CHAPTER 1

INTRODUCTION

1.1 Introduction

This is the era of Modern Technology. Science may move Technological development, by producing demand for technological improvement that can be create through research. In this world there are millions of people is not capable to understand the environment. To maintain their regular routine and make self-depend them we want to implement this paper. It has involvement to identify the objects through a picture, video or a webcam feed. At present over the world we can see object detection is used widely. There are huge cases where to use objection detection. There are endless scope such as Objects tracking, Video surveillance, Pedestrian detection, Anomaly detection, counting people, Self-driving cars or Face detection, the list goes on.

Figure 1.1: Blind Peoples

The “Object Detection Method” has been disapprove the problems of blindness. In our system we had try to detect object that’s why blind people are realize everything as normal people. This method works outdoor and indoor environment. When blind people go outside like as school, college, shopping mall, roadside etc. It is very difficult to understand what have in their front side so that we are working to develop a system for the blind people to help them in many ways.

1.2 Motivation

We are currently obeying our Bachelor in Computer Science Engineering at Daffodil International University, we feel the problems of blind people of move inside and outside freely so that we want to do something several way to help blind people and implement this method. We are highly presumed that blind people will much self-dependent by using that. Sometimes road accident can occur by passer for their road crossing. So that we think blind people are badly help them in road side way. Not only blind people every people can spontaneously use this. There are two types of object detection in our project firstly we classifying the object and the other one is detect object in this work we use python language.

The proposed system is able to detect object in front of the blind people and also observe the object. So that it is a successful implementation of a distance measurement method based on some algorithm. This is an important filed, in which depend the responsibility of some types of people who are impaired. So it is a big responsibility of any society. Our proposed method is efficient to detect object.

1.3 Objective

Our main concernment is about to detect and identify object. In this identification we use YOLO model that's why we get exact and speedy output. YOLO model get a balance achieved between object and relevance and image divide into many parts.

We tried to make a fast and efficient object detection system that help to all blind people to live their life beautifully like a normal people. They freely passing outside by using our method. So that they feel freedom. That's why they don't think that they depend on someone. We use totally different approach to implement this project.

At one time the object detection is done, our following purpose is flow our system with useful images. By using Binary patterns images are divide some parts and convert with our Screen Object Detection YOLOv3 method.

Through our proposed method decrease various accident. Blind people lead their life like a normal people and they feel independence.

By taking up this proposal we can increase their self-confidence and reducing many types of accidents. By developing this project, we want to manage our harsh society system because some people of our society are neglect blind people every day.

1.4 Expected Outcome

- This system can be applicable for indoor and outdoor environment.
- To develop our country our proposal work effectively.
- Make them self-depend.
- To avoid manual and iterative work.
- They are not face any unrequested incident.
- To provide a mobile application to reached their destination
- They save their time.
- They live as a normal people.

1.5 Report Layout

Chapter 1: Introduction:

We explain about introduction, motivation, objectives, expected outcomes and also report layout of our project in this chapter.

Chapter 2: Background Study:

Background part of our proposed a traditional method is discussed in this chapter and we also explain literature review, related works, recognition like SVM, KNN, CNN , ANN and decision of the problems and demand about our project in this segment.

Chapter 3: Methodology:

In this chapter we added overall process that we have used to build this system and all method are interpret step by step and essential figure and diagram which used to complete our proposed method.

Chapter 4: Result and Discussion:

Our experimental results are exhibited along with the whole working process analysis that is gain by the proposed method system. And we also added the output of our project implementation.

Chapter 5: Conclusion and Future Scope:

In this part we have observed about conclusion and future work of our proposed system and how we improve the system for blind people.

CHAPTER 2

BACKGROUND STUDY

2.1 Introduction

Python is very popular and demandable language. Machine learning is a type of artificial intelligence (AI) which based on Python. Machine learning based on the development of Computer Programs. Our project is a mobile based application where we have developed the system by using OpenCV and python language. It able to detect and recognize object to identifying and accomplish images and it use to help blind people.

Using OpenCV and python language a system had developed by us. This system is used for detect objects situated in image. It qualifies to detect objects for verifying as well as identifying them. For many different issues this system can be used.

We used OpenCV for developing our system to detect object because it plays a vital role for developing our system. Everyone can easily as well as freely use the OpenCV as it is an open source platform. Its basic interface is made in C++ but MATLAB, Python, Java are also capturing.

There are two steps for object detection in our object detection process. First one is classifying they object and the other one is object detection. Mainