Final Term Project

Smart Copter

(Software)

Session 2013-2017

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DECLARATION

We **Abdul Muteeb** S/O **Sajad Hussain**,**Bilal Amjad** S/O **Amjad Waheed, Sidra tul Muntha** D/O **Saeed Ahmed** student of Bachelor of Computer Science, Department of Information Technology, Superior University, Lahore , Pakistan is based on our original work, and has not yet been submitted or published elsewhere.

Group Members:

- **Abdul Muteeb**
- **Bilal Amjad**
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I certify that **Abdul Muteeb** S/O **Sajad Hussain**, **Bilal Amjad** S/O **Amjad Waheed, Sidra tul Muntha** D/O **Saeed Ahmed** student of Bachelor of Computer Science, Department of Computer Science and Information Technology, Superior University Raiwind Road Lahore, Pakistan, worked under my supervision and the above stated declaration is true to the best of my knowledge.

Sir Khuram Jalani

_____

Department of Computer Science & Information Technology

Superior University Raiwind Road Lahore. Pakistan

Dated: _____

ACKNOWLEDGEMENTS

We are thankful to Almighty for giving us such an opportunity and talent to help his people. We express our success to all our teachers for their hard work on us we would also like to thank our Head of Department (HOD) Muhammad Azam who provided us comfortable working environment. The final outcome of this project required a lot of guidance and hardworking team and we are extremely privileged to have got this all along the completion of our project. All that we have done is only due to such supervision and team and we should not forget to thanks them.

We respect and thanks to sir khuram jalani to providing us such opportunity to do this project (smart copter) and giving us all the support and guidance which made us to complete the project on time. We are extremely thankful to him for providing such a nice support and guidance, although he had busy schedule managing the corporate affairs.

We heartily thanks to our project guide Mam Amna, who took keen interest on our project work and guided us all along, till the completion of our project work by providing all the necessary information which we need for project. We are also thankful to sir Osama for his time and sharing sincere opinion about our project.

We are thankful and fortunate enough to get constant encouragement, support and guidance from all teaching staff of BCS-IT department which helped us in successfully completing our project work. Also, we would like to extend our sincere esteems to all staff in laboratory for their timely support.

In the last but not least, we also pay our deepest appreciation with deepest sense of respect to our parents for their love and their prayer

Abdul Muteeb

Bilal Amjad

Sidra tul muntaha

ABSTRACTION

Handling the crowd in any event, shopping mall, school functions and in any get to gather party is a big problem. The event management has to suffer with many problems if the crowd exceeds the given limitation. The Crowd if exceeded from the given limit then the management has to face the shortage of the food and the air conational and many other thing like sitting arrangement etc. The same thing apply in public park because the people like to went park with their family for relaxation and feel the some new environment but if the park are extra crowded then its spoil the enjoyment. This lead the suffocation problem and it in riding park the people have to wait too long in a queue for their turn and the rides controller overloading the rides to overcome this situation but this overloading may increase the accident ratio in rides due to overweight and overload the rides.

Now we see that everyone use the cameras for the security and checking but everyone have to counts the presents of people manually. So we thought why not we make our camera as much intelligent that they perform automatically people counting while the recording them. So for this purpose we start to make our project to helping the parks, events etc. managements.

Our project is a desktop base application which can be controlled easily. the layout of our project is start with simple form the user select the scenario and after selecting the desire scenario the form redirect to that scenario form. The 2nd step is the camera configuration or video uploading which you are using for the project. Now the system detect the recorded video that if the video has at least 2 frame than it run if it does not contain at least 2 frame then its terminated it. Now after this process we take 2 frames and save each frame in a each variable. Now we will create a 3 channel image to convert it into a gray scale image using the edge detection algorithm. After converting it into the binary image we apply the blob algorithm on it. The algorithms detect the people and extract the features with the area of person and return it. We get the people detected in our video. Now for counting we use a loop that how many times the blob algorithm detects the people it increases the count.

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Number of Figures

1. Introduction to the problem.

Now's a day's crowd management is the complex problem in shopping mall, events, city parks and in some disasters. The people overloading in any public or private sector creates the huge problem for government about security risk. I mentioned about the some scenarios below and the problem due to them.

- It is observed that if an event has been arranged for 1000 people and somehow more than 1000 people come to this event. Then it would be difficult for event management to facilitate those overloaded people because the management has arrangement for 1000 people. This situation leads many risks for the event management as well as those people who come to attend this event.
- In weekends the mostly people planned to visit the city parks with their family and the park management have to allow the every single person for entrance. In the end this overloading of people in parks creates the huge security risks for every visitor in any unreal situation.

These all the scenarios lead some basic problems which are listed below.

- In fire situation. The management has fire equipment for only 1000 people but the people exceeding would create the serious problem for management to arrange more fire equipment.
- In any disaster the people run to the emergency exit but the event exit were plane for only 1000 people and in case of people overloading there are more people injuries risk is involved.
- The air condition system were designed for 1000 people but in case of people overloading it creates the suffocation which will be a huge problem

The people don't follow the rule and regulation and breaks the rule which is major problem currently in our country. The people try to visit those places which are restricted by the government or areas owners. The intension behind it might be dangerous may be they have rubbery plane or something else. It's a serious problem for the government or owners to stop them.

1.1 Background Information

This project is developed to control the crowed in a public or private sector with the help of Quad Copter cameras or simple IP cameras. The Object of this project is to count the number of people in an entry or exit point and closed areas (building, shopping mall, universities and parks). The result of this project is too accurate with the minimum manufacturing cost. For this project we just need a camera for recording people activities and this software automatically count the people and show the result.

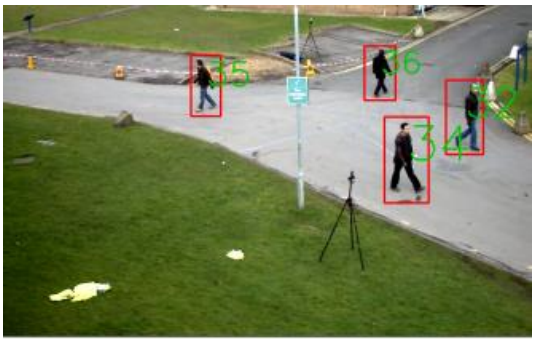
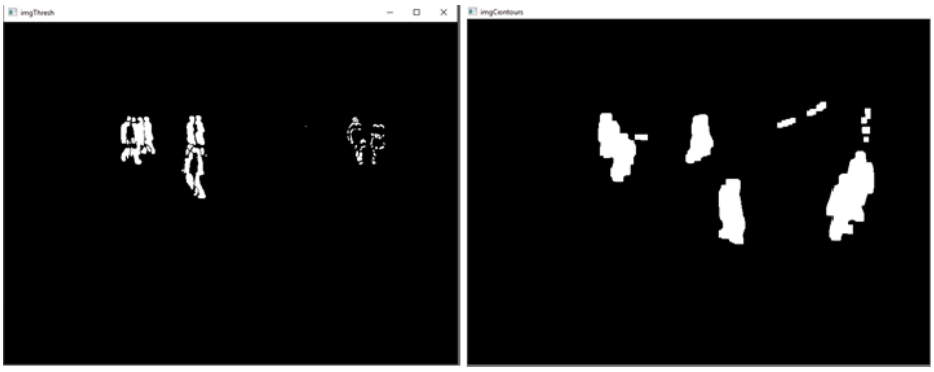


Figure no 1

In figure 1 the people are walking outside a building the IP camera is placed on a tower near to the building. The IP camera is recording the people activities. Where some people are walking in a group and some are walking individually. This software apply background subtraction and remove the noise using the thresholding and Gaussian blur filter to identify each moving and static people. In figure 2 and figure 3 we show you how we apply the thresholding and convex hull technique in this software to removes the background and noise to detect the people. The thresholding convert the input image into a binary image to remove the noise from the picture and the convex hull is used to detect the shape of people in a binary image.

Figure no 2 | Thresholding

Figure no 3 | Convex Hull



1.2 Computer Vision.

Computer Vision is a high level image processing technique. It is used to train the machines (computer, software, robots, etc.) for getting the useful information from surroundings. This process can be done by making images or videos which are recording on the real time. In Computer Vision we train the machines to get the information from the single image or multiple digital images in the form of video. How we can get the useful information from images of videos. So for getting the better results we have many algorithms in Computer Vision for example (Edge detection, illustration tagger, image similarity, gender classification, Biometrics, Deep Fashion, Traffic monitoring, etc.) which extract the defined object form picture and highlighted it But people detection is most complex work in Computer Vision because we are implementing edge detection algorithm, convex hull which use (sklansky's algorithm) and blob algorithm. The using of these algorithms at the same time decreases the CPU performance which makes it more complex. Now's days Computer Vision is being applied almost in every type of industrial including (film and video, sports analysis, gesture Recognition, Industrial automation and inspection: electronic and food industries) where robots are used for inspection the object to detect the objects and inspect them.

1.3 Motivation

As a software engineer I and my friends thought to serve humanity with the positive use of technology. So soon we figured out that the crowd management is the biggest problem in everywhere not just for security risk but also for a success of an event. We see that many events, parks managements are using the Quad Copter for controlling the crowd. The problem with this process was that the person who is controlling the quad copter need's an assistant for counting the crowd and in the end there would be a human error. So we thought to make this system automatically and soon we find a solution for this problem. The solution is to apply a Computer Vision in Quad copter camera or simple IP camera which automatically detect the people and count them. This solution can be very helpful for a lot of people to protecting and saving a lot of people. It cans easily implementing on an IP camera or any other camera. This solution can be applied in companies where you need to maintain the presents of employee. If any employee I go outside the company so this software will detect it and if some extra person come to the company then it will also show you that the total number of employee allowed inside this area is for example 10 person per there are 12 person present or there are extra 2 person present in this area. We can use this project like if some employees are working on a project and you there is no need or any other employee then the other employee can be forwarded as per need. On the borders where our soldiers are monitoring the border activates that is there someone cross the border line or not so for this our solder have to do their duty very hard. So our project can be applied on border for making a line and if someone crossed the border line our system automatically detect his motion and generate an alarm or anything else which alert our soldiers. So this application not only count the real time people but also its perform many other thing like for example if you are submitting a bills or purchasing a tickets in a queue so it is must to keep the discipline in the queue but some people don't follow the discipline and break the queue so the shop owner or band have to put there guard for the queue monitoring but our project can easily find perform detection on those people who broke the line and highlighted them. So it would be easy for shops owners and banks for keeping the punish those people who don't follow the rules and regulations with completely automatically.

1.4 Objectives.

The working on this project was not an easy task. There are many people detection software has been made but the problem with them is the camera which is recording the people is static and to count people the people must walk from a special path but this solution cannot be apply on quad copter camera because the quad copter moving and change its direction or angle every time.

i. The 1st objective of this project is to maintain the reliability of the result in any case.
ii. The 2nd objective of this project is to people detection throw the computer vision which is not an easy task because this should detect the people clearly.
iii. 3rd objective was to maintain the CPU performance because the while people detection there are survival algorithms are running which decrease the performance of system due to which you can get the better result.
iv. The 4th objective was to detect the people individually from the groups from the images. To achieve this functionality we have to firstly convert the images into grayscale and then applying thresholding on them to remove the noise and to make them into a binary image.
v. The 5th objective of our project is to monitoring the people who are in queue. This is the one scenario of our project.
vi. The 6th objective was to restrict the people from a given area.

To achieve the solutions we start researching on object detection and edge detection algorithms in computer vision that how we can apply those algorithms in our projects for getting the better result. The solution we found was to use a pre-defined algorithm named (Blob algorithm) with the edge defined algorithm and Gaussian filter algorithm.

2 Literature review.

2.1 Exiting solution

Many people have done this project before but there project had 2 very basic or common limitation which are listed below.

i. Counts in only a specific area

The projects which have been made before are using the static camera and they draw the virtual lines into a specific area which works as counter. When any person crossed that virtual line from that specific area the lines come into a contact and the counter incremented.

ii. contact type system

The contact type counting technique is used in their system. Which major disadvantages is this technique count only when the virtual line is touched or crossed by people. If 2 people or more than 2 people crossed the virtual line at the same time then contact type system count them as 1.

2.2 Purposed Solution

In our project we are using vision based system. It works on input videos multiple frames. The main benefit of vision based system is that it counting method is used the tracking in the direction of blob. So we do not need to specify an area for counter the people like in contact type system. The vision base system can be track and detect the people in camera range. It also does not need to have a static camera we are implementing it on a quad copter so the quad copter move its direction as per control. So I can say that our purposed solution is much better the existing solution.

2.3 Algorithms

2.3.1 Thresholding

For image segmentation the thresholding is the basic step or technique. The thresholding convert your input image into small segments. Each segment represents something for example in our project the segment present the people with white color like this.

To apply a thresholding on an image we have to firstly create 3 images 1 for red 1 for green and 1 for blue. Now the result will be black when we will combine these images. Now make a copy of these combination images and you will find the thresholding result.

For creating the 3 Channels images in EmguCV we use MAT class. Which can be defined as?

```
Dim imgMat as new Mat
(
        Size,
        Depth Type,
        No of Channels
)
```

```
CvInovke.Threshold
        (
        Source,
        Destination,
        Threshold,
        Max Value,
        Threshold Type
        )
```

Figure no 4 | Thresholding

2.3.2 Edge Detection

Canny edge detection is very popular algorithm in edge detection. It's a multiple stage algorithm but we access them stage by stage. We apply these entire steps in our project. Their work description is listed below.

i. Noise Reduction

The most susceptible algorithm for noise reduction is edge detection. It removes the noise of image with Gaussian filter.

ii. Finding intensity gradient images

It took the derivative of horizontal direction G(x) and vertical direction G(y). From these images we can easily find out the edge Gradient which is applied on each direction of pixels.

$$Edge\_Gradient\ (G) = \sqrt{G_x^2 + G_y^2}$$

$$Angle\ (\theta) = \tan^{-1}\left(\frac{G_y}{G_x}\right)$$

Figure no 5 | Gradient intensity

iii. Non maximum suppression

There are still some unwanted pixels in the resultant of noise reduction and intensity gradient image. To removing the unwanted pixel, it checks the local maxima in each pixel that if there is any local maxima in its neighborhood or not in the direction or gradient.

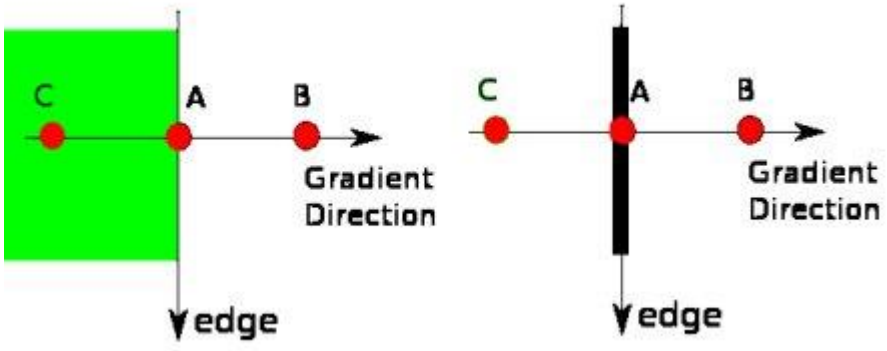


Figure no 6 | NMS

iv. Hysteresis thresholding

At this stage the process check the image edges that are these edges are real or not. For verifying the edges we need to threshold point maximum or minimum. If the intensity of edge is greater than the maximum so it consider it sure edge or if the intensity of edge is equal to the minimum value than it consider it non edge. The intensity of edges lies between the threshold maximum and threshold minimum values than these edges are verifying on the basis of connectivity with the 2 points.

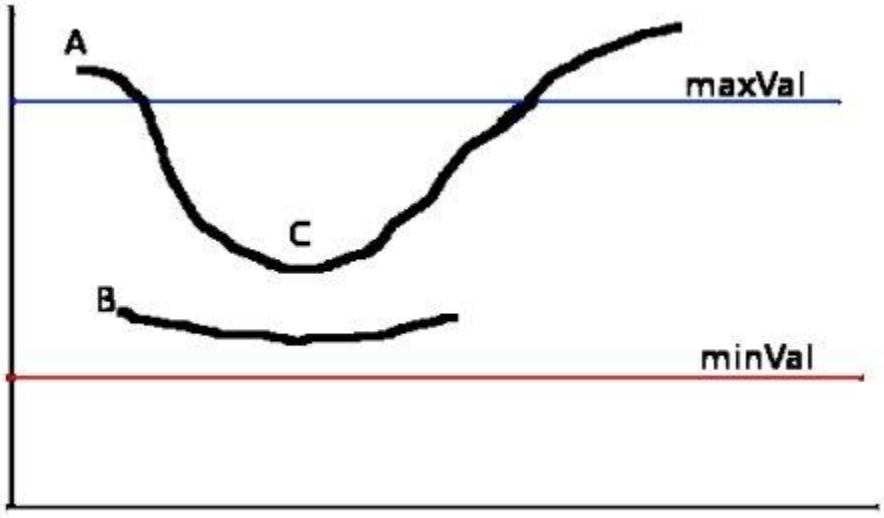


Figure no 7 | Hysteresis Thresholding

2.3.3 Convex Hull

To achieve the convex hull there are many algorithms which allow to store the input image pixel in arbitrary order (grahms'1972 this algorithm require that the input data has to be a star-shaped polygon). The simple Sklansky's(1972) does not work on all type of polygons. The boundary point set to draw to the region of object. We do not have if star-shape polygon than we cannot achieve the convex hull directly applying the Sklansky' algorithm. For getting the convex hull on all type of polygon the Computer scientists introduce a new algorithm named SPCH.

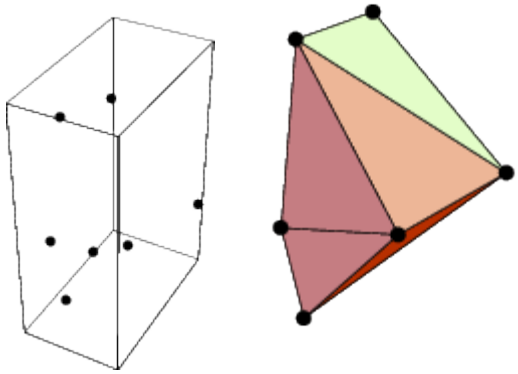


Figure no 8 | Convex HUll

The convex hull of a set of points S in n dimensions is the intersection of all convex sets containing S. For N points p_1, ..., p_N, the convex hull C is then given by the expression.

$$C \equiv \left\{ \sum_{j=1}^{N} \lambda_j \, p_j : \lambda_j \geq 0 \text{ for all } j \text{ and } \sum_{j=1}^{N} \lambda_j = 1 \right\}.$$

Figure no 9 | Equation

2.3.4 Blob Algorithm

Blob extraction method applies only on binary images. Blob consists on the array of connected pixels. There are 2 types connectivity in blob. 1st one is 4 pixel connected and 2nd is 8th pixels connected. The 8th pixels give the more accurate result as compare to the 4th pixel. But mostly we prefer the 4th connected pixels because it is not time taking and fastest then the 8th pixels.

The 4th and 8th connectivity pixels shown below

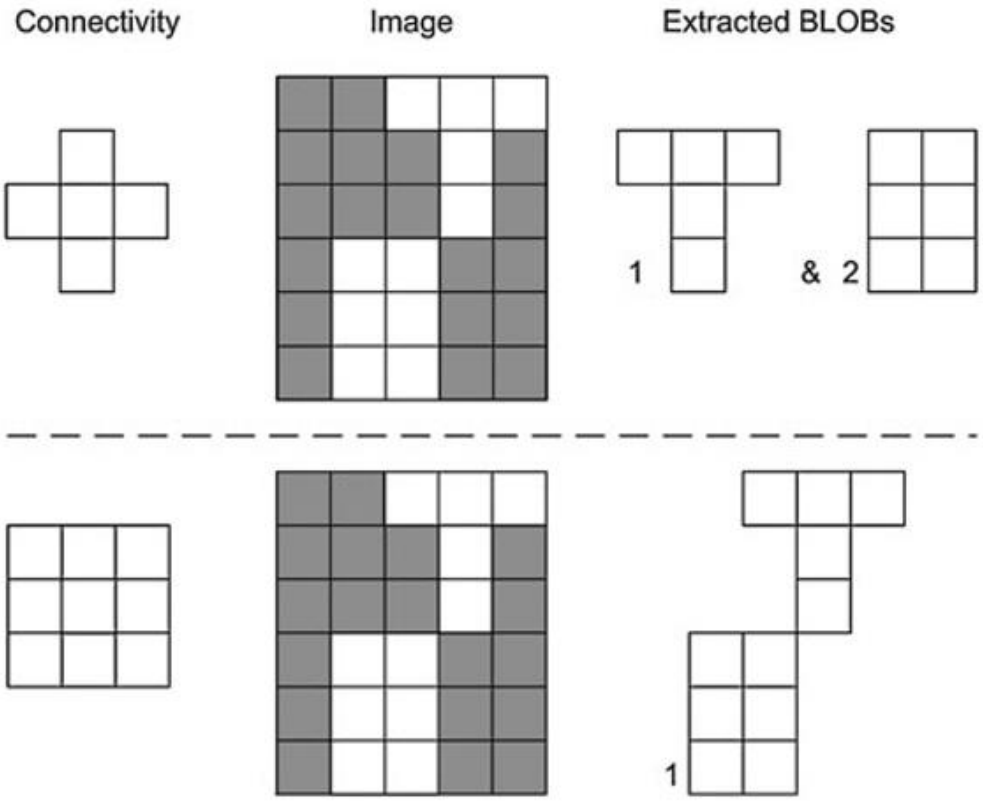


Figure no 10 |4 & 8 point

The object has many method and properties like color, brightness, compare to surrounding regions. Commonly we call the constant part of image as a blob whose properties can't change. Blob algorithm has many methods of features detections.

i. **Extracting blobs**

In this step we apply the classification about the human or non-human. It consist of 2 process.

a. Denote each blob no of characteristics
b. Extract different features

ii. Feature extracting

All features are represented by some numbers. First of all we compare all the features pixels to keep the relevant information and ignore rest. Then we apply the features extraction on the entire blob this method is used to keep the guess each object in the image border.

iii. Area of Blob

It calculated the entire object pixel for knowing better about the blob detection.

(a)

Figure no 11 |Bounding box

(b)

Figure no 12 |Bounding circle

(c)

Figure no 13 |Convex Hull

It's also calculated the direction of blob with the difference of point one and the radius between the blob

$$\text{Compactness} = \frac{\text{Area of BLOB}}{\text{width} \cdot \text{height}}$$

Figure no 14 |Area of blob

2.4 Object Counting

Object counting is the at most exceptional technique which is use in image processing in much application for example counting the people walking on roads, counting many shapes etc. First of all image can change into grayscale image. The grayscale image reformed into binary image. Object counting is not difficult to counting on detection of mark object. To performing the object counting first of all we have to give some images as a input to our software on which the software perform detection and counting.

There are 3 types of counter analysis which are listed below.

i. Contact type system
ii. Sensor type system
iii. Vision based system

In our project we used contact type system as well as vision based system.

The vision based system can be achieved by implementing several ways. It works on input videos multiple frames. In vision based system the system counting method is used the tracking in the direction of blob. Firstly the image changes into grayscale image, Gaussian filter to blurring the image to reducing the background noise. Then we applied convex hull on the image and when convex hull detect the people then we apply final change our input image into the binary image.

The Contact type system used in our queue scenario where the people are detected when they cross the virtual line in this case the counter count the people who are in the contact of Virtual line the counter don't count those people who does not contact the virtual lines. The problem in contact type system is its count the people when crossed the virtual line but how it's know that the line is crossed by 1 single person or by a group on people. For example if 3 people crossed the line as a group so the contact based system count it one. There is also some problem in sensor type systems. If we a take an infrared camera as a sensor, Now it will detect the people by crosspiece infrared light. The people can be able to cheat this system a if somebody blocked its crosspiece infrared light.

2.5 Tracking

When foreground is separated from the background, then we perfume the tracking on objects. When the Gaussian blur method is applied successfully then the object must be tracked because at this stage the image is smooth and binary. The typical problem in people tracking is the people are moving constantly so for the software it's hard to detect the shape of people, occlusion and unpredicted path in every frame. The tracking method is usually applied on the people path. The people detection is hard because the people detection depending on people size, color and velocity in videos.

When people are walking in a group with same velocity so then it's create the common error which is intermixing the people or track the group as a 1 single person. To solving the problem we use Kalman filters.

3 Analysis

3.1 Vision Document

3.1.1 Introduction

The main purpose of this project is to serve humanity with the positive use of technology. We figured out that crowd is the biggest problem for everywhere for security risk and management. This is a common issue that unwanted or uninvited people come to attend the event this create the many problem for management like shortage of food, gift distribution and security.

Our project help the management team to solve this problem by automatically detect the exact number of people who are attending the event or who gather at any place. We find a gap in where all this work done by manually so this thing motivate us to do something that manually detect the correct number of people

3.1.2 Background

This project is developed to control the crowed in a public or private sector with the help of Quad Copter cameras or simple IP cameras. The Object of this project is to count the number of people in an entry or exit point and closed areas (building, shopping mall, universities and parks). We apply the thresholding and convex hull technique in this software to removes the background and noise to detect the people. The thresholding convert the input image into a binary image to remove the noise from the picture and the convex hull is used to detect the shape of people in a binary image.

3.1.3 Requirements

With the prospective of development we should know about image processing and its technique. The computer vision is high level of image processing so image processing is a basic step. We should know how to work with OpenCV and EmguCV framework and we also know about the utilization the emguCV classes and its function. Having the experience with VB, C+, C#, Python is essential.

We need a camera to record the people and if we are recording from the quadcopter then we should need to configure quad camera with our software otherwise which camera you are using its important to configure with the software.

3.2 Supplementary and specification

Our project all requirements are mentioned in this documents. These are those requirement which we can shows in the use case models. If we marge the supplementary and use case model so it would describe our whole project requirement. We define the no functional requirement in this section such as

I. Functionality

In this section we describe the functional requirement which we implementing in our project.

i. People Detection

We detect the people individually form the groups of images. Our project have multiple scenario the 1 scenario in our is people detection in restricted area means detect those people who don't follow the rules and regulation and try to go into the restricted area.

ii. People Counting

Our project also counts the people using the vision based system technique. The other projects which are made before have the restriction that they count the people if and only if the people crossed the virtual lines created by the developer. But our project does not need those lines it's the people using Counting analysis.

II. Usability

In this section we describe those points which affect the usability of our software. There are main two key usability points which are listed below

i. Operating system Compliance

This project is compliment with all type of operating systems including the (UNIX, Linux, Mac OS and Windows).

ii. Design of ease-of-use

We design our project for computer literate user community. Our project is too easy in use that everyone can operate it easily just with simple computer know how.

III. Reliability

There are main 2 points in reliability.

i. Availability

There is no time restriction in our project. The user can use it any time.

ii. Main Time Between Failure

Our software does not give the better result in low intensity light and when people are not clear or they wear up some costumes or hiding in something.

IV. Performance

The performance characteristics of our project are listed below.

i. Transaction response time

The start time of our project is 1 minute at first time in (HP Notebook 240) and performs the detection with in the second. The system specifications plays an important rule because the run time is depend of system specifications.

ii. Simultaneous User

There is no limit of people detection in our project but sometimes in a very crowdie places our project does not give the better result due to the large groups of people because the in groups the some person are hiding back from the front people.

V. Design Constrain

There are 3 design constrain in our project which are following.

i. Blob analysis

This analyzes the blob from the input frame of a single image or sequence of the images w it the help of background subtraction.

ii. Platform requirements

Our project can be operate in any system with the specifications of 1.6 GHz or high, 1 GB ram and 500MB memory space for working and 5400 RPH hard disk.

i. EmguCV Compatibility

Our project is completely working through using the EmguCV library, name spaces and classes. Our people detection algorithm is also written in EmguCV classes, functions.

3.3 Use Case Model

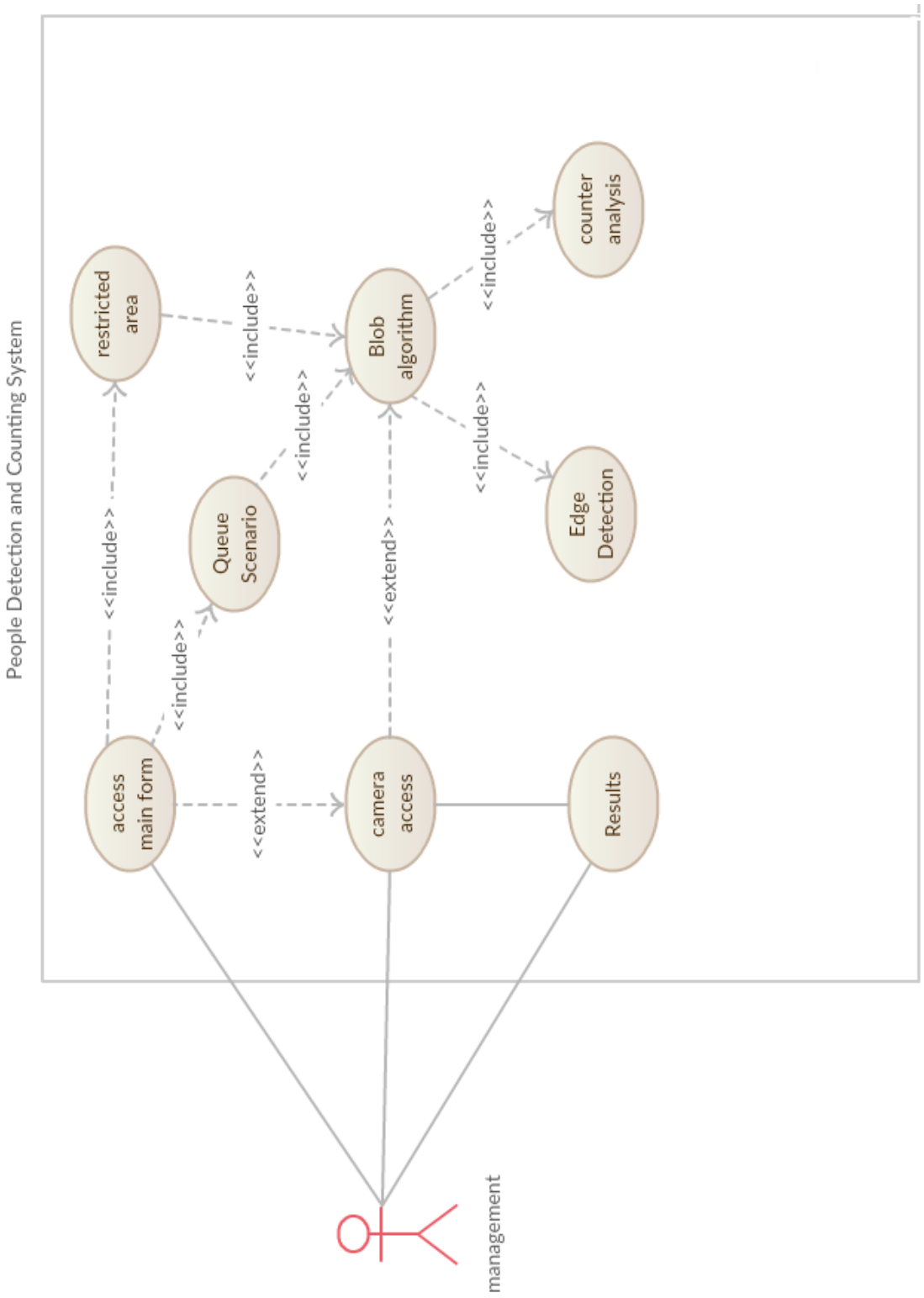


Figure no 15 |Use Case

3.4 Use Case (Essential)

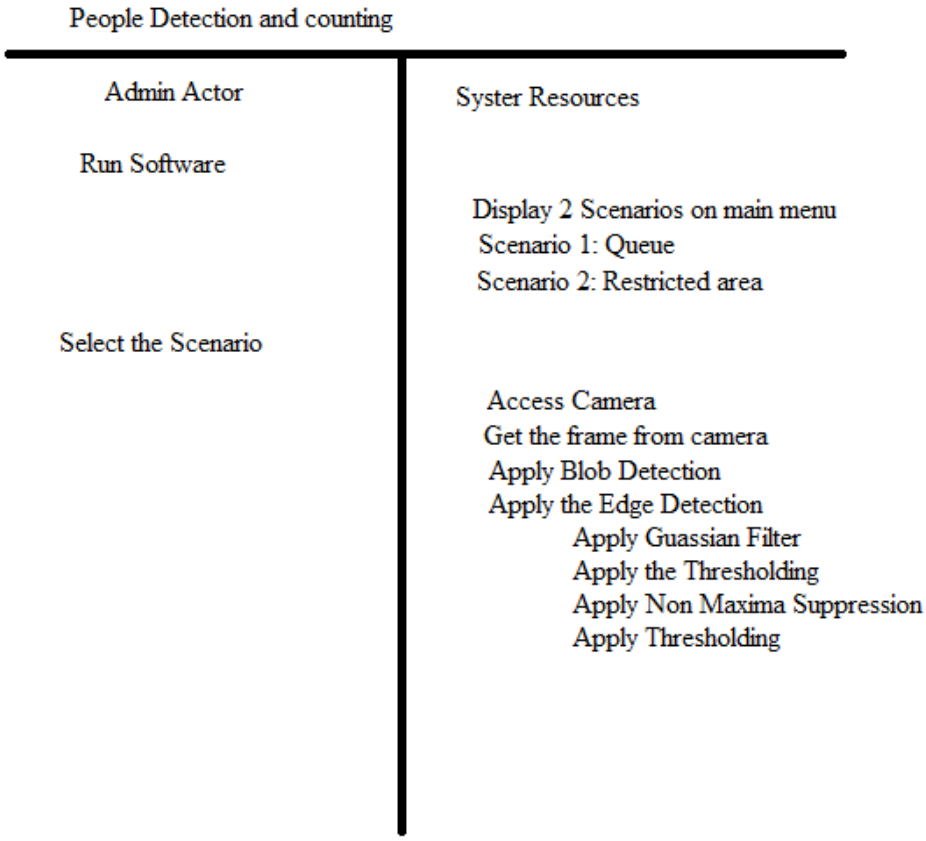


Figure no 16 |Use Case essential

4 Design

4.1 System Sequence Diagram

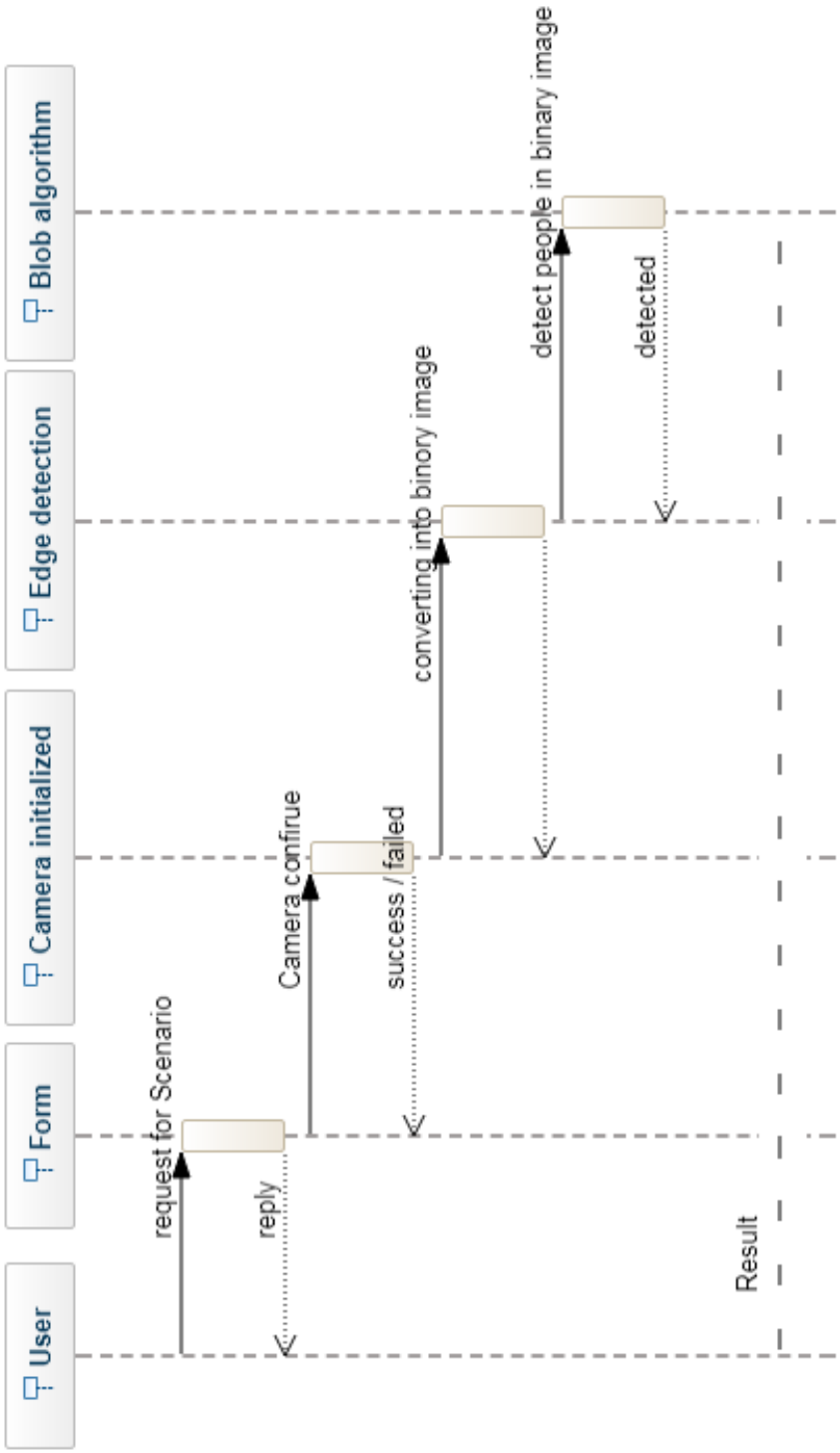


Figure no 17 |Sequence Diagram6

4.2 Class Diagram

Figure no 18 |class diagram

4.3 Flow Chart

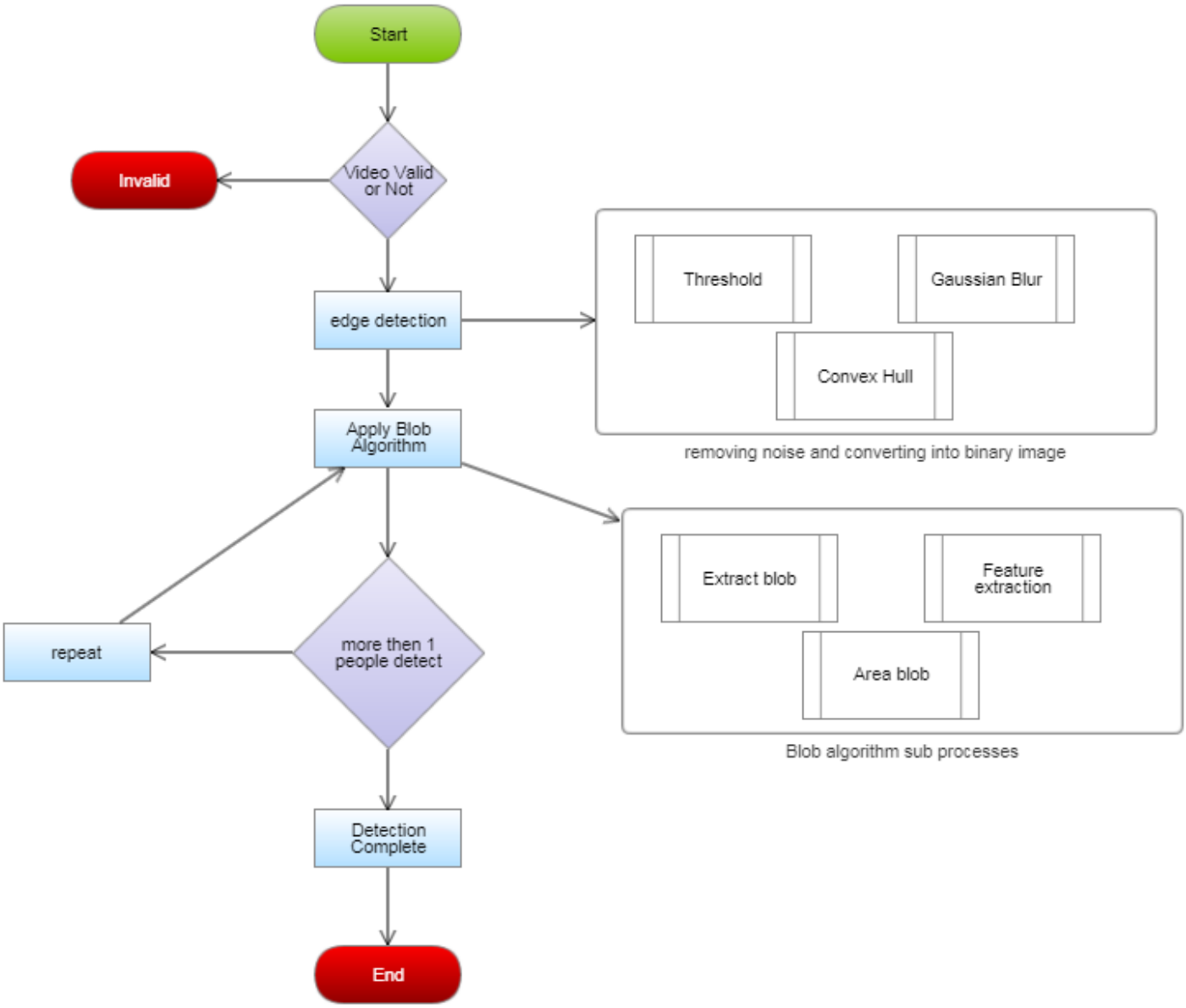


Figure no 19 |Flow diagram

4.4 Data Flow Diagram

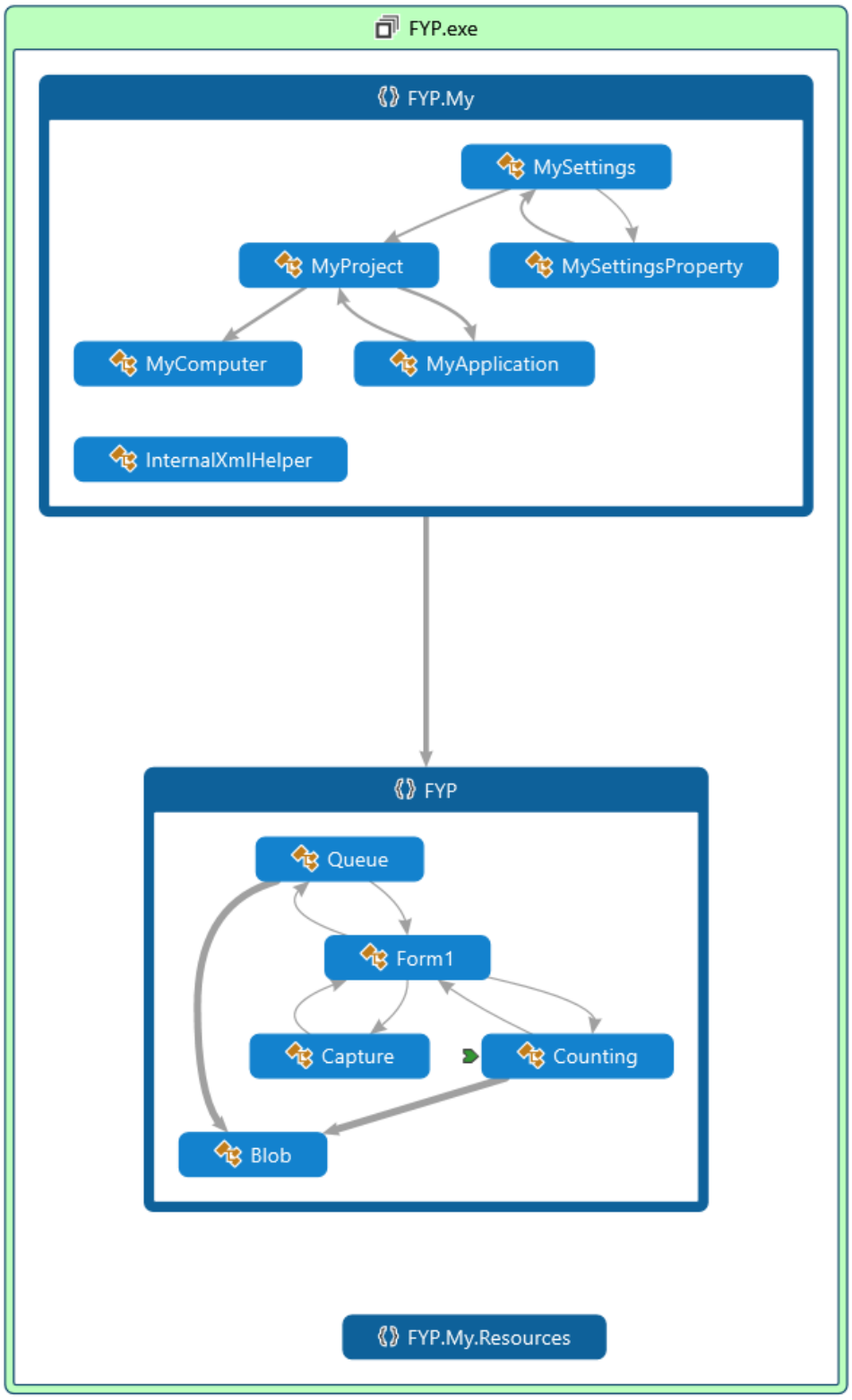


Figure no 20 |Data Flow diagram

4.5 Activity Diagram

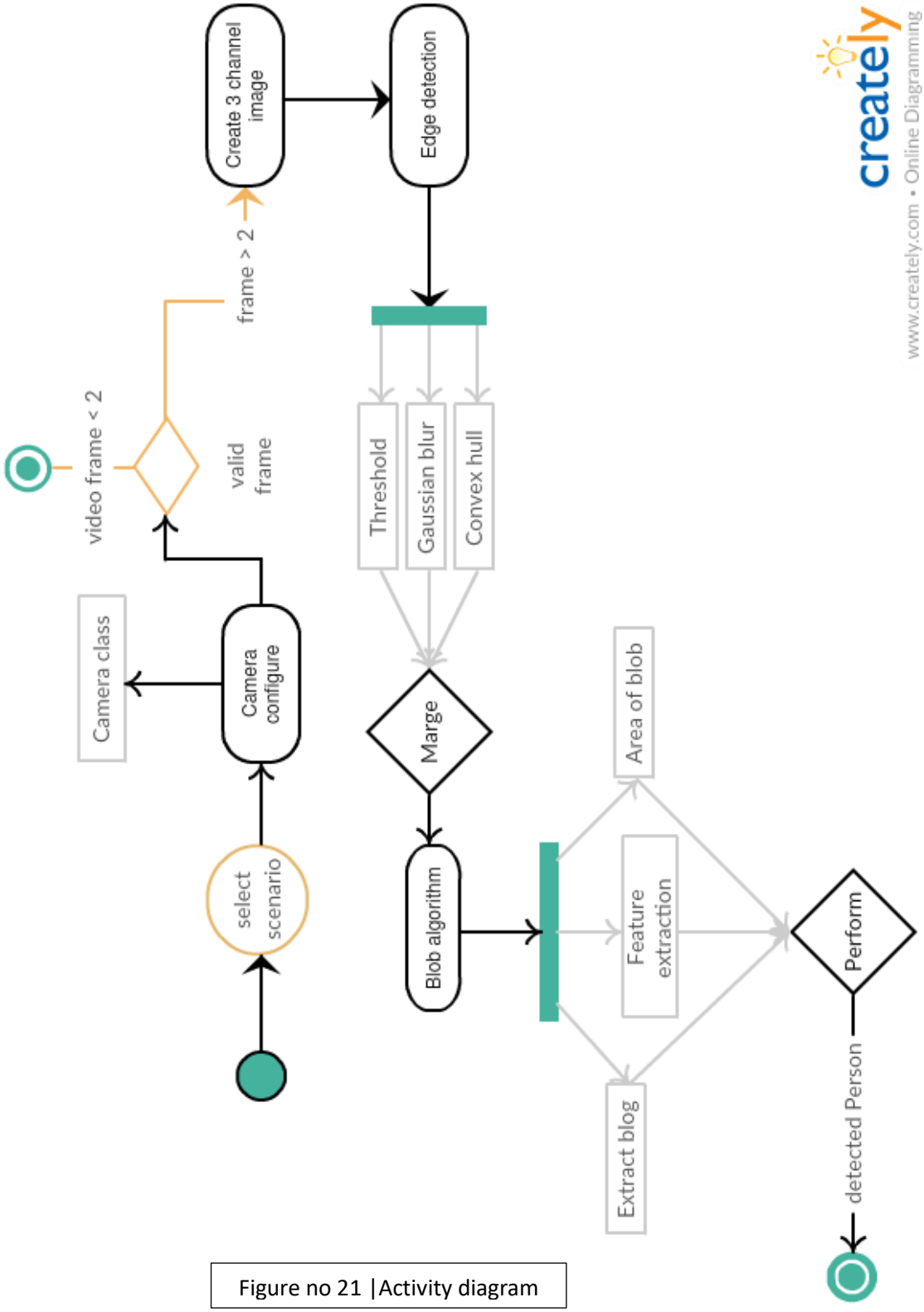


Figure no 21 |Activity diagram

4.6 Persuade Code

```
Start

Read Video file

If Video file!=valid

Alert (“ Video file is not valid ”);

Else

Imageframe1= Video.Frame;

imageframe2= Video.Frame;

imagefram1coply as math= imageframe1.clone;    //convert into 3 channel image

imageframe2coply as math= imageframe2.clone;

imageframe2=cvInvoke.Convert(grayscale);                    //Edge detection

imageFrame=cvInvoke.Gaussian();

int count=0;

while(video!=end)

{

imageblob= Compare(imageframe1,imageframe2);            //blob algorithm

count++;

}

End
```

5 Testing

5.1 Black Box Testing

This software Black box testing result are satisfying. Here many tests are applied on this project in black box testing like

a. Missing Function
b. Interface errors
c. Performance error
d. Termination error

The all results are good we did not find any missing function or interface error. Even we did not see any performance error during the lift time of software.

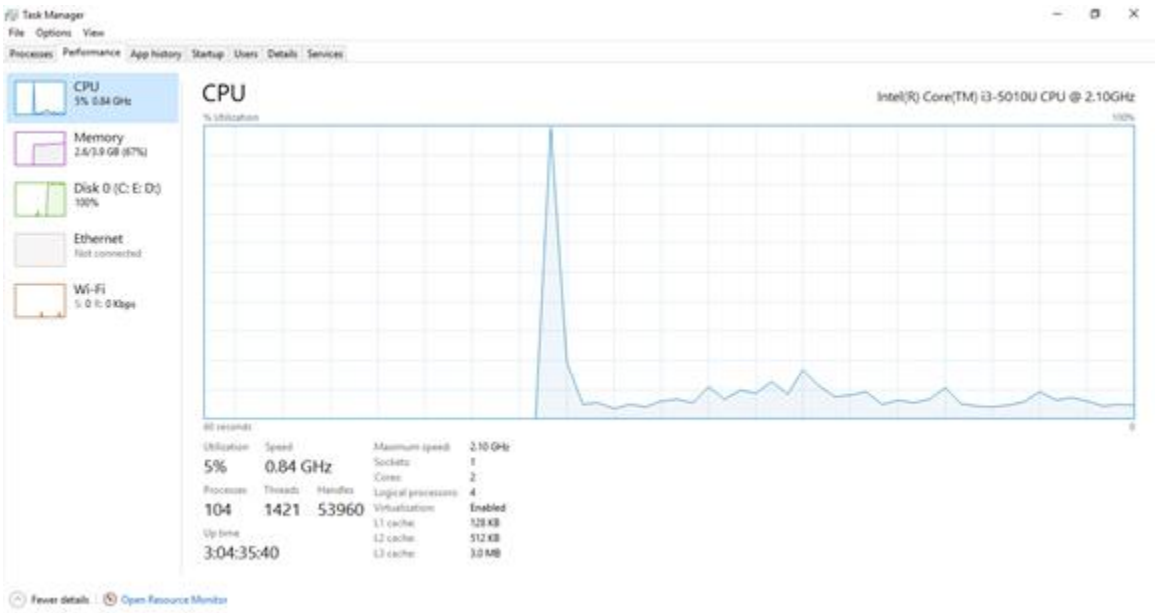


Figure no 22 |Black Box Testing

The start time of this project is 1 minute in (HP Notebook 240). Its increase the processing of system at run time but after 1st time building the project it starts working correctly.

Performing the termination errors we find some problem in testing. The low resolution video stops working or analyzed before the end time and shows the termination error.

5.2 White Box Testing

White box testing is also applied on this software with the help of some performance test or code analysis testing. The tests which were tested are listed below.

i. Code analysis

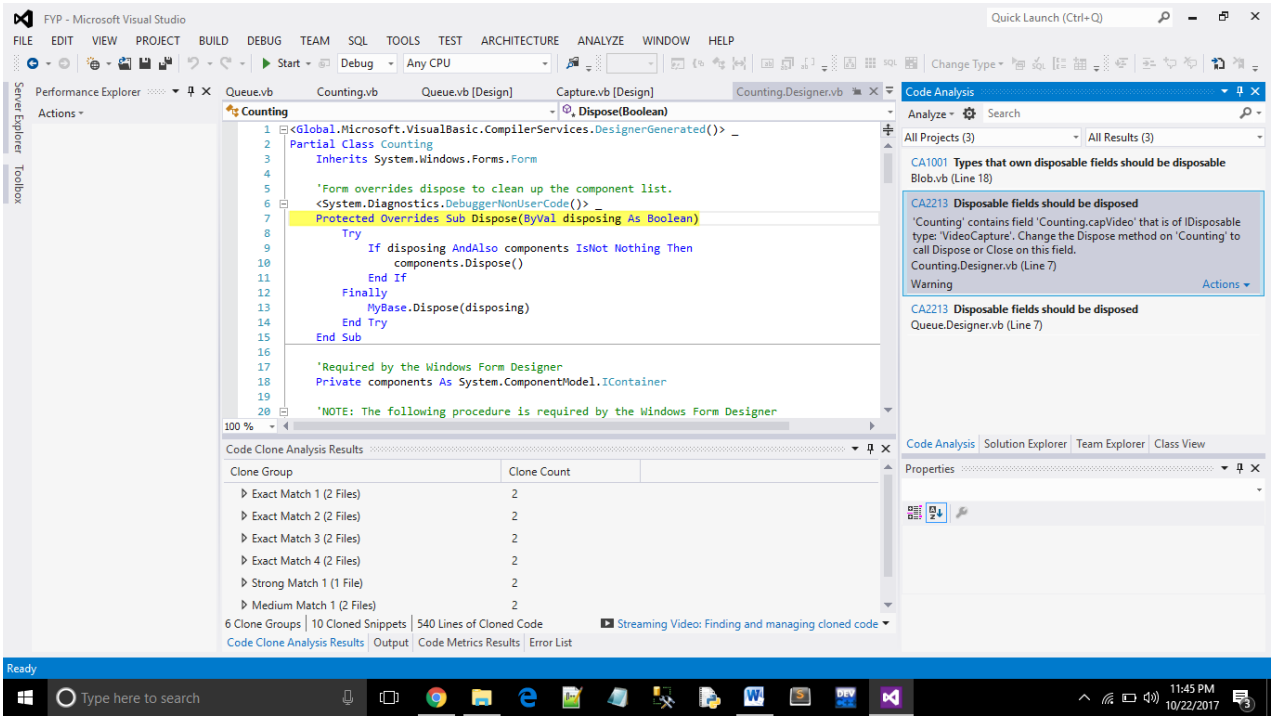


Figure no 23 |Code analysis (a)

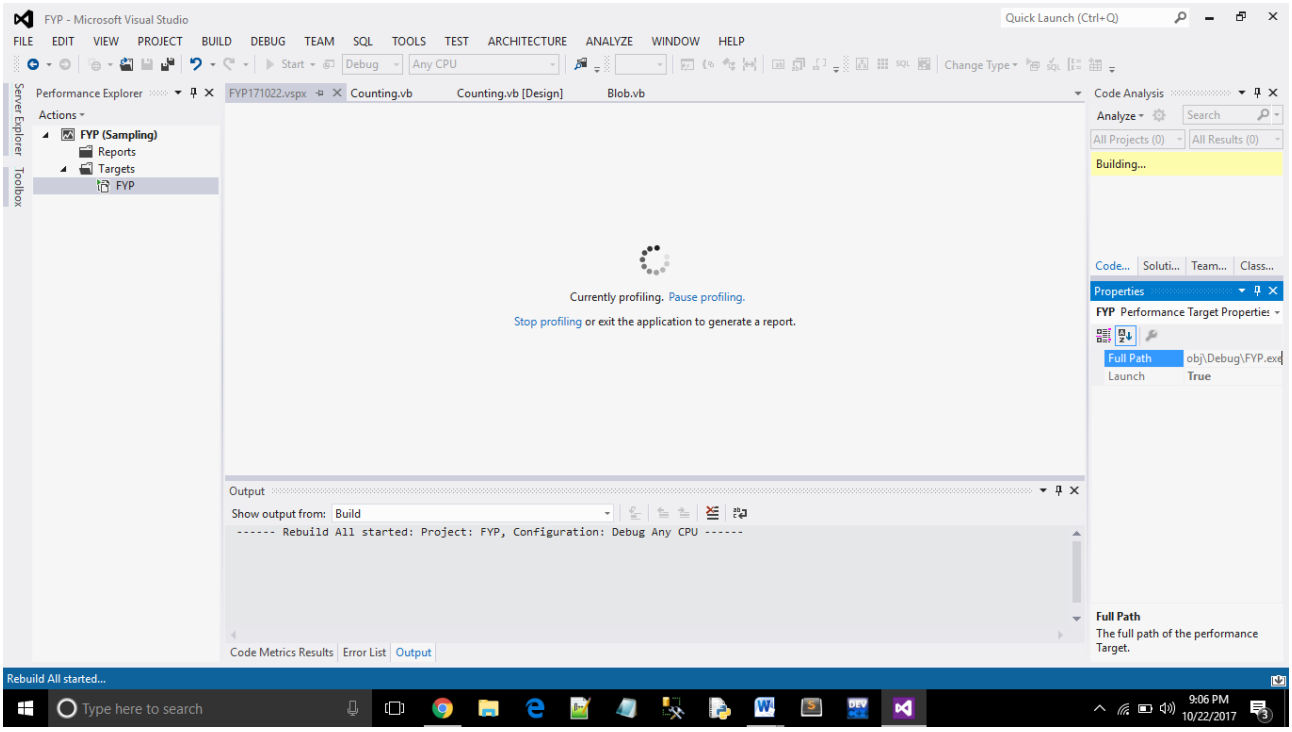


Figure no 24 |code analysis (b)

------ Rebuild All started: Project: FYP, Configuration: Debug Any CPU ------
FYP -> E:\FYP\FYP\bin\Debug\FYP.exe
Running Code Analysis...
MSBUILD : warning : CA1001 : Microsoft.Design : Implement IDisposable on 'Blob' because it creates members of the following IDisposable types: 'VectorOfPoint'. If 'Blob' has previously shipped, adding new members that implement IDisposable to this type is considered a breaking change to existing consumers.
E:\FYP\FYP\Counting.Designer.vb(7): warning : CA2213 : Microsoft.Usage : 'Counting' contains field 'Counting.capVideo' that is of IDisposable type: 'VideoCapture'. Change the Dispose method on 'Counting' to call Dispose or Close on this field.
E:\FYP\FYP\Queue.Designer.vb(7): warning : CA2213 : Microsoft.Usage : 'Queue' contains field 'Queue.capVideo' that is of IDisposable type: 'VideoCapture'. Change the Dispose method on 'Queue' to call Dispose or Close on this field.
Code Analysis Complete -- 0 error(s), 3 warning(s)
========== Rebuild All: 1 succeeded, 0 failed, 0 skipped ==========

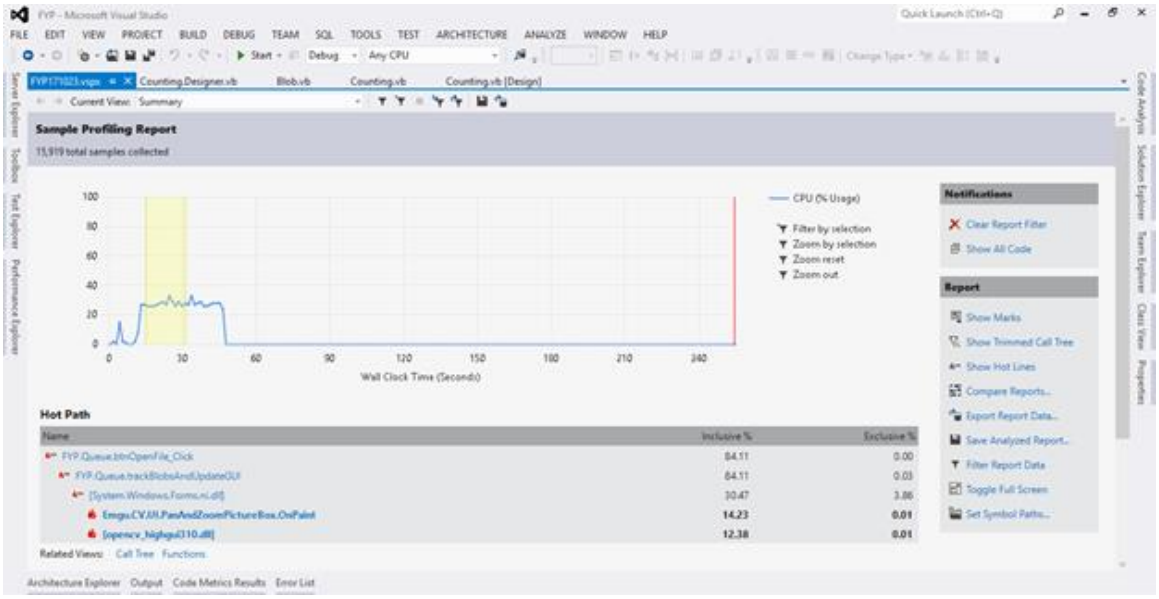


Figure no 25 |code analysis (c)

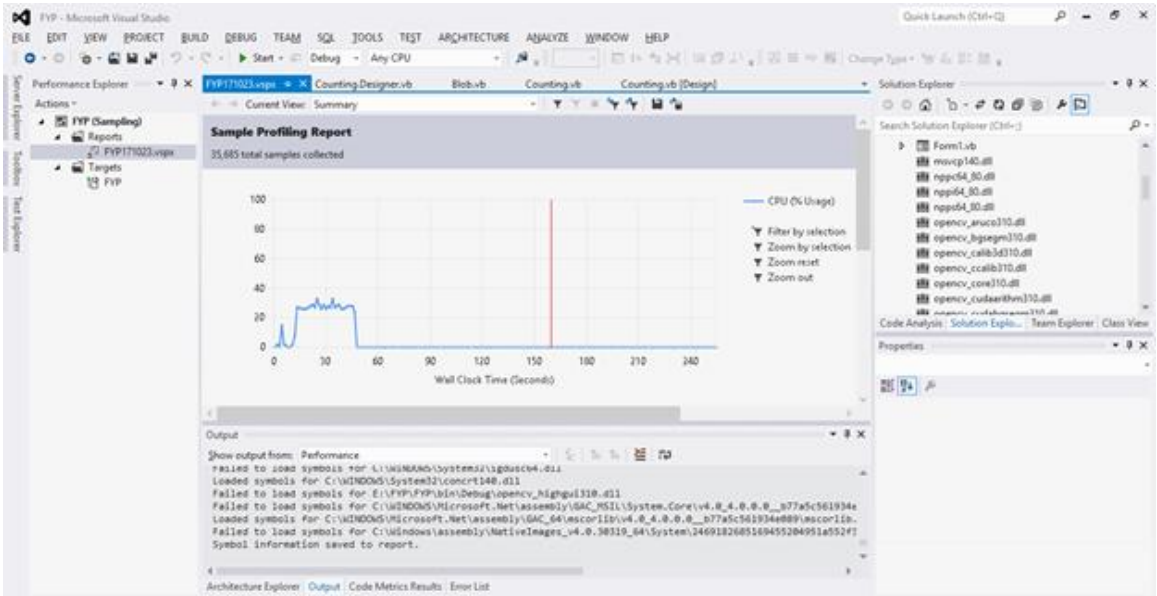


Figure no 26 |code analysis (d)

i. Unit test

Here we tested our software with many units test. In this unit test we test almost our all function and there output. These tested functions name and output are shown below.

