

Real-Time Vehicle Speed Detection Based On Video Image:

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This Report Presented in Partial Fulfillment of the Requirements for the
Degree of Bachelor of Science in Computer Science and Engineering

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DAFFODIL INTERNATIONAL UNIVERSITY

DHAKA, BANGLADESH

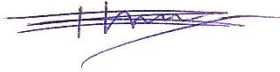
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APPROVAL

This Project/internship titled “**Real-Time Vehicle Speed Detection Based On Video Image**”, submitted by Khondokar Abdur Rahman Rafsan, ID No: 173-15-10365, Ananya Afrin, ID No: 173-15-10273 and Nusrat Jahan Choudhury, ID No: 173-15-10270 to the Department of Computer Science and Engineering, Daffodil International University has been accepted as satisfactory for the partial fulfillment of the requirements for the degree of B.Sc. in Computer Science and Engineering and approved as to its style and contents. The presentation has been held on 09-09-2021.

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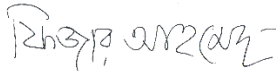
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DECLARATION

We hereby declare that, this project has been done by us under the supervision of **Nusrat Jahan, Lecturer (Senior Scale), Department of CSE** Daffodil International University.

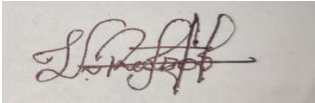
We also declare that neither this project nor any part of this project has been submitted elsewhere for award of any degree or diploma.

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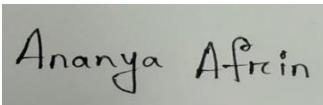
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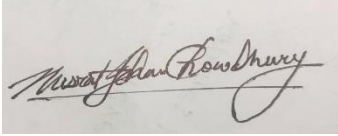
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ABSTRACT

In this Study, we try to make a system who can detect over speed. The most challenging part is detecting the over speed and find out the information of drive properly. In our country we can see that every day about 20 people killed by road accident in Dhaka. We research the main reason for road accident and at last we get the reason. Over speed is the main reason for accident. Young generation people use cars and motor cycle and most of the people dive those vehicles on over speed.

If we can detect the over speeding vehicles and tress them then we can take an action against them.

The overall project is dividend in two categories, at first we detect the over speeding vehicles and second step we find out the driver information by using image processing technique.

TABLE OF CONTENTS

CONTENTS	PAGE
Approval page	ii
Declaration	iv
Acknowledgements	v
Abstract	vi
CHAPTER	
CHAPTER 1: INTRODUCTION	1-4
1.1 Introduction	1
1.2 Motivation	2
1.3 Rational of the study	3
1.4 Research questions	3
1.5 Expected output	3
1.6 Project management and finance	4
1.7 Report layout	4

CHAPTER 2: BACKGROUND	5-9
2.1 Terminologies	5
2.2 Related works	5
2.3 Comparative analysis and summary	8
2.4 Scope of the problem	8
2.5 Challenges	9
CHAPTER 3: RESEARCH METHODOLOGY	10-19
3.1 Research subject and instrumentation	10
3.2 Data collection procedure	10
3.3 Statistical Analysis	11
3.4 Proposed methodology	12
3.5 Implementation requirements	19
CHAPTER 4: EXPERIMENTAL RESULT AND DISCUSSION	20-22
4.1 Experimental setup	20
4.2 Experimental result and analysis	20
4.3 Discussion	22

CHAPTER 5: IPMACT ON SOCIETY, ENVIRONMENT AND SUSTAINABILITY	23-24
5.1 Impact on society	23
5.2 Impact on environment	23
5.3 Ethical aspects	23
5.4 Sustainability plan	24
CHAPTER 6: SUMMARY, CONCLUSION, RECOMMENDATION AND IMPLEMENTATION FOR FUTURE RESEARCH	25-25
6.1 Summary of the study	25
6.2 Conclusions	25
6.3 Implementation for further work	25
REFFERENCES	26-27
PLAGIRISM REPORT	28-28

LIST OF TABLES:

1.1 National statistics trends on road accidents	2
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LIST OF DIAGRAMS:

2.1 Workflow diagram	18
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LIST OF FEAGURES:

1.1 Calculation	10
1.2 Some Library functions	11
1.3 Detect estimated speed	12
1.4 Coding part of tracking multiple objects	12
1.5 Create rectangle shape	13
1.6 Rectangle shape for an object	13
1.7 Define Vehicles x, y, height, weight position	14
1.8 Number plate giveaway	14
1.9 Over speed detection	15
2.1 Over speed list	16
2.2 Speed detection with defined number	20
2.3 Input video before speed detection	20
2.4 Output video after speed detection with defined vehicles number	21

CHAPTER 1

INTRODUCTION

1.1 Introduction

In developing nations like Bangladesh is a country with a huge population. The numbers of growth rate of vehicles are increasing day by day. Accident is a common fact for our country. About 1.2 million people are being killed also about 50 million peoples being injured in road accident in our country. Most of the accident happens for driving vehicles too much fast. Over speed is the main reason for road accident. Our peoples are not aware about their life. They think time and money is everything in their life. They forget about their family and friend. We try to make a system by over speed detection and getting driver information by image processing system. We have try to note down in this paper the relation for this issues. The process is simple that when our system detects the over speed then we track that vehicles by image processing. Then we find out the owner's information by detecting number plate of that car. In this paper we cannot use AI system that's why we give a string value for each vehicles. This project workable for every time in our IDE. We have completed the whole paper work by using open-cv python.

