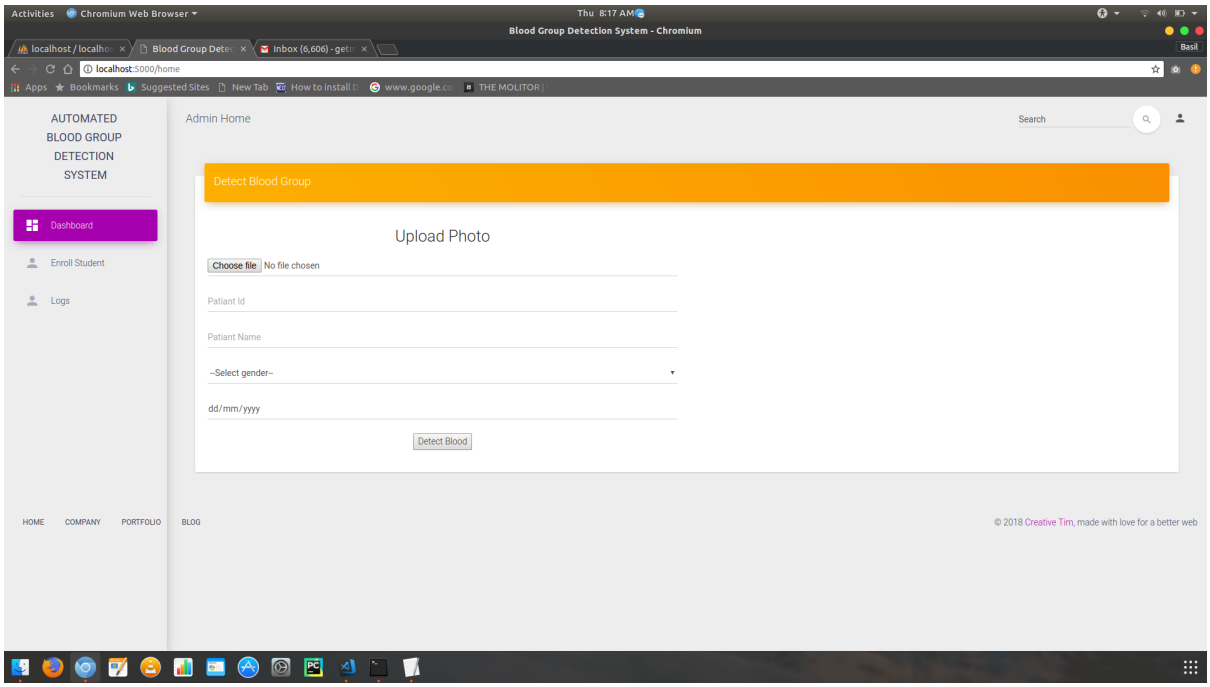
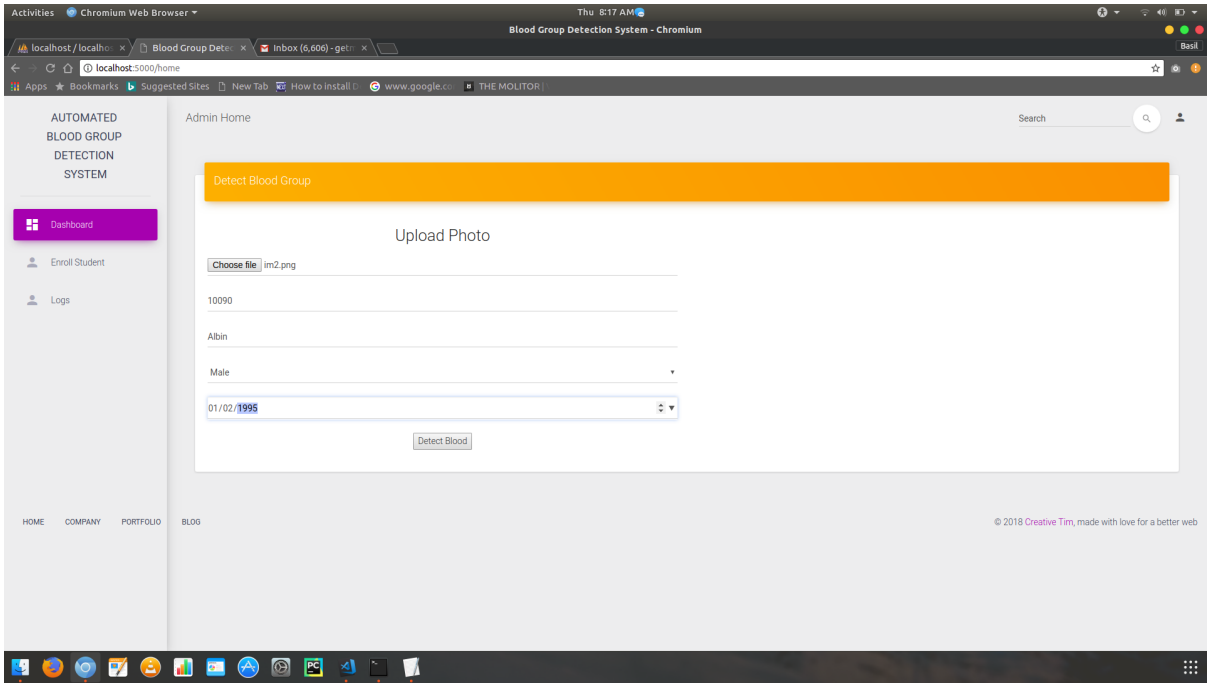
APPENDIX

INPUT FORMS

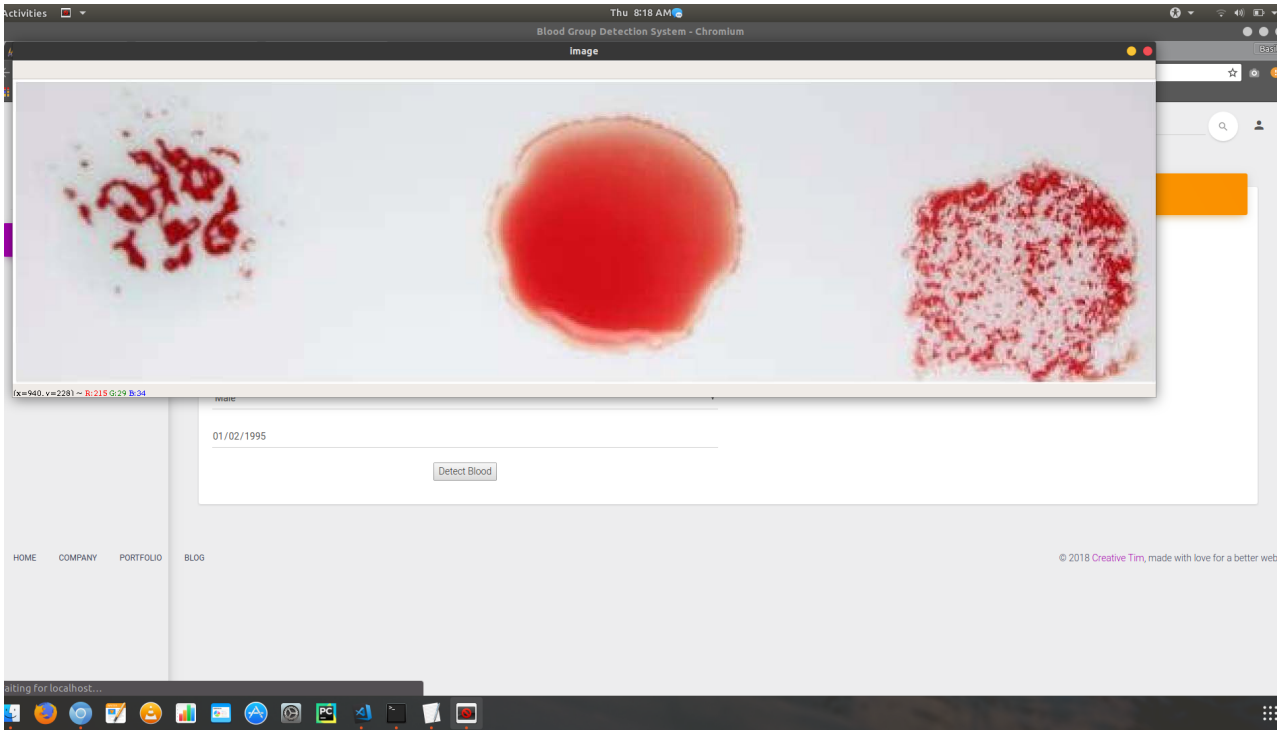
1. HOME PAGE



2. USER DATA



3. IMAGE ACQUISITION



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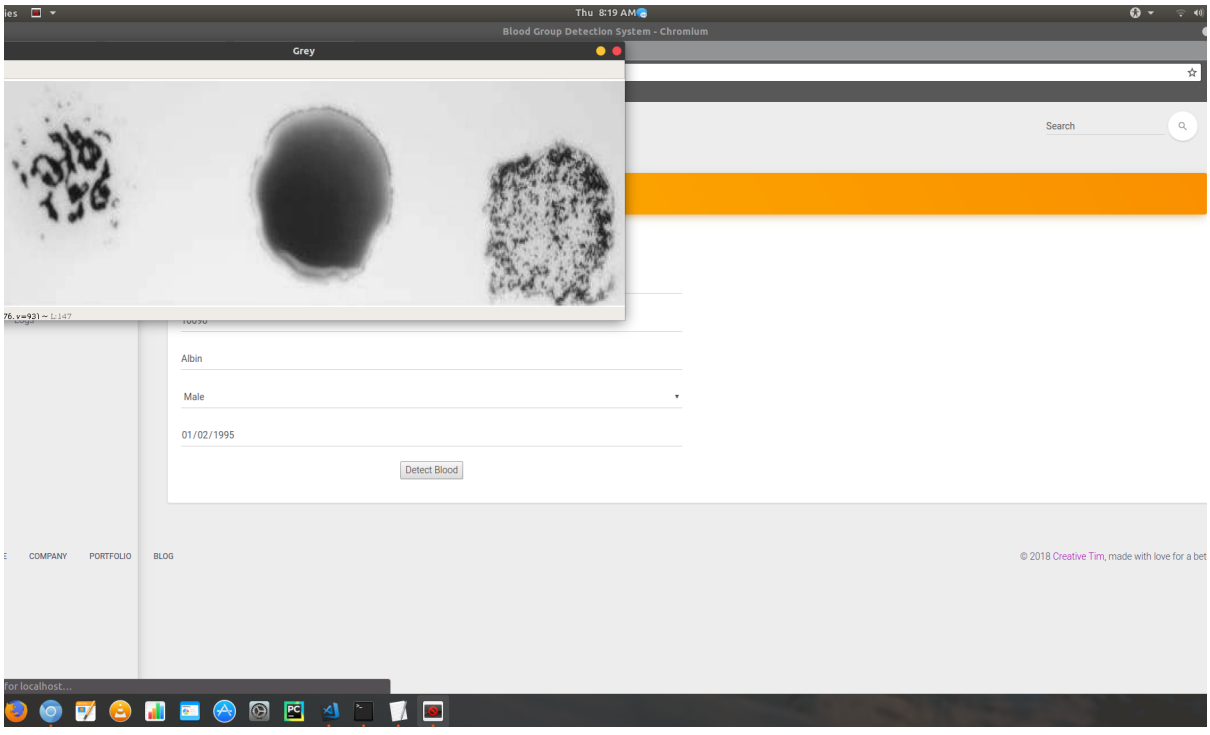
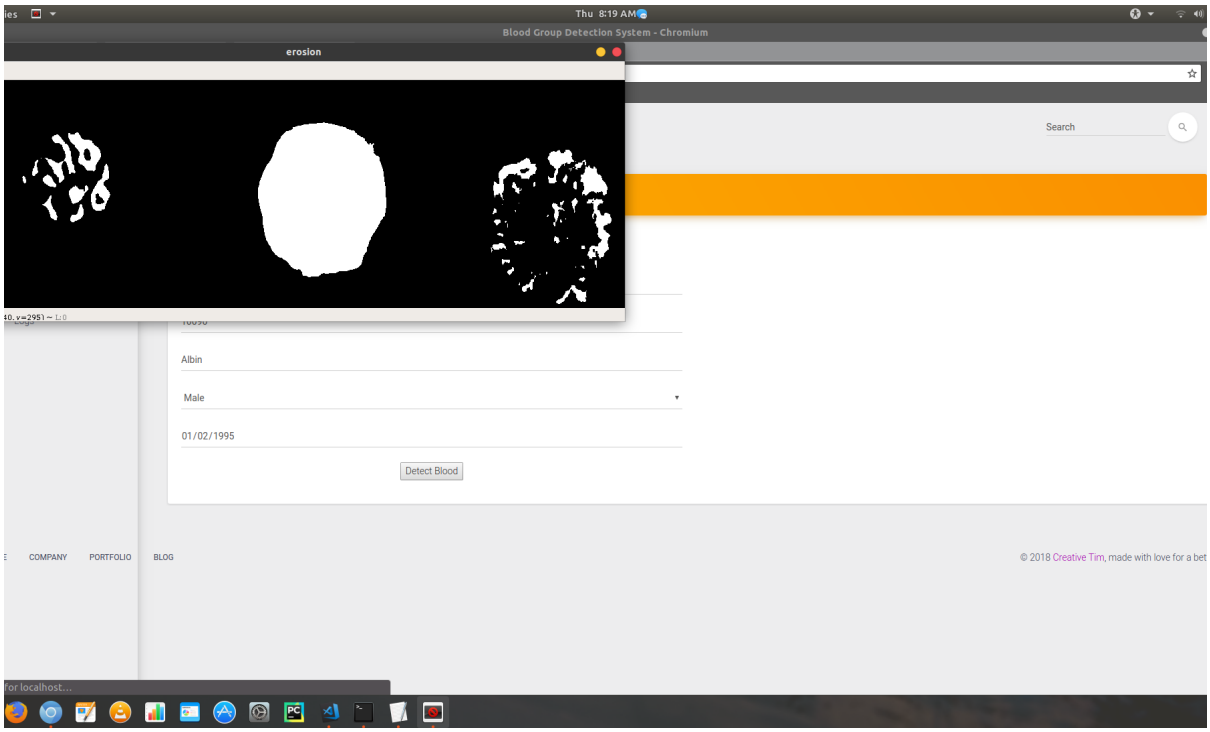
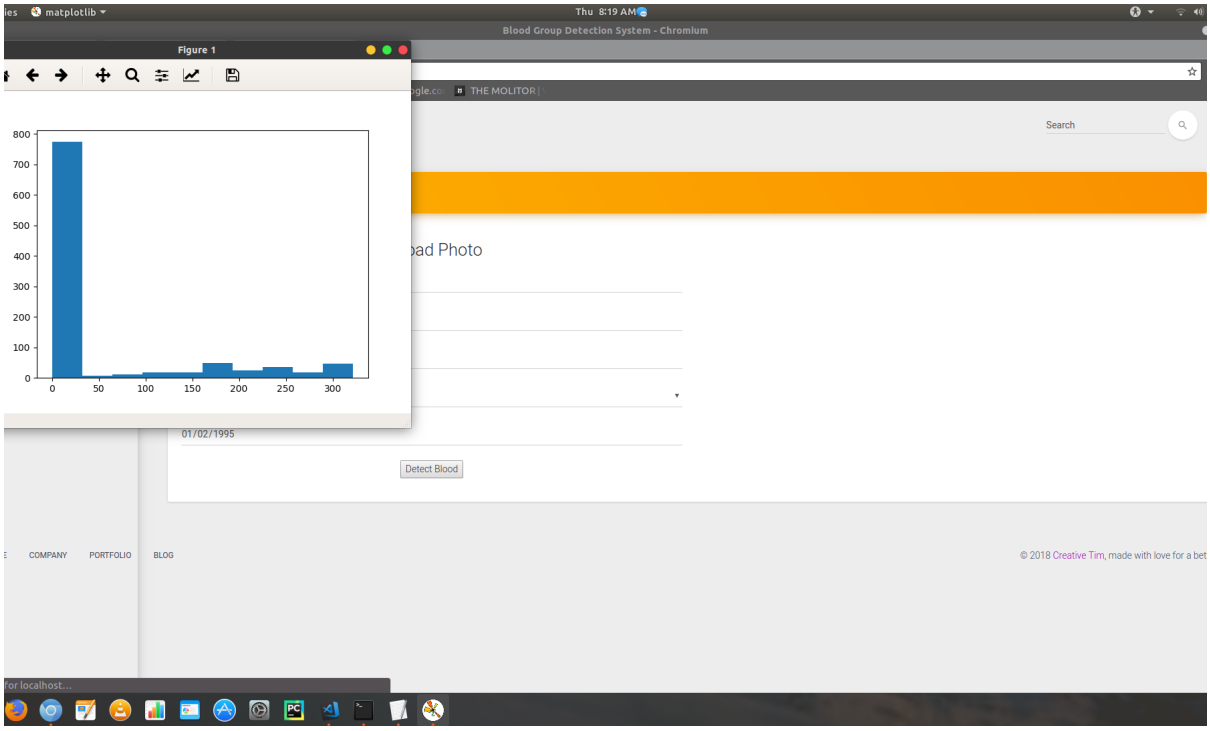


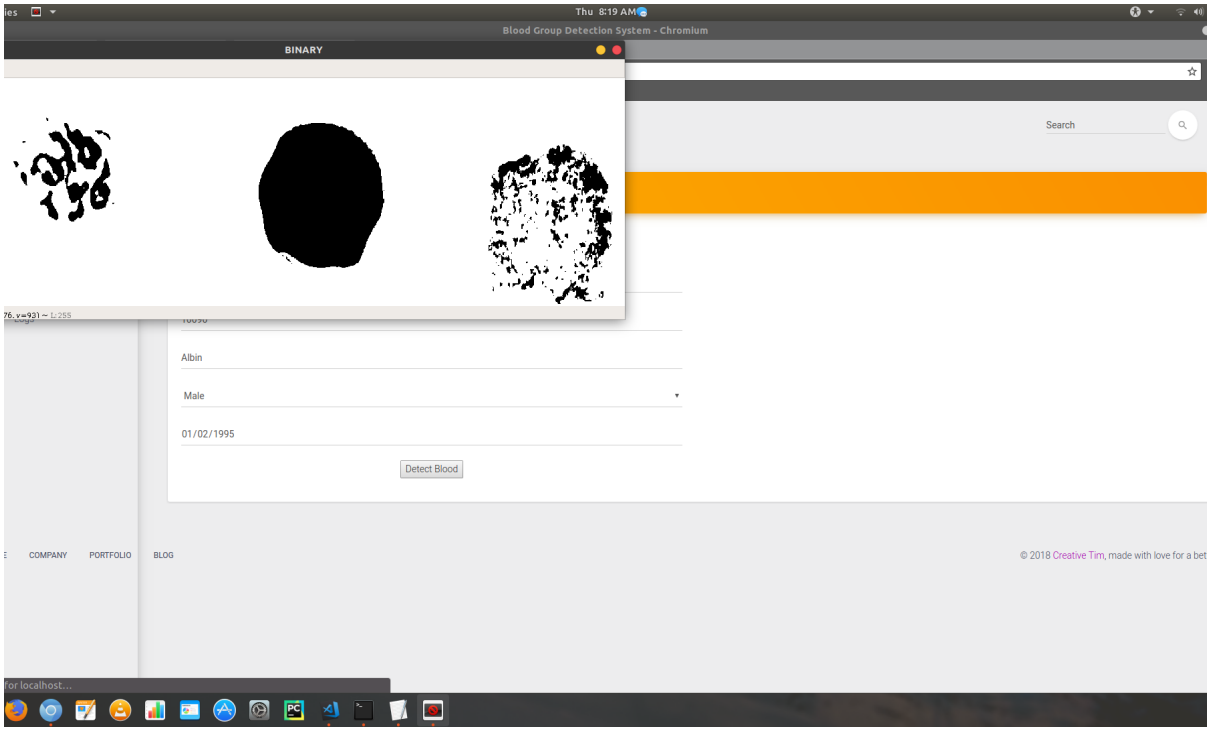
5. HSV CONVERSION

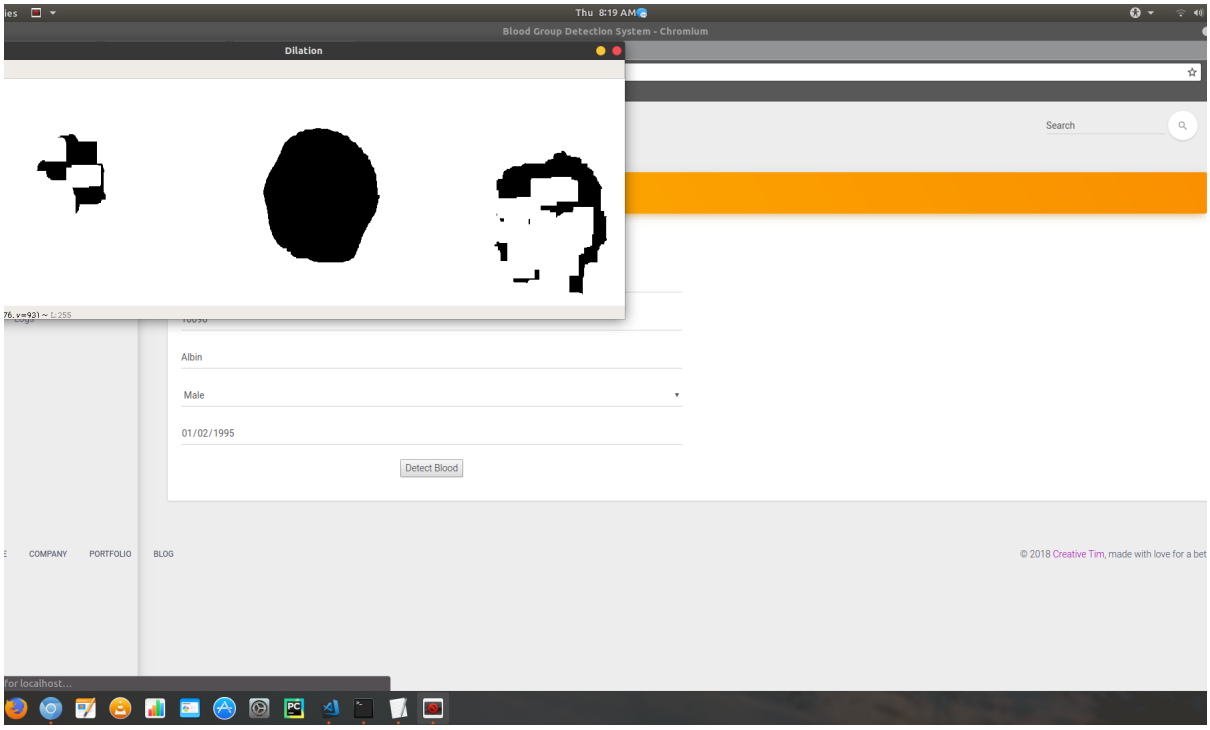


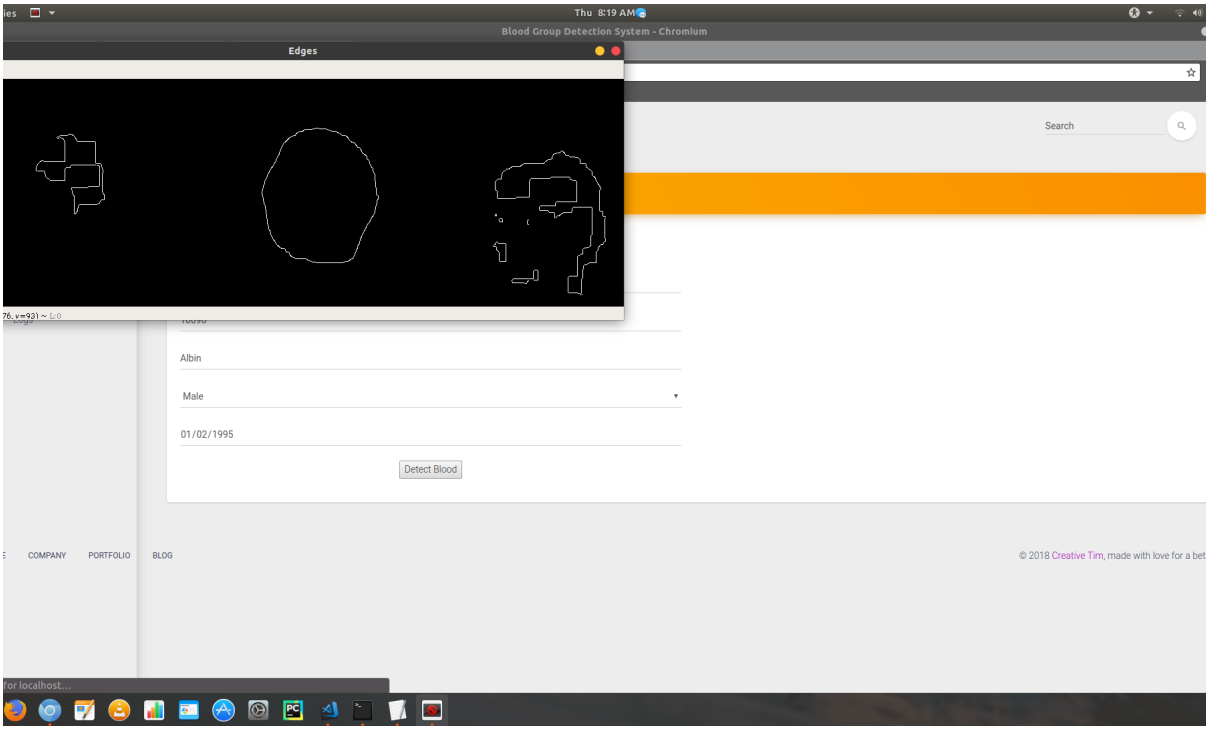
6. VERTICAL HISTOGRAM CREATION



7. DERIVATIVE OF HISTOGRAM AND SPIKE REMOVAL






Thu 8:19 AM
Blood Group Detection System - Chromium
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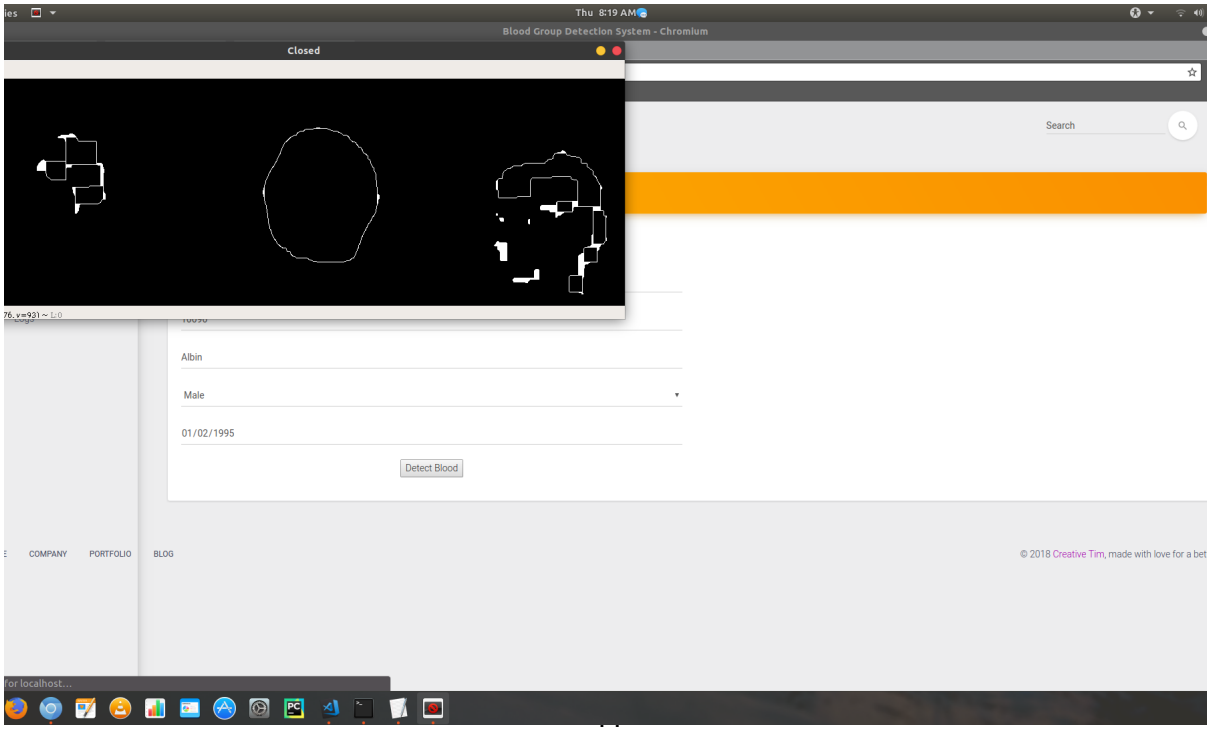
Male
01/02/1995
Detect Blood
COMPANY
PORTFOLIO
BLOG
© 2018 Creative Tim, made with love for a bet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Blood Group Detection System - Chromium
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01/02/1995
Detect Blood
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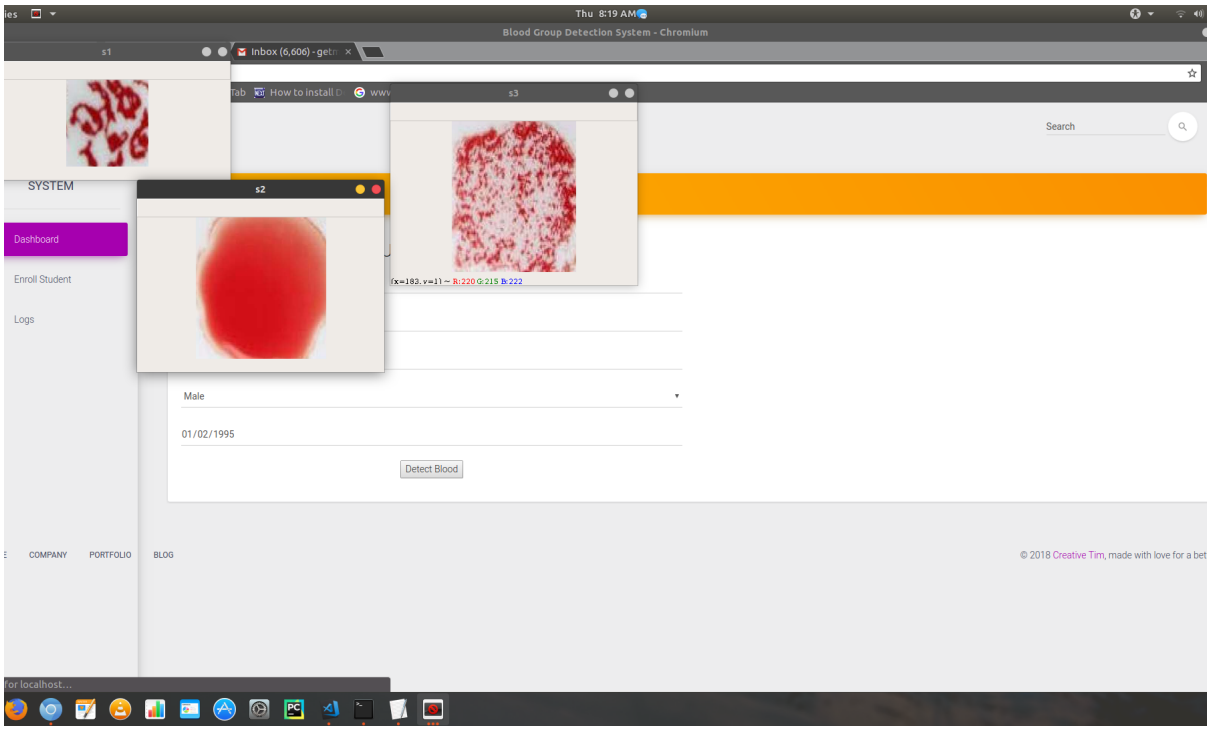
PORTFOLIO
BLOG
© 2018 Creative Tim, made with love for a bet

8. SEGMENTATION



9. DETECTION OF BLOOD GROUP TYPE