a. Threshold

Figure no 27 |Threshold

b. Gaussian blur

Figure no 28 |Gaussian

c. Convex Hull

Figure no 29 |Convexhull

d. People Detection With Algorithm

Figure no 30 |Blob

5.3 Performance Testing

In Performance testing we check the CUP, memory and disk usage before the start of software and after the start of software.

i. CPU usage

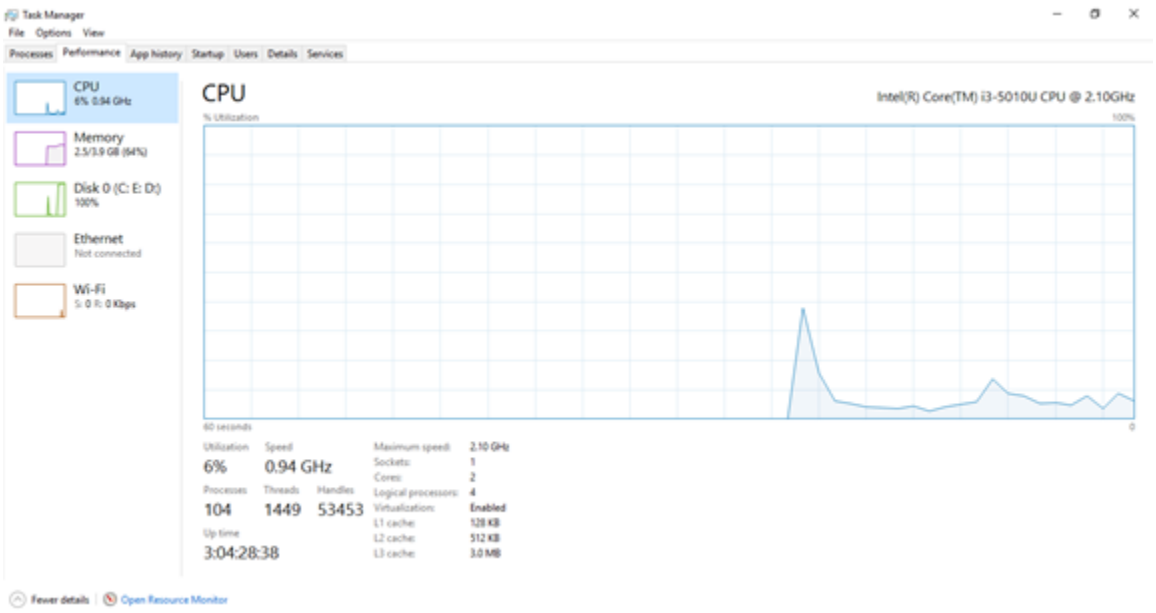


Figure no 31 |Before Software Star (a)

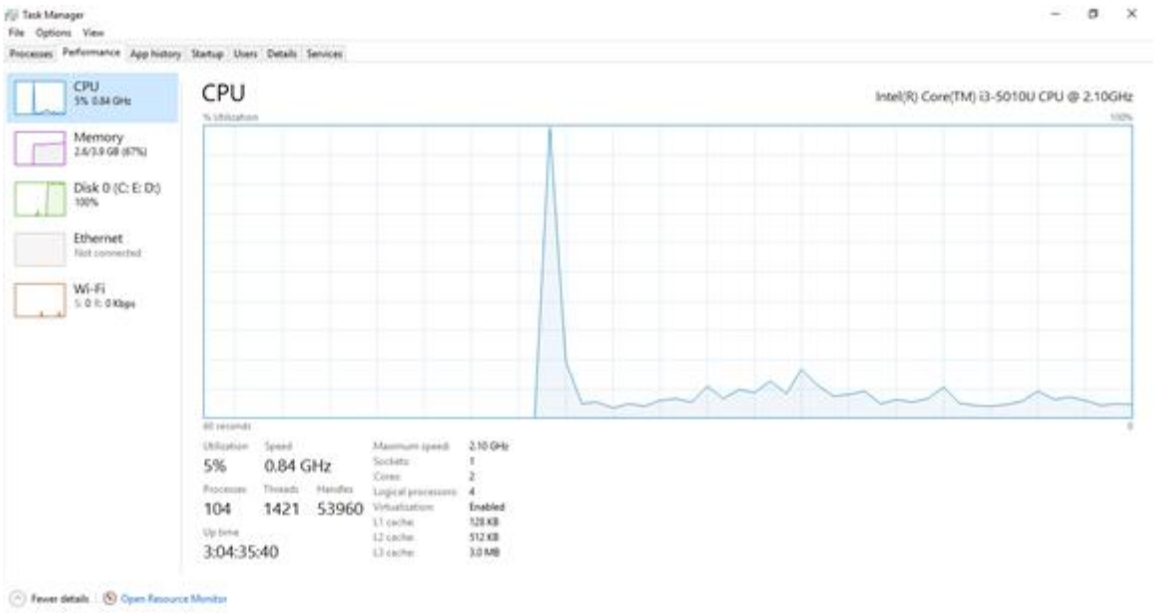


Figure no 32 |After Software Star (b)

ii. Memory usage

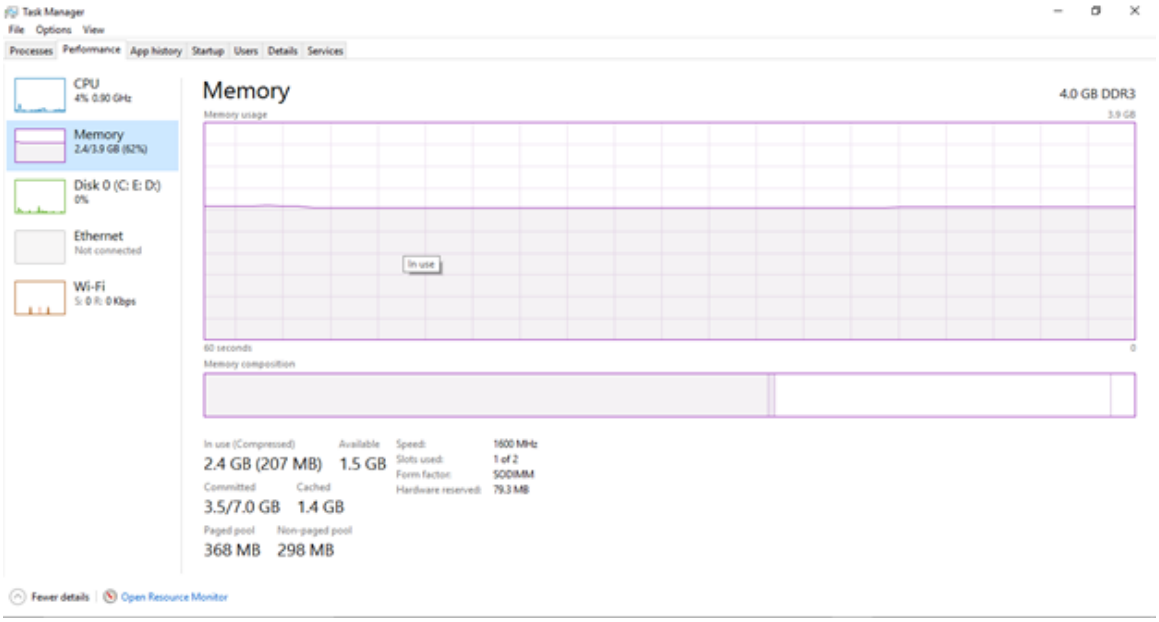


Figure no 33 |Before Software Star (a)

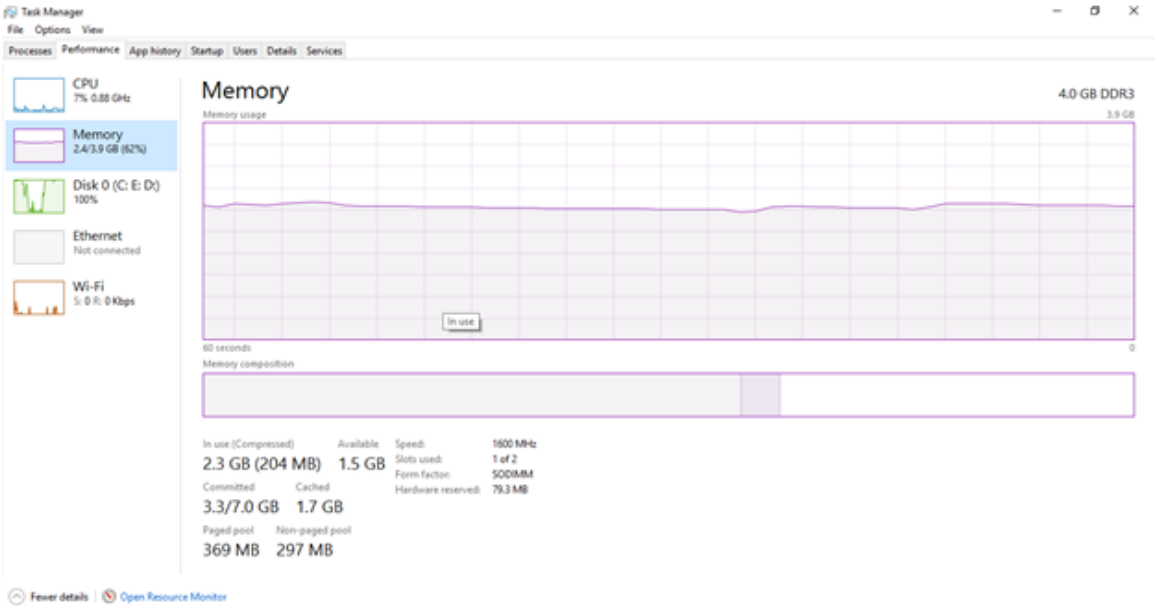


Figure no 34 |After Software Star (b)