1.1.1 Objective

Now, this is the time of wonders of modern science. We are trying to develop each and every sector in our society. Our main objective is maintaining vehicles over speed in road and when this happened that time we can detect the driver. Our full project is based on image processing technique and some algorithm. Not only detect the driver but also we can watch the drivers all information in our database. We can describe our goals in the short list like this:

- At first our system detects all moving objects.
- Detect the over speeding of vehicles.
- Then detect the number of vehicles
- Store those data in a database.
- Able to see all information of driver who derived the vehicles on over speed in road.

1.2 Motivation

In this thesis, we are trying to improve the over speed detection system and find out the vehicle owner. Real life effect of this over speed is losing our valuable life for without any reason. Based on statistics 20 people killed every day on average in road accidents in 2020 in our country (Bangladesh). Time is too much important but life is more than time. People want to save their time by using over speed but they forget about that over speed is the main reason for road accident. If we detect them then we could take action against them and next time they will realize. We cannot use artificial intelligence in our project because it's a huge work. At first we think about that and then we realize time is too short but work is too long. Then we decided to make a system which can detect frame per second (fps) in video and by calculating the distance of pixels which can detect the moving object in video. Also we can store the information who is passing by over speed on vehicles. At the last we want to give a message that life is a beautiful gift by god. We look at the national statistics trends on road accidents which is given below:

<i>Year</i>	<i>Accidents</i>	<i>Fatalities</i>	<i>Serious injuries</i>	<i>Light injuries</i>
<i>2001-2002</i>	3823	879	458	4138
<i>2002-2003</i>	3864	682	785	4442
<i>2003-2004</i>	5430	802	1659	3925
<i>2004-2005</i>	5532	808	1795	4039
<i>2005-2006</i>	3894	825	1866	3655
<i>2006-2007</i>	4546	953	2583	5331
<i>2007-2008</i>	6821	1131	2663	5245
<i>2008-2009</i>	8353	1356	3609	6457
<i>2009-2010</i>	11747	1734	4130	7383
<i>Sum</i>	54010	9170	19548	44615

Table 1.1 National statistics trends on road accidents

1.3 Rational of the study

There was a lots of problems in our project but one of the biggest problem was its not workable for all video. In this project we calculate the distance of between two pixels and counting frame per second (fps). Sometimes many videos don't work as an input. Then we try different kind of algorithms and at least we able to do this project.

We cannot use artificial intelligence in our project for short time. We try to study more and more papers for a unique idea. We observed that many people using artificial intelligence on their project. Then we decided to make this system.

1.4 Research questions

It was too much challenging for us to complete this whole work. At first we cannot expect that we can complete the project. Because the expected outcome is the most important part of any project. In the beginning we face many kind of problems like team work. Every person has their own opinion. Then we discuss with each other and we got strength. Basic questions for our challenging project is given below:

- Does out system detect the speed properly for every moving object?
- Does every video workable for input?
- Is it possible to collect huge data?
- Is our expected outcome accurate?

1.5 Expected output

Expected outcome is a one kind of statement which describe what we expect from this work or we can say what we achieve from this project. In this section there are few focuses. Our main focus on this research base project is controlling the vehicles over speed. The expected outcome is the main strength of our research. If we talk about the result of our project, it's not too much powerful but it's quite interested. Expected outcome is the most important part on a research base project or project too.

- i. At first we detect all the moving objects in a video.
- ii. In the video a sensor detects the speed of moving objects like vehicles.
- iii. At a same time, we can watch the speed of that vehicles on the video.
- iv. We store all the data who drove the vehicles on vehicles.

1.6 Project management and finance

If we talk about finance, government can apply this system on everywhere. This is project about road safety. And if government want they could develop this. Government can apply this project for road safety and that's why they will pay for this project. Otherwise if anyone want to like this project for their personal work they also can buy this project. And this system is very easy to handle. Just need to input an input video.

1.7 Report layout

If we talk about chapter one, then in chapter one has illustrated basic thing such as introduction, objective, motivation, rational of the study, expected outcome, research question etc. Here we briefly discuss about our expected outcome which means what we want from this project. After this which type of questions we face from this project.

In chapter two we describe about a basic introduction about chapter two. After this we added some related works. In related work section we shortly describe about the same topics which has been done before. After this we talk about research summary and challenges.

In chapter three which is research methodology is the main chapter of this project. In this section we describe how's work our system. In this section we describe about working the procedure of this project. We also show some features and diagrams for realize the project properly.

Chapter four is the experimental result and discussion. In this part we talk about our output of this project and also we show the accuracy level of our project. We use multiple input that's why we have different kind of result and we briefly discuss about it.

In the conclusion section which is the last chapter of our project we discuss about what we learn from this project and the summary of this project. This section is dependable to appear the full venture report following to suggestion. We also talk about the future of this project.

CHAPTER 2

BACKGROUND

2.1 Terminologies

In this sector we will discuss about similar works which means related works, summary's and difficulties of this project. In similar work section we will discuss about same type of work like their work, their project, their methodology etc. If we talk about next section which is research summary section, we will give our project summary of our related projects. In challenges section we will discuss about our problems and the accuracy level day by day.

2.2 Related works

Manipriya Vutturi et.al [1] presented a device which can Automatic detect Speed and Reporting System. For this project they used Arduino with 5 volts' power. They use Infra-Red (IR) sensors for detection vehicles. The main theme is calculating the speed of vehicles. This project mainly used as sport check, to control over speed near prohibited areas. The system accumulates information of moving objects displaying on LCD display and when over speed occurs then it alert by giving buzzers.

In this paper Sathiskumar S et.al [2] try to reduce over speed control in a restricted zone. The whole system is being controlled by the Arduino Uno. They used this Arduino Uno because of higher processing speeds and powerful ability to handle multiple input and output result at the same time. They used here ZigBee transmitter. The system works between 10-100m. Here multiple device is combined to monitor. Cars current speed sensed by the dc motor and output given.

Koustubh Deshmukh et.al [3] make a system which can control speed, smart transportation, road safety and less accident happens. Embedded and radio frequency are the main base of this project. They used here transmitter for signal detection. Then the received signal will have decoded by using microcontroller. They also used here LCD display and ECU technique.

Chan Chia Yik [4] proposed a system which can detect the over speed. In this project he doesn't use any components. He tries to make a system which can detect moving objects

by image processing system. He tries to say that radar is used in every place for vehicle detection and that's too much costly. But image processing system is low cost and helpful. His system consists 4 major steps which are 1) image acquisition 2) image background subtraction 3) location detection 4) speed estimation.

Lae Yin Mon et.al [5] made a technique by using Arduino Uno which can detect the vehicles over speed. He said that by using this system police can easily check the over speed. In this project he used two IR sensors (MD-0138 Infrared Obstacle Avoidance Sensor). We can watch the detected speed in 1602A LCD display. When over speed occurs then a buzzer is alarmed. The main things are, two sensors detect the over speed and we can watch the vehicles speed on a LCD display and a buzzer is alarmed.

Eithar ABD Alslam Mohammed Ahmed [6] works on a system which is related over speed control. He told that his project proposed a modern and responsive methodology for detect the vehicles over speed. He used in this project GPS module for speed measurement and track the location. For the processing and controlling he used raspberry PI. Sending infractions to authority's web server by GSM module. The system alerts the driver when he arrived on over speed.

Samkit Patira [7] completed his full project by using the area of computer vision and Artificial intelligence. He used the object detection algorithm which name is Yolo. He also experimented with transfer learning that's why he trained the model. The main experimental parts were 1. Loss function 2. Transfer learning 3. Changing the number of convolution layers 4. Different batch sizes. For predict the correct speed sign reading he used different kind of approaches which are: Based on frequency, car speed, Gaussian distribution.

Sulaiman Khan et.al [8] also works on this topic. He completes an intelligence system which can monetarize the vehicle over speed on highway. He used a HD (high definition) camera. He proposed to setup the camera on road side or on a pole because the vehicles can be tracked by using a technique which name is radius growing. Then it's can have calculated the vehicles speed by calculating vehicles mask and its displacement in consecutive frame. Nothing else this is the image processing technique and we already know about it.

Abdul Gader Ramadan Gadah [9] published a paper where he works on vehicles speed measurement by using image processing. In this project he used video real time detection of vehicles. Whole process is completed by distance measurement in video. He set seed in three bands based on their value which are: 1) slow 2) medium 3) fast.

Sumit Deshpande et.al [10] completed his project on implementing a system to detect over speed. He used some components on this project. They are 1) Speed Sensor 2)

Bluetooth Module 3) ARDUINO MEGA 4) Motor Driver 5) Raspberry PI 6) Motor attached to the wheel 7) Number Plate on the vehicle. And he also used a) The Vehicle b) Camera with resolution 720p for this project. He divided the whole project in two part. Part one is detect the speed of vehicles and the second part is capturing images by camera.

In this paper D.Dharini et.al [11] said about a project which can measure vehicles speed. He used Raspberry Pi on his project. Basically this is project of image processing system. And they input an input video for start the process then after all process he got the output which is vehicles speed.

Tingting huang [12] completed his project on tracking multiple car and detect the over speed. In his project he used surveillance video data and an algorithm detect all the moving object. Then a histogram comparison is applied to link objects across frames. He got the output result from counting pixel domain to the real world. It's the image processing system and we know about this system very well. And after his project he said that he will develop this project in future.

Aiswarya Mechery et.al [13] researched a paper based on detect the over speed and vehicles number plate. They used image processing on their system. In their project at first they talk about image segmentation. Two algorithms are used in this system. First one is Harris corner detection algorithm and filtering algorithm is the second one. They also used Doppler effect on their project.

Muazzam Ali et.al [14] also work on the same topic. Microcontroller 8051 is the heart of this system. They used AT89S52 and this is the CMOS version of 8051 microcontrollers. Its internal flash memory size was 8kbytes. They used here infrared sensor for speed detection on their project. They also used SMS functioning. In this case they used GSM module SIM900A. They also used a display for the messages. The message module was only two lines. Per line has 16 characters.

May Zin Tun et.al [15] wrote a thesis paper with project about Speed detection system. They used here Doppler Radar (HB100) on their project. Because its provide a velocity output. Sensor and microcontroller used for calculate the speed on their project. Other main components for their project are Arduino Uno, LCD display and last one LM324. In This project they used C++ language.

2.3 Comparative analysis and summary

In our short project we use cv2 which is Open CV for image processing. Also we use dlib for tracking vehicles. Then we take a function which can measurement the distance between two pixels. Then in main function we are tracking multiple objects at a time. In this case first we Started the time and calculate an object displacement at a fix time. Then by detecting every car we set a vehicles number for each vehicles and at a same time we removed the multiple duplicate vehicles number.

Then for each and every tracked vehicles number we set a rectangle shape. Then we can watch it in a string. Then we check the vehicles speed in our project. After this we shorted the list and again delete the duplicate items from the list. Then we created a file and we compared between vehicles id. In final file we can watch vehicles id, speed, first name, last name, NID card, Phone number etc.

We can shortly describe that at first we calculate the distance between two pixels and then we tracking multiple objects. Then we measurement the displacement of an objects. After this we set vehicle id for every vehicle. We create a rectangle shape on every object. After deleting duplicate values, we can watch details in a file.

Some calculations are given below:

```
d_pixels = math.sqrt(math.pow(location2[0] - location1[0], 2) + math.pow(location2[1] - location1[1], 2))
```

```
ppm = 8.8
```

```
d_meters = d_pixels / ppm
```

```
fps = 18
```

```
speed = d_meters * fps * 3.6
```

In this section we calculate the distance between two pixels and also by calculating we get the vehicles speed.

2.4 Scope of the problem

Problem is a part of the life. In every section we have problem and we need to struggle. For completing this project also, we face some problem which are really discourage us. The main problem is input video section. We cannot record input videos by going outside because of the Covid situation. And also we cannot find enough video for input.

2.5 Challenges

Most challenging thing in our project are detecting multiple object at a same time and number plate detection of vehicles. We cannot use here AI (artificial intelligence) because of short time. That's why vehicles number plate detection was a tough though for us. That's why we need to though different way to solve this project. Then we discuss each other and we get a new idea for this. We though when we detect a moving object in our system that time we give an id number for that moving object.

Another big problem was input video section. Some of video was not working in our system because every video has not the same fps (frame per second). Every video has different kind of frame per second like 30fps, 60fps, 120fps.

Another challenging part of our project is video regulation. When the video regulation is too much like 1080p then we face the system is working little bit slower. We waited so much with keep patience and finally got the output form this project and after all we did it.

There was a lot of papers on internet about this topic. We keep patience and try to read those project ideas and working procedure and feel motivated that everyone done their own work and we also can do this.

CHAPTER 3

RESEARCH METHODOLOGY

Introduction:

In this area we are going to discuss about working procedure of our main approach to classify over speed detection. There are many kind of key point like processing, work flow, method, chart, table, code, mathematical calculation, diagram etc. This is the main part of our project. In this sector we will know how to work our system and we will know details about our project.

3.1 Research subject and instrumentation:

Different kind of subject can be called investigation or experimentation area that was inquiry for cleaning any idea or concept. It's not an implementation on the other hand also have design the model, implementation, process, test etc. But if we think the another side then we have instruments and that's the technology and process or method we used. We used in our project many several software and system. We used windows 10 platform for our project. Also we use python language, and many packages of python like dlib open cv etc. At first we setup python environment on our pc (personal computer) and we also use open cv because it's an online open source but the interesting matter is it's totally free. We also use visual studio code in our project which is a heavy software.

3.2 Data collection procedure:

In our project we try to collect data from internet. We cannot go outside of home because of COVID situation. That's why we try to recover our project by the help of internet. We want to make some real video footage for our project. Because we need to input video for run our project. Then we collect some videos from YouTube.

We used two input video for complete our project. And we are hopeful any kind of video (like our input one) will be worked in our system. Another thing is we read too many papers for completing our project. More than twenty papers we completely read for complete our whole project.

3.3 Statistical analysis:

In this project we followed the time consume section. We calculate the run time that means after input a video how much time to solve the problem. Actually the output result depends on input video because we cannot use artificial intelligence system on our project.

```
ppm = 8.8
d_meters = d_pixels / ppm
#print("d_pixels=" + str(d_pixels), "d_meters=" + str(d_meters))
fps = 18
speed = d_meters * fps * 3.6
return speed
```

Figure 1.1 calculation

In this figure we pointed the calculation equation for calculating the distance between two pixels.

Also for calculating frame per second we decreased the frame per second. That's why the output video duration will increased. In this way we can collect all the information of vehicles.

3.4 Proposed methodology:

In this section we use a working flow for well understanding our project. We will describe step by step in this section.

3.4.1 Library function:

At first we import some library function for multiple work in our project. If we talk about which kind of library function, then we can say that “dlib” for vehicles tracking, “cv2” open cv for image processing, “math” for calculation on our project and other some of the important library function.

```
import cv2
import dlib
import time
import threading
import math
import csv
import collections
import uuid
```

Figure 1.2 Some Library functions

3.4.2 Detect estimated speed:

On this step we use “def estimate_speed” function. Its detect the estimated speed of vehicles on our project. Its works by using some law and calculate the distance between two pixels. Then we divide that by pixel per meter and multiply by fps. We got the speed of the vehicles on our project like this procedure.

```

def estimateSpeed(location1, location2):
    # sqrt((x1 - x2) + (y1 - y2))
    d_pixels = math.sqrt(math.pow(location2[0] - location1[0], 2) + math.pow(location2[1] - location1[1], 2))
    # ppm = location2[2] / carWidtht
    # pixels per meter
    ppm = 8.8
    d_meters = d_pixels / ppm
    #print("d_pixels=" + str(d_pixels), "d_meters=" + str(d_meters))
    fps = 18
    speed = d_meters * fps * 3.6
    return speed

```

Figure 1.3 Detect estimated speed

3.4.3 Tracking multiple objects:

After previous work then we took the main function of our project which work is detect multiple objects. On this stage we pre define some variables and dictionaries. Then we start the time and calculate the displacement of all moving object base on time. We already defined the height and weight at first of our project.

```

def trackMultipleObjects():
    rectangleColor = (0, 255, 0)
    frameCounter = 0
    currentCarID = 0
    fps = 0

    carTracker = {}
    carNumbers = {}
    carLocation1 = {}
    carLocation2 = {}
    overSpeedList = {} # over speed list
    speed = [None] * 1000

    # Write output to video file
    out = cv2.VideoWriter('outpy.avi',cv2.VideoWriter_fourcc('M','J','P','G'), 10, (WIDTH,HEIGHT))

    while True:
        start_time = time.time()
        rc, image = video.read()
        if type(image) == type(None):
            break

        image = cv2.resize(image, (WIDTH, HEIGHT))
        resultImage = image.copy()

        frameCounter = frameCounter + 1

        carIDToDelete = []

```

Figure 1.4 Coding part of tracking multiple objects

3.4.4 Creating rectangle shape and define unique id:

Previous step we got all the moving objects like vehicles. On this stage we define a track id which means number for every car. At first of our research we already told that we could not use AI (artificial intelligence) system on our project that's why we cannot detect the number plate from image. That's why we define a unique string for every vehicle on our project.

```
for carID in carTracker.keys():
    trackingQuality = carTracker[carID].update(image)

    if trackingQuality < 7:
        carIDtoDelete.append(carID)

for carID in carIDtoDelete:
    # print ('Removing carID ' + str(carID) + ' from list of trackers.')
    # print ('Removing carID ' + str(carID) + ' previous location.')
    # print ('Removing carID ' + str(carID) + ' current location.')
    carTracker.pop(carID, None)
    carLocation1.pop(carID, None)
    carLocation2.pop(carID, None)
```

Figure 1.5 Create rectangle shape



Figure 1.6 Rectangle shape for an object

After those work we define every vehicles height, weight, x and y point string by calculating. And we defined all information on a list. Then we give a track id based on rectangle shape of vehicles.


```

for (_x, _y, _w, _h) in cars:
    x = int(_x)
    y = int(_y)
    w = int(_w)
    h = int(_h)

    x_bar = x + 0.5 * w
    y_bar = y + 0.5 * h

    matchCarID = None

```

Figure 1.7 Define Vehicles x, y, height, weight position

3.4.5 Random number plate:

On previous step we already tracked vehicles and then we created rectangle shape form vehicles number. Then we visible that rectangle on a string. Then its create a random number plate and show as a string by using “put_text”.

```

if matchCarID is None:
    # print ('Creating new tracker ' + str(currentCarID))

    tracker = dlib.correlation_tracker()
    tracker.start_track(image, dlib.rectangle(x, y, x + w, y + h))

    carTracker[currentCarID] = tracker
    carLocation1[currentCarID] = [x, y, w, h]

    currentCarID += 1
    # currentCarID = getCarId()

cv2.line(resultImage, (0,480), (1280,480), (255,0,0),1)
cv2.line(resultImage, (0,270), (1280,270), (255,0,0),1)

```

Figure 1.8 Number plate giveaway

3.4.6 Over speed detection:

We got the estimated speed and we also check the max speed or top speed on this stage. When we detect the over speed of any vehicles then we store that vehicles data on a list which name is “over speed list”.

```
for i in carLocation1.keys():
    if frameCounter % 1 == 0:
        [x1, y1, w1, h1] = carLocation1[i]
        [x2, y2, w2, h2] = carLocation2[i]

        # print 'previous location: ' + str(carLocation1[i]) + ', current location: ' + str(carLocation2[i])
        carLocation1[i] = [x2, y2, w2, h2]

        # print 'new previous location: ' + str(carLocation1[i])
        if [x1, y1, w1, h1] != [x2, y2, w2, h2]:
            if (speed[i] == None or speed[i] == 0) and y1 >= 275 and y1 <= 285:
                speed[i] = estimateSpeed([x1, y1, w1, h1], [x2, y2, w2, h2])

            #if y1 > 275 and y1 < 285:
            if speed[i] != None and y1 >= 180:
                cv2.putText(resultImage, str(int(speed[i])) + " km/hr", (int(x1 + w1/2), int(y1-5)),cv2.FONT_HERSHEY_SIMPLEX, 0.7)
                # Over Speed car check
                if speed[i] > MAX_SPEED:
                    overSpeedList[i] = speed[i]
```

Figure 1.9 Over speed detection

3.4.7 Remove duplicate:

On this stage we shorted the list and removed the duplicate items on our system.

3.4.8 Final list create:

This is the last stage of our project and on this stage we create a file and after this we compared that with vehicles id. After this we write those in a file. And the file is the list of over speed list. And on that list we define vehicles id, first name, last name, top speed, national id number, phone number etc.

This is the file where we can find the over speeded drivers information. By detecting them we can take action against them. In this way we can get an idle environment on the road.

```

overspeed_userInfo.csv
1 CarId,Speed,FirstName,LastName,NID,Phone
2
3 "86bbf287, 75.09465101836645",Tripty,Fardin,33347982,017 68942132
4
5 "735f6b36, 73.63636363636364",Tazy Farzana,fahim,23677877,017 80333778
6
7 "75aa2def, 65.86236588272106",eblehe,SIAM,12256372,017 80833778
8
9 "e77c4126, 82.32795735340135",ririko,Rakib,14233627,013 88794139
10
11 "5f77ef16, 67.88937282188397",Srayoshi,Tasfin,56884634,013 18173375
12
13 "e3729046, 66.27272727272728",Fariha,Abir,11260132,019 20432014
14
15 "659e0446, 76.87862065652314",Sanjana,mahir,31372555,019 77427874
16
17 "c3b81cf6, 62.914936670065444",Sadia iqbal,Atif,99412329,016 24632535
18
19 "ea3a3dc0, 74.00362957370837",Afroz,Ashik,48122845,016 88036554
20
21 "838e38e2, 67.88937282188397",Rodela,Kibria,55534910,019 46644023
22
23 "413df997, 75.81327649272245",Moriom,Taufiq,22051099,019 75079051
24
25 "f41e681c, 73.63636363636364",Eshita,mehrab,90674174,017 47863103
26
27 "cd64b51e, 81.33402203565164",Muhaiminul,Riad,16893415,015 49203267
28
29 "8ed908c8, 73.63636363636364",Noor,KHAWAJA,77971797,015 20085511
30
31 "25e785cd, 75.09465101836645",Sharmin,Seaam,55718905,013 70346235
32
33 "2057c54b, 63.34439514822297",Munira,ali ashraf,63050928,018 27937266
34
35 "09533852, 73.63636363636364",Labiba,Shams,93612447,014 47829035
36
37 "438b7994, 60.722101031823726",Amatullah,rabi,17434736,015 34661574
38

