

Traffic Recognition System Using Machine Learning Approach

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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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APPROVAL

This Project/internship titled “**Traffic Recognition System Using Machine Learning Approach**”, submitted by **Md. Al Sharid Adnan, Most. Tajmin Akter Liza, Tanmay Biswas**. ID No: **181-15-10940, 181-15-10830, 181-15-11089** 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 02-01-2022.

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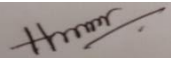
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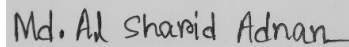
We hereby declare that, this thesis has been done by us under the supervision of **Abdus Sattar, Assistant Professor, Department of CSE** Daffodil International University. We also declare that neither this thesis nor any part of this thesis has been submitted elsewhere for award of any degree or diploma.

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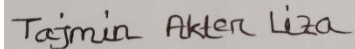


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ABSTRACT

Our paper is about Traffic Recognition System Using Machine Learning approach. The Artificial Intelligence is maintaining a notable development for overcome the gap among the deftness of human being and machine. The advancement of the sector in computers visibility of the dense Learning sector is already established & fine by the time, basically into one great algorithms - a Convolutional Neural Network. Here our purpose to use that CNN algorithm to detect those photo then algorithms be provided that a gorgeous tectonics of structure recognitions like an output. Convolutional Neural Network is one of the great algorithm, this could annex images like an output, apportion value in different various figure from object & could separate one of others. The native fathom for structure it's the best conception beneath CNN. Our research has 93.34% affirmative exactness .This obtainment evolved will aider to a guy & specially a driver to recognize the vehicle from any kind of traffic. Computer vision & object recognition will help people many ways and develop their motive to open an actual earth for living. The range of query is ordain liability.

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CHAPTER 1

INTRODUCTION

1.1 Introduction

Various kinds of vehicles or traffic is a great invention of modern technology. In this era this sector affects our daily life and it is related to our social & economic development. Now we can travel easily far way by using those vehicles, which was not possible in way back. It has many positive sides. But on the other hand we faces some difficulties also for some mismanagement & for having too much traffic on roads. Even it's a major problem of our country as developing. We also need regulation and public safety. To solve that issue we have to monitor & estimation on vehicles. We can use our project theme in CCTV for monitoring in highways, parking process of traffic, vehicles flow controlling depends on road etc. Thinking overall situation we made this type of project by the favor of Convolutional Neural Network and YOLOV3 algorithms.

Traffic detecting is a super instrument for road observances. At the beginning of all that could distribute to the filter a lot of dataset & devour human besides computational work by observed in the field of interest with traffic curriculum. After that pre-trained convolution plan public free. Second fact is, on pre-trained design by urgently convergences in final directed & needed less instances- annotation learn datasets work. Basically they aren't suitable to some scenario. In our project we uses vehicle images for input. We firstly trained that machine around six thousand data of twenty one traffics. In the taking period of image like an input this will show that name and accuracy of that traffic. It working because the data was pre-trained. By taking help from this project everyone can freely know those name of that traffic. This system can even recognize the separates traffic from 1 image.

1.2 Motivation

Now a days, Bangladesh is more connecting with ICT uprising. The progress of our country in this sector of information and communication science is fantastic. But it is a matter of sorrow that hand of ICT in the sector of roads & traffic is very short. Besides, in Bangladesh there are over traffic in cities. That causes traffic jam. For this problem vehicles lost its power & wasting its fuel. There are overtaking tendency, slow moving vehicle, and many accident on the highway. Even we can say it a global problem. We should be more conscios about this term & solve those major facts as soon as possible for our self-security and development. Day by day we are being attracted for the urbanization. Uses of new productive implementation and is still gap in the sector of vehicular congestion. We have to attach more technology in that field if we want to live safely and be progressed. That's why this project focused on the present condition of our country & tried to make extensive change by using Artificial intelligence and image technology. That will support the country to make a nice system for better living.

1.3 Problem Definition

In this modern era AI is a most important part of ICT. Application of Artificial Intelligence helps us to get knowledge. First of all we should find out the problem to solve the main issues and take necessary steps. It's also essential to knowing the government discretion, regulation & I.T company requirement along with that subject methodology to fix AI into this field. Going through a shortest survey on peoples & kids to detect the problem.

1.4 Research Questions

Focuses question of this thesis is given bellow:

- Will we recognize that vehicles which is the name of vehicles we know?
- Do we know that name of those traffic that we noticed around us?
- What is the restriction for work with AI in that field to recognize traffics?

- Do this system can detect the many kinds of traffics in 1 picture?

1.5 Research Methodology

In these section in our thesis paper, we will show those experimental data sets, Data Pertaining, architectural fact of that following model, Rates of learn and the structure of Optimize, Dataset Augmentation processing & Train that model.

1.6 Research Objectives

Here is some special benefit of using Artificial Intelligence in traffic detection. Some of them technic objectives are here:

- Developed a productive model to recognize traffics.
- For inspiring the I.T's developer for works with machine learning approach by use of this model.
- Fulfill those pattern into mobile app & website.

There are the others objective:

- Helped the younger people to find unknown traffics.
- Helping to get huge idea about traffics.
- Help to identify the traffic easily.

1.7 Report Layout

Chapter 1: It will discuss about introductions, motivations, Problem Definitions, Research Questions, and research Methodologies.

Chapter 2: It will discuss about backgrounds of the thesis, the related work & present status bases on Bangladeshi perspective.

Chapter 3: It will tell the methodology of the research.

Chapter 4: It will describe the play of the propose pattern.

Chapter 5: It will denominate the result comparisons.

Chapter 6: It will describes the conclusion of this thesis.

Chapter 7: It will show the reference we used.

CHAPTER 2

BACKGROUND

2.1 Introduction

In Bangladesh there are many kinds of temporary random works about traffic solution. But we are doing a unique project which is not similar like previously done that can perfectly recognize traffic on the roads in our country. That's why the background is the present condition of basically cities way and the uses of Artificial Intelligence in all roads of Bangladesh.

2.2 Related Works

Images processing uses Convolutional Neural Network, for recognize previous to quiet energy for identifying image. Now convolutional object recognize primarily divided in two groups:

- (1) First, Proposal bases
- (2) Secondly, Proposal free

For understanding real times object detection, that proposal free process is alike Yolo. Yolo generally use an individual feed forward convolution networks for detect object class and located direct, that is not required second territory arrangement work. That's why it's extreme swifts.

Researcher trying for recognize the object by use images process and variant algorithm, there some researcher get succeed like this work. Some researcher propose a default system for recognize vehicle on the road by use of computers technique. They uses Convolutional Neural Network processes. In this following task, they uses cameras. Here used a special camera for counting the traffic. For took images here used another cameras. In this function many methods applied to count. They uses time, mix and others relative and appropriates method.

Even acoustics detection is already used. Here designing the pattern to identifying variation. For developing an acoustic detection system, here uses DCNN pre learned on Image. Here completed that trained by Py-Torch utilize Py-Sound-File and librosa-python packages to audios file read & process.

Apurva Sriwastwa presents preprocess image & colors base image segmentations. In that term they transform the images into better qualities, transfer into grayscales & make placement for contrasts.

2.3 Bangladesh Perspective

The development of our country is increasing. Now a days our peoples are moved to urban area from rural life. Neoteric life made our style like machine. For this reason traffics on the cities road is increasing daily. So necessary steps for solution that conflict problem is must. Specifically the patient in ambulance will be benefited from this. Drivers and passengers can reduce their stress. Now we can say that in Bangladesh perspective the following technology will be a great invention.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 Introduction

By took Convolutional Neural Network into company of 21 discordant varsities figure which truck ideal 93.34% exactness.

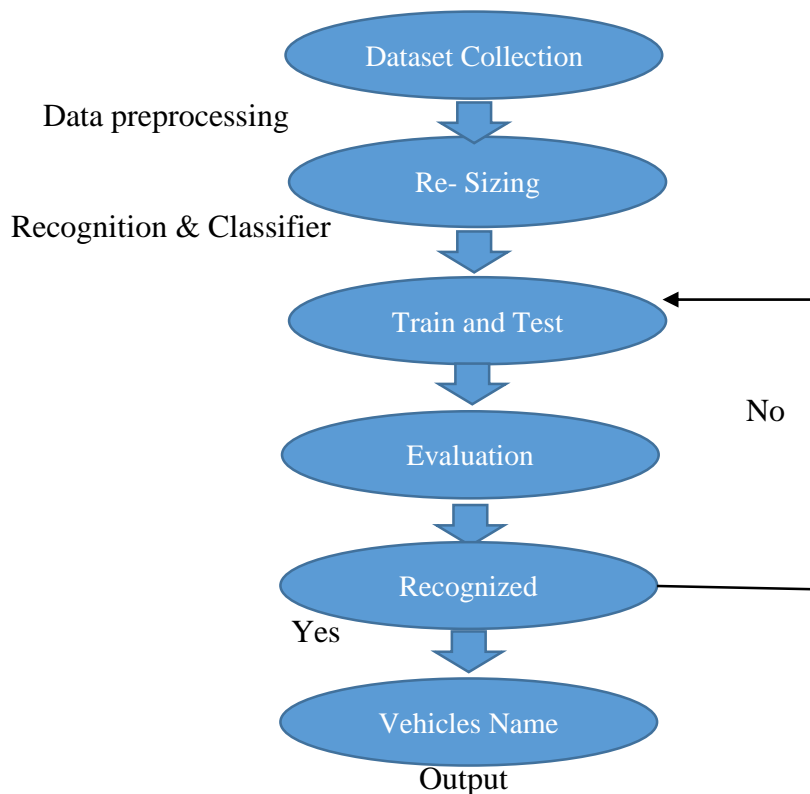


Figure 3.1.1 Process and Data Collection

3.2 Feature Set Test

The following data file number has a big number of square figure & there is twenty one classifications. Maximum of them are taken from real life and others are from different sources. This task was very difficult for us because of last lockdown situation. But we hardly tried our best to complete the task. Those files is generates to carrying out a figure identifications research. Our

data file has almost 6000 figure, around 4500 figures for learn the structure and others are for check the motive or testing of the whole thing. For completing the task here are 21 class. Around 250 to 300 figure has transforms reducing motives and rest of for collecting for check motive of overall categories.



Figure 3.2.1 Dataset Collections

3.3 Pre-Processing Features

The whole dataset which was collected from manually by our hand using camera or mobile phone & rest of from different section was not in same size or resolution. This part of the project was very hard for us, such of pre-trained task, same sizing & regulations. We had to do quad dimension for matching. We make the photo to a fix regulation for 125×125 that from height of the bottom type to the image. At first, we cropped whole figure in variable quad dimension for reducing avoid objects for figure. The required dimension for the crops photo which uses label images in preprocess full fling this figure. We are also adding the statement, our pre learned RGB color models also helped to complete the work.

3.4 Model of the Architecture

Classical of the similar period is plane in distinguishes traffics and there four convolution layer into classical & classical had two fulfill joining layers. Complete joining layer is incorporates into batch normalization, less thick and dropout which is assists into realization classical. At first, Convolutional Neural Network layer that is considering and putting into layer & it kernel sizes was 3 into putting to shape 32×32 for (RGB) colors mode & filter sizes was 32. This layer uses activate into strides and has alike mummify good. This function of that similar period got in real values, after that return that value before and like than got input value which turn into 0.

After that Convolutional Neural Network layer 1 gain goes into which enters into first highest pools layer. Make regions bin highest pools reduce into numerical to parameters and here highest-pool layer containing pool size to into long 2. After this filter sizes was 64 to kernel sizes is three & this stride was 1. This had batch normalization into regularizes this Convolutional Neural Network that is vanish gradient teach and make good performances minimize teach. That's like pool size is 2 to 2.

Layer 3 held 108 filter size which better into kernel sizes, stride & batch normalizes like into similar for number 2. After that three gave output & then output was associating into 3rd pools layers and after that pool sizes, strides are two. After that four has filter sizes 256 which was contains than alike features into similar to 3.

After that four layers, there were two deep layers that representing matrix vector multiplication. In the first deep layers have 256 concealing unit & rest of into activation value.

Addition those layer into model result is became easily and nosy free and adding two whole join deep layer into made best perform to that classified task. There were batch normalizing and dropped into better. After that, that was optimized, which could assists into perform gradient descant and then it is classified problem.

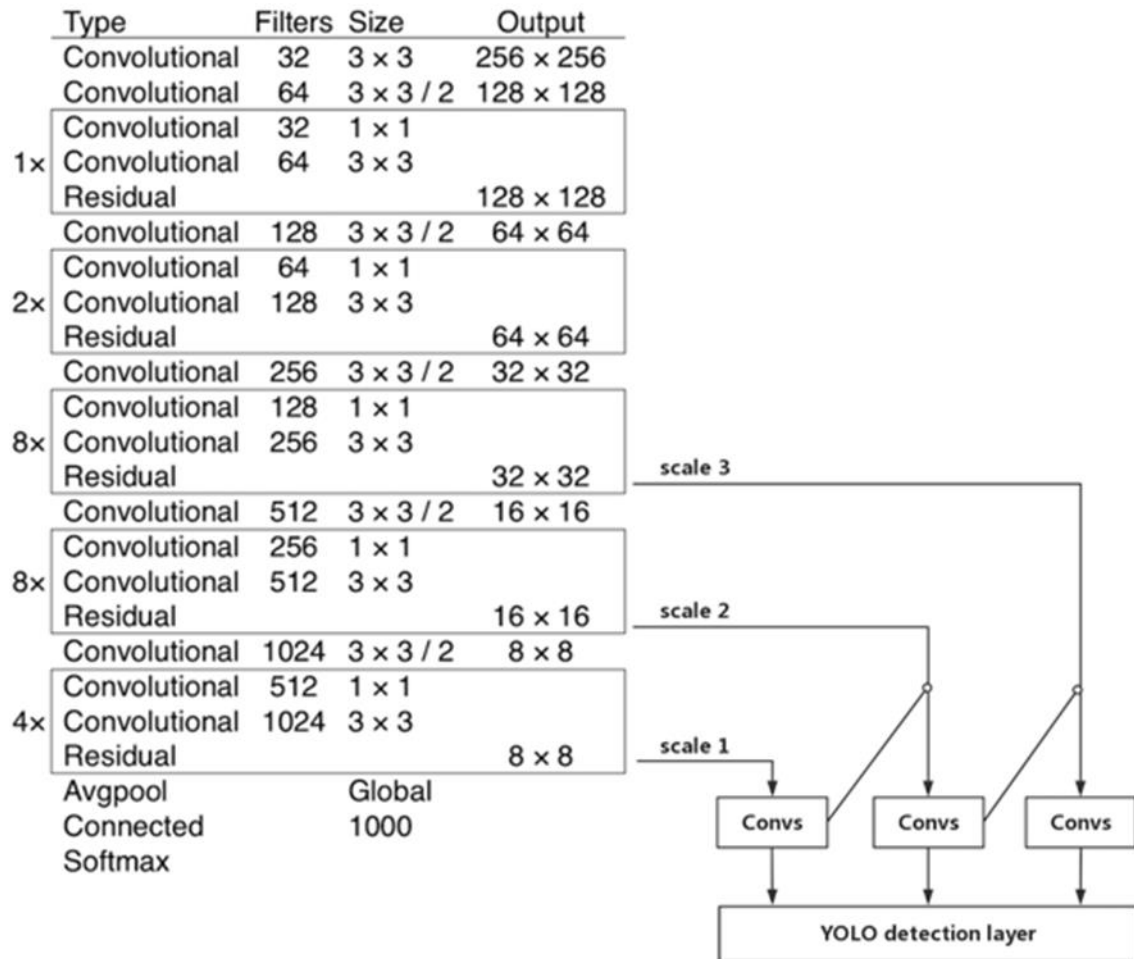


Figure 3.4.1 Model summary of Representation

3.5 Optimizer and Learning rates of the model

Based for trained datasets Adam Optimize 0.011 modernized network weights and made output fastest on starting learned level. For our effective words on paper which modernize this network weights to passes in one iteration into those after iteration [11]. Weight is modernize according into one which one iteration index.

Learning rate performs better for 2x size & 11x modes size alike, which means they do not depend for model size. Focuses learning rate is good moments Hyeres parameter for those model. Those model is to the calculation into whole modernizes to learning rate decay.

Our used short teaching rate reduction 0.01 and turn below that learn rating first reducing errors. Using in called function in called teaching rate that were bearded in Keri. That call function design in made 1 refine classic weight in reducing that teaching rate in the same time Classic stop improve.

3.6 Data Annotations

Firstly annotating our learned and checked data for label in the similar period that bolted range is maximum matching. Data annotations is a process where we add Meta data into data set. This Meta data generally took the forms of tagging that could be add for different kind of dataset include texting, image, & videos.



Figure 3.6.1 Data Annotations

3.7 Training that model

Testing is carried ways into four complex layer & two fullest connected layers. In that similar period training the model into specific vehicles data set which given better showings. Batch size 30 was used into 60 spanning. After that structure achieved great fitting exactness in the similar period learning precisions 93.34% & checking precisions 91.33%. That destination size to figures 32× 32 that pairs for teaching and checking. That wind model that is used here cannot recognize figures that one by one level winning dissimilarly classes was predicts the class into the figure exactly.

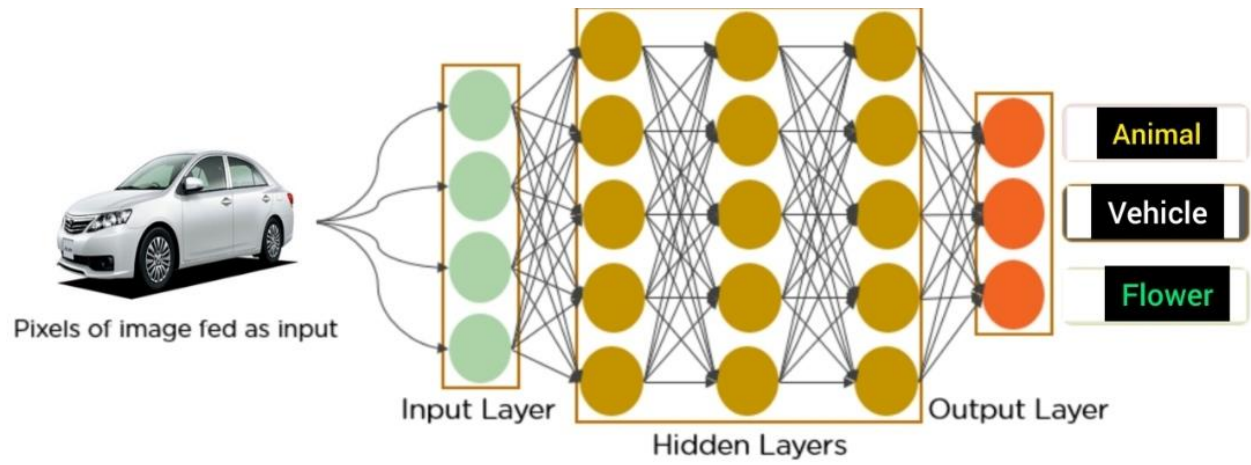


Figure 3.7.1: Convolutional Neural Network layer

CHAPTER 4

PERFORMANCE OF THE PROPOSED MODEL

4.1 Testing, Training & Validation of the following Data Model

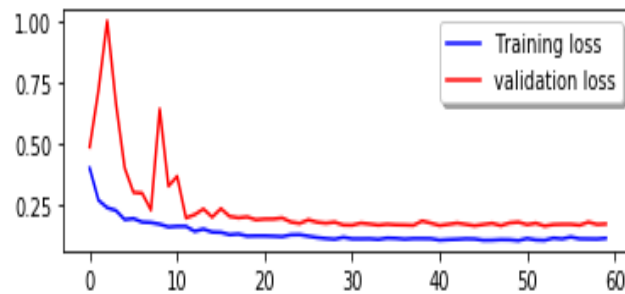
In this section we differentiated trained, tested and validations data's out of given photos. The amount of photos was six thousand. There 5500 data's from photos are for training section and rest of around five hundred data for the testing section. Then training & tested those dataset, a less amount of dataset works for validations. Convolutional Neural Network was main deeply learned theme. There Convolutional Neural Network & Yolo-V3 frameworks was using to detect that inputs images. There was used that colors of RGB model & that modes for categorically and finalize those pattern is batch thirty to training & tested dataset. There had proposal data structure that provided good authorship. The validated dataset contributes that recognize traffic alike those training & tested dataset. Beside it recognize those unfamiliar proposal design which is here:



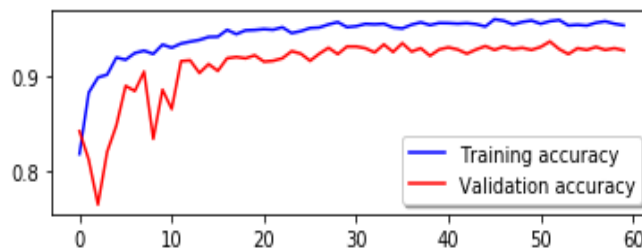
Figure 4.1.1: Validation data

4.2 Efficiency of the Model

Finishing that sixty epochs about that proposal model that was working successfully. Here got that exactness about trained data set 93.34% & got exactness for tested data set 91.33%. After finished that training & tested procedure that result gain a success exactness. Depending to valid rent & that matrixes in confusions dataset that was acquire to that procedure, into those cause we should tell Convolutional Neural Network base proposal model was acceptable into this recognition procedure. That effectual performs of that research is described there:



(I)



(II)

Fig: 4.2.1 (I) Explaining trained loss & validations loss (II) Consoling training exactness & validation accuracies.

$$\text{Accuracy} = \frac{(TN+TP)}{(TN+TP+FN+FP)} \quad (7)$$

Given, current performance at this proposal structure & that structure to that matrixes for confessional dataset was using extremely. That's why that given false positive (FP) rent was negative & negative value detecting like positive, true positive (TF) rent was actually positive & detecting for positive. The True negative (TN) rent was detecting value exactly for that following negative & lastly false negative (FN) rent actually positive value detecting like negative to each type of data set.

CHAPTER 5

RESULT COMPARISON AND ANALYSIS

There were various kinds of worth full works about this system. But not all of them were very much successful. We know that this system has many methods alike trajectory based, GPS, R CNN, FASTER R CNN, Yolo-V3 etc. In this part we are using Convolution Neural Network (CNN) bases objects recognition technique. For the frame working task here using Yolo-v3 algorithm. Our hard work gave us highest exactness more than others system because of direct training objects without including further data set & further better tuned processing. Here we can see several previously done recognition & theirs exactness level.

Table 5.1 Analogy with some previously done works:

Topic of Detections	Used Algorithms	Accuracy Rate
Recognition to inputs images(vehicles) pre-training into many sample from PASCAL VOC	FASTEST R CNN	58%
Recognition for Aubergine disease on pest base leaf image	FINE TUNED VGG16+SVM	79% 77%
Recognition for inputs images (traffic) pre training to samples.	Yolo	80%
Discovery those objects without dense super visional for PASCAL VOC testing.	DSOD 300	78.6%
Recognition for that inputs images (vehicles) used convolutional neural networks.	YOLO V3	89.39%

By analyzing this chart we have seen many outputs. Different researcher used various kinds of algorithms & finally get various kinds of exactness rates. There we can see the high Exactness ratio was 89%. Here using CNN it has done. Different high results was 80% here using Yolo Algorithms. There using high resolutions images for getting high exactness rate. Although that rate is not good than us. That was high exactness ratio on that following chart. There using CNN networks base recognition matter of that help YOLO V3 frame work. There are also many kinds of single state algorithm. We are working with the YOLO variant. YOLO V3 is our priority. It is fastest. As a final result we got highest exactness (93.34) than others.

CHAPTER 6

CONCLUSION & FUTURE SCOPE

In our task we generally described CNN bases recognition. Our task was detecting that objects by the following algorithm. It's already proved that this system is better than any other work for recognizing those objects. Here we get highest exactness ratio 93.34% that was higher from following chart. Even we are still trying for making it more efficient and helpful. Though, there is not current ample amounts for data set. Those types of recognition system is a great invention of modern time in Bangladesh.

In upcoming future, this methods needed to be improved in term for count period. Those system can extends for videos recognition of traffic. We can update it by updating recognition system that can know about newer objects class. Even, it is possible to update that algorithms which generate sources combination. In near future we will also make an android application for monitoring traffic system that can easily recognize all vehicles on the roads. To get more exactness in the dataset we are developing our skills. It will prevent wrong side riding and overtaking tendency.

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APPENDIX

Appendix A: Survey form

Respondent Information:

Respondent Name :
Vehicles name :
Date :
Time :

Vehicles Name	Visibility			Solution	
	Clear	Obscure	Very Obscure	Known	Unknown
Ambulance					
Auto Rickshaw					
Bicycle					
Bus					
Car					
Garbage van					
Human hauler					
Minibus					
Minivan					
Motorbike					
Pickup					
Army Vehicle					
Police car					
Rickshaw					
Scooter					
Suv					
Taxi					
Three wheelers(CNG)					
Truck					
Van					
Wheelbarrow					

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