ii. Disk usage

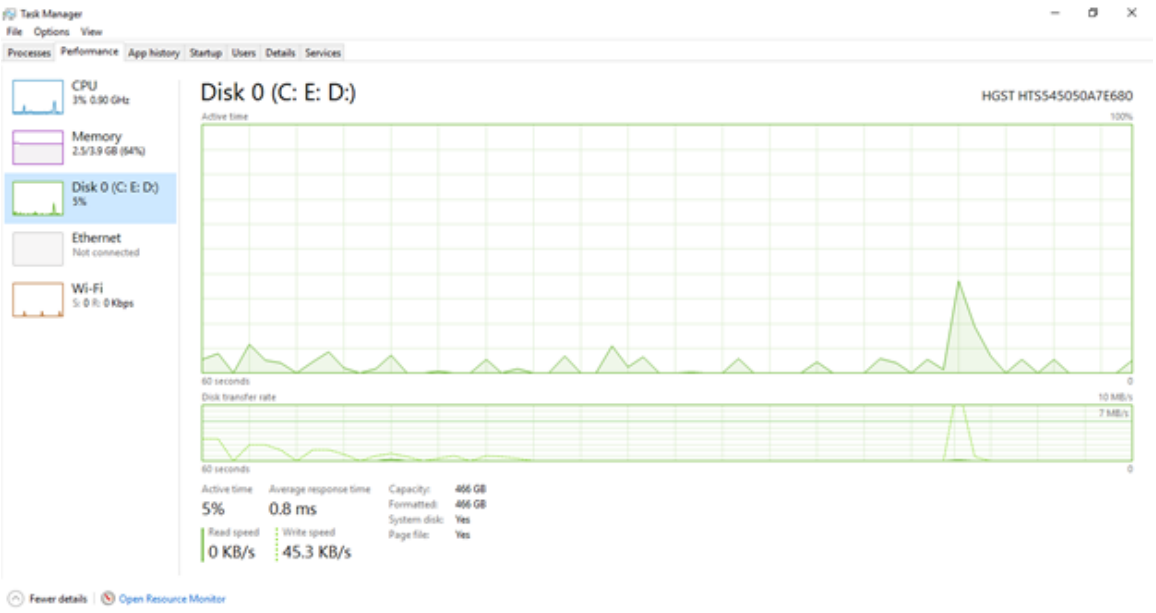


Figure no 35 |Before Software Star (a)

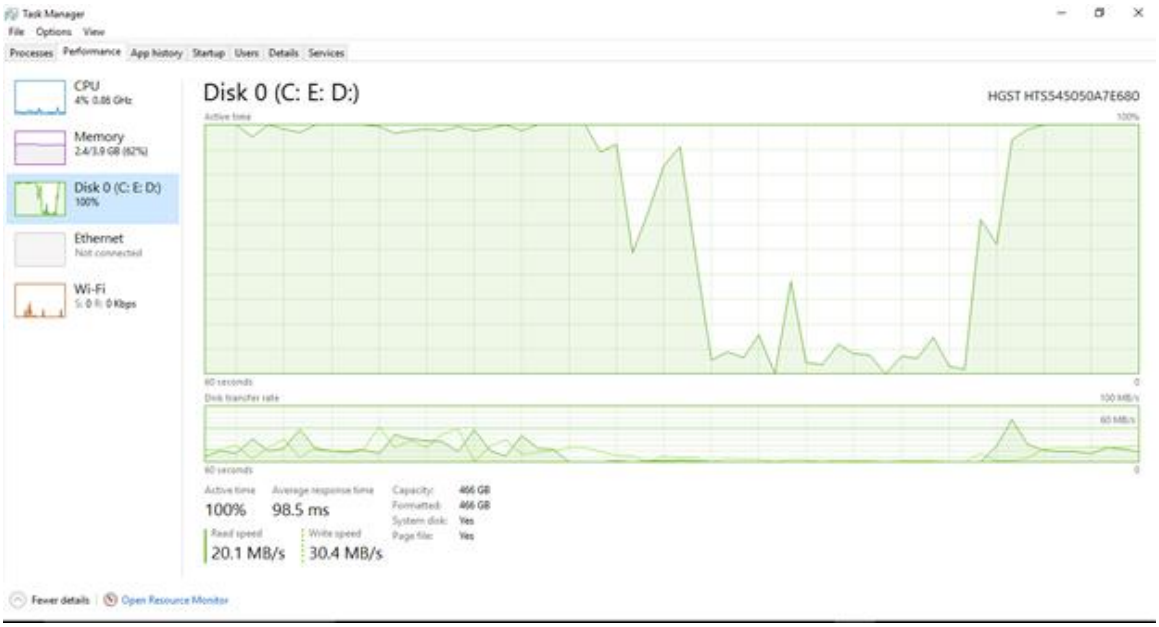


Figure no 36 |After Software Star (b)

6 Tool Used

6.1 Languages

i. VB

For user interface we used VB.net. VB is developed by Microsoft and it is a simple and object oriented programming language. The use of VB is very simple because it is very flexible langue.

We create all the forms using VB languages. For designing the layout we use these tools using VB language

a. Open dialog box
b. Text box
c. Timer
d. Image box
e. Label

6.2 Libraries

i. EmguCv

For performing the image processing we use the opneCV framed work EmguCV in our project. It is compatible with all .net Framework.

In EmguCV we used these libraries

a. Emgu.CV
b. Emgu.CV.CvEnum
c. Emgu.CV.Structure
d. Emgu.CV.Util
e. Emgu.CV.UI

6.3 Classes

ii. Blob Class

We use the blob algorithm as blob class in our project. This class function use with emguCv for people detection in a single image or videos

7 Summary and conclusion

We completed our project successfully in all scenarios. Our project is fully functional it detects successfully the people who are even in the groups. It also work on contact type system like in our 1 scenario where we make virtual line to keep the people in queue and if any people try to break the queue he will touch or crossed the virtual line and when line came to touched in any people it will detect this person. The second scenario is counting the person who breaks the queue. The working our software is EmguCv by using the open CV platform in vb.net language.

8 Lessons Learnt and Future Work

We learnt new technologies by developing our project. We don't know about the image processing but we learn it by developing this project. We used emguCv for image processing and its algorithm to detect the blob.

In future we can add some new features like we can apply the face Recognition in it and it will help us to make more secure our event like then we don't need to count the people to know how many people are presents although we would be able to do it by face recognition.

9 Bibliography

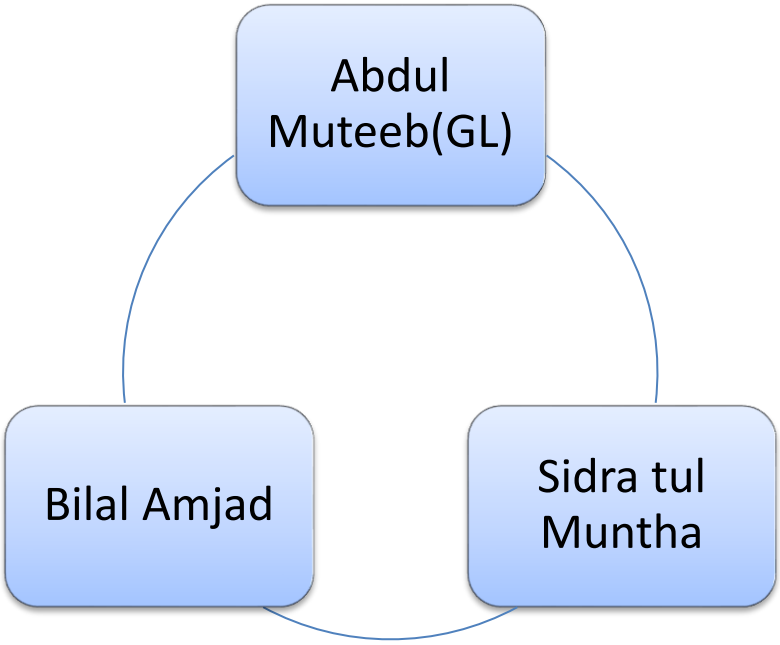
We learnt new technologies by developing our project. We don't know about the image processing but we learn it by developing this project. We used emguCv for image processing and its algorithm to detect the blob.

In future we can add some new features like we can apply the face Recognition in it and it will help us to make more secure our event like then we don't need to count the people to know how many people are presents although we would be able to do it by face recognition.

Appendix A

1. Project Management Document

a. Team Structure



b. Rule & Responsibilities

- **Andul Muteeb : Group leader**

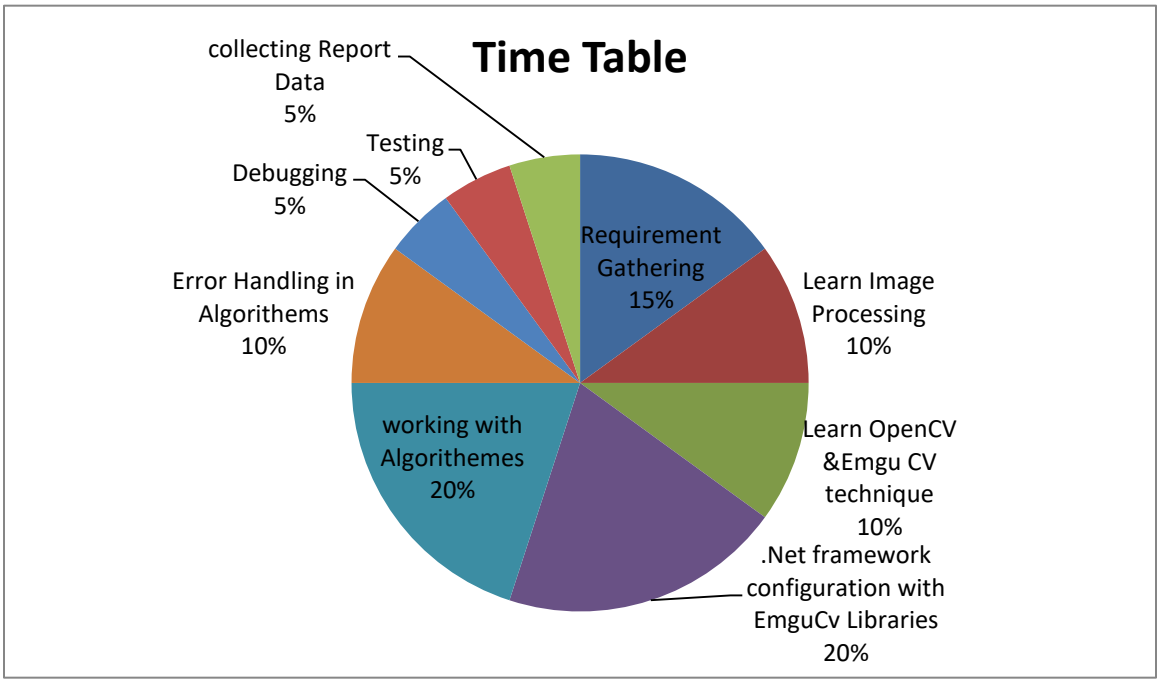
He work in developing the software and he also work in research department.as well documentation and also keep eye on other member work

- **Bilal Amjad:**

He worked in development and research department according to tasks and also on documentation

- **Sidra tul Muntha:**

She work in research as well as she work in development like setting the user interface and also work on documentation.


Time Table
collecting Report Data 5%
Testing 5%
Debugging 5%
Error Handling in Algorithems 10%
working with Algorithemes 20%
.Net framework configuration with EmguCv Libraries 20%
Learn OpenCV &Emgu CV technique 10%
Learn Image Processing 10%
Requirement Gathering 15%