```

Figure 2.1 Over speed list

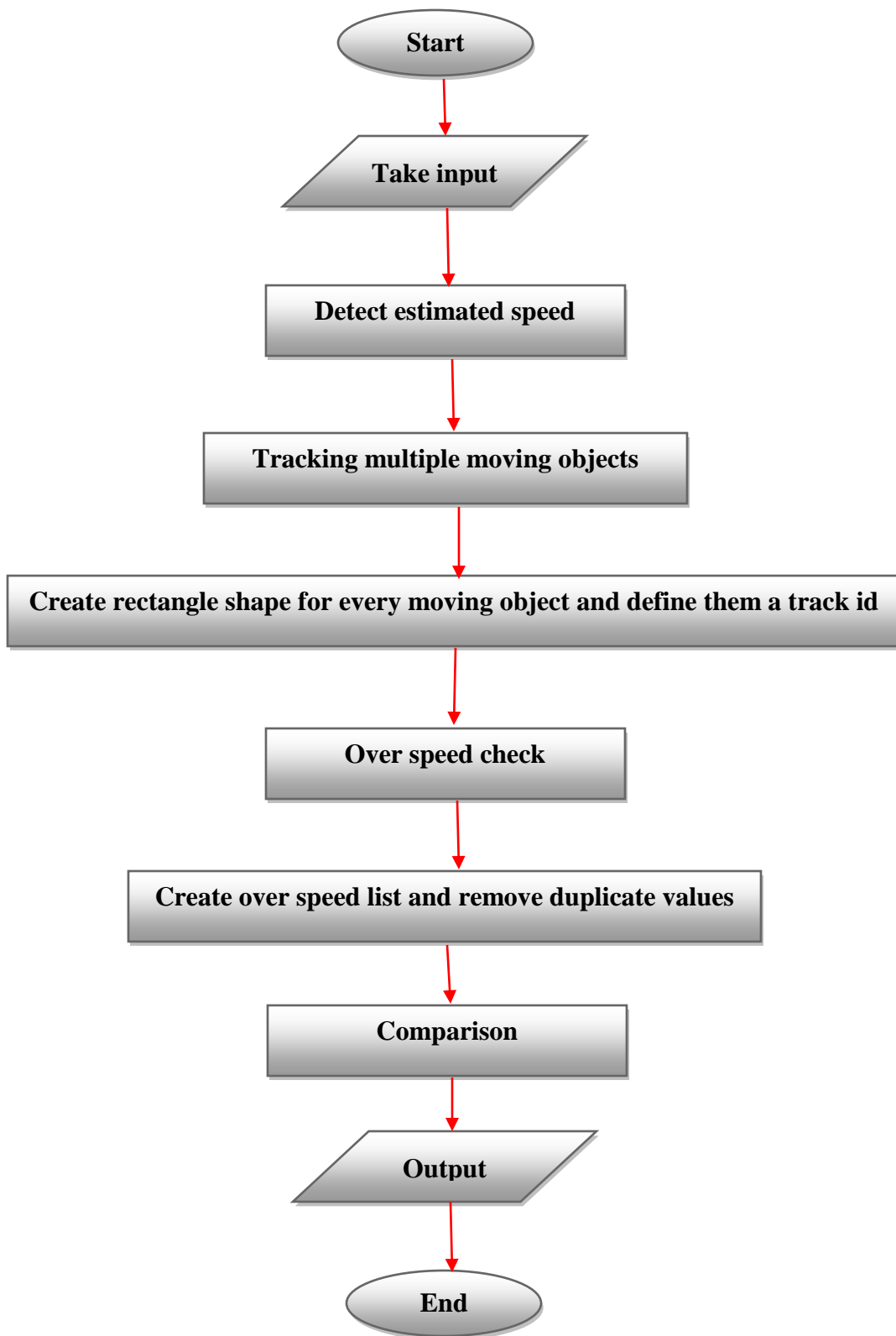


Diagram 1.1 Workflow diagram

3.5 Implementation requirements:

After properly completing this section, a list of requirements has been generated that must be required for complete this project. Our laptop was a little bit slow that's why some times we faced many problems. But we understand about the requirements for run this project properly. And the necessary requirements are given below:

Hardware and software requirements:

1. Operating System (Windows 10)
2. Hard disk (500 Giga Byte or above)
3. Ram (At least 8 gb)

Developing tools:

1. Visual Studio Code
2. Python environment
3. Google Colab

CHAPTER 4

EXPERIMENTAL RESULT AND DISCUSSION

Introduction:

In this area we will discuss about our projects accuracy level and some other topics. How we setup our project and also we will talk about experimental result and analysis data. Also we will explain the input and output result. Another topic is discussion.

4.1 Experimental setup:

At first we collect some input video for this process. Because for this project we must need to input an input video data for process. This project is completed by python open cv. For run this type of project need to setup python environment on the device. Its workable on Microsoft windows laptop or pc (personal computer). After completing the setup of python environment, we need to install some other software like visual studio code.

4.2 Experimental result and analysis:

In our project at first we need to input an input video. Then by calculating the distance between two pixels, we measure the displace of moving object. We use image processing system for this project. And in our project we able to detect all the moving object actually vehicles from the input video. The accuracy level of our project is above 90%. We are able to detect all of the moving vehicles. At the same time, we also try to show the vehicles speed and the vehicles number plate. We are using different method for this because we cannot use artificial intelligence system on our project. The different method is when we detect a moving object then automatically a rectangle shape will track that vehicles. At the same time with tracking we define a number plate no for every car. The workable capacity of our system is completely fine and every time the system gives us the accurate result.

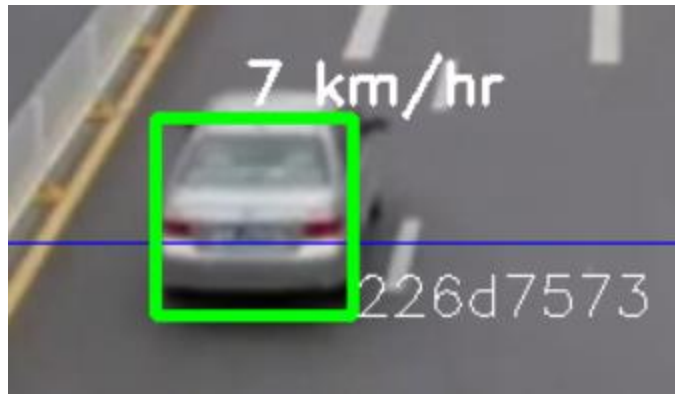


Figure 2.2 Speed detection with defined number



Figure 2.3 Input video before speed detection

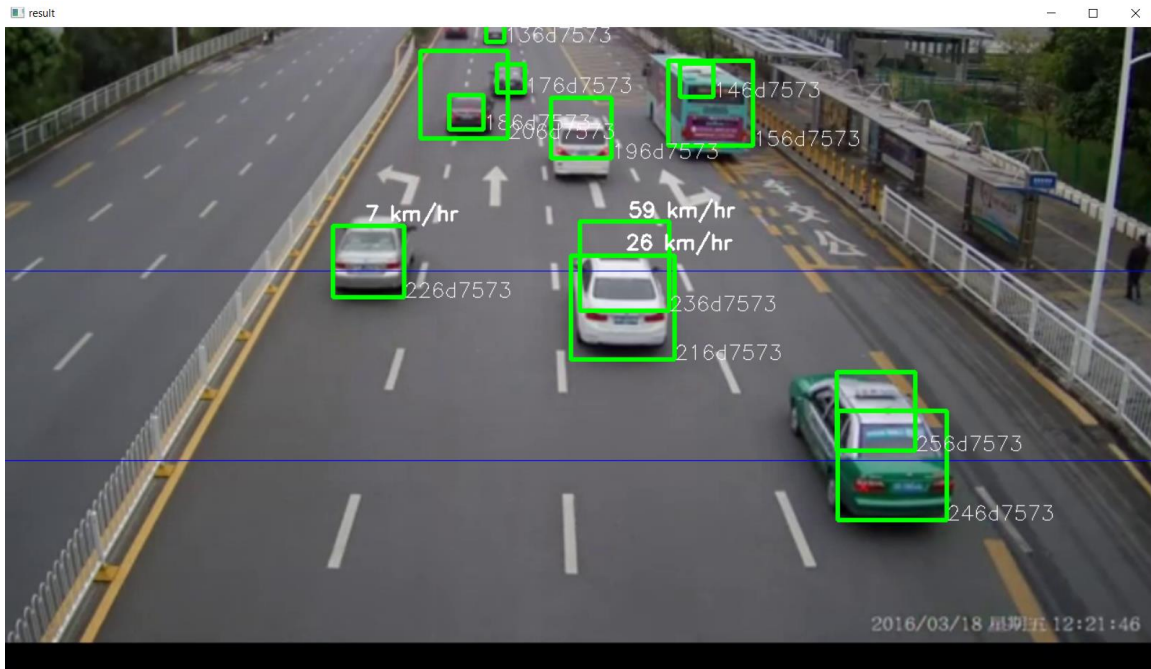


Figure 2.4 Output video after speed detection with defined vehicles number

4.3 Discussion:

On depending overall, the project we can say that the project output is great but we need to upgrade this system by using artificial intelligence. But for this development we need more time. But in future we will do that. But if we talk about this project then it's also different from other project and its runnable with a great condition. The accuracy level also above 90% which is quite impressable. Whatever the project can give us a great experience.

CHAPTER 5

IMPACT ON SOCIETY, ENVIRONMENT AND SUSTAINABILITY

5.1 Impact on society:

Road accident is the one of the most dangerous experience in the world. Who face this once no one does not face this again on his life. Time is important and its never wait for anyone. But life is more important than time. Some of the people forget about this. Over speed is the main reason for road accident. We try to develop a system which can detect the over speed. We also can find the vehicles drivers information too. If we approve this type of system on our society then we think that over speed can be controlled. Something is better than nothing. We know our system is not too much improved but if we decrease at least 5% of them then day by day after developing we recover more than 80% too. We think the impact of our project on society will be good.

5.2 Impact on environment:

Sound pollution is the another big problem in our society. When a people ran his car on over speed that time we face very loud sound too. Not only accident but also we lose the perfect environment. If we controlled the over speed at the same time also we can develop the environment too by decreasing loud sound. Main thing is if we solve one problem on our society then another's problem will be decreased automatically. In this way the society will be a better society and natural environments also will be ok for living peoples.

5.3 Ethical aspects:

In this moment if we talk about ethical aspects then we can talk too many things for this. Because Over speed is very dangerous for us. We forget about this. Life is beautiful gift from Allah. We need to take care about it. Also we need to take care about our family and friend. Not only we destroy our life but also we destroy our family and friend's life. We need to understand everything. By the help of this project we can detect over speed and we can catch those people who broke the rules. If we punished, then by the help of authority then those people learn from their mistake and they can be changed.

5.4 Sustainability plan:

We try to improve our system but perfection has no limit. Every time day by day every system will upgrade. We also try to improve our system day by day for better performance. It is not very easy to achieve goals. But we are still trying to do better. This kind of projects can help us a lot for maintain our natural environment. People who's are not care about then and others, they create problems in society. For catching those people, we need try to develop more and more this kind of projects. We also try to make a system like this for better sustainability.

CHAPTER 6

SUMMARY, CONCLUSION, RECOMMENDATION AND IMPLEMENTATION FOR FUTURE RESEARCH

6.1 Summary of the study:

There is no confusion that there are a lots of research on this topic. Also there are some research which are really awesome than us. But we also try to do something different in a lower cost. Some of the research and project are too much expensive and need too much components. It's very difficult for our country because our country is not too much developing like those countries. That's why we try to do in this way. And for more perfect calculation this project will too much improve. We collect many kind of information from internet but it's not possible to complete all the part of our whole project to depending on internet.

6.2 Conclusions:

In the conclusion we can say shortly that in this system at first we start our project by doing detect estimated speed and after this we detect all the moving objects displacement by calculating the distance between two pixels. Then we detect the max speed for all moving objects on the video. And we store that information on a list. We cannot detect number plate on video that's why we define random number for every vehicle. We can't do that because for detecting number plate on video we need to use artificial intelligence system. But don't have enough time for that. By the way it's a fantastic chapter of our life for complete this kind of project.

6.3 Implementation for further work:

In this project we used image processing technique and it's not artificial intelligence based. And for this we cannot detect the number plate of vehicles automatically. In future we want to do use which means we try to develop our project by using artificial intelligence system. We know that we need to more improvement on our project because perfection has not limit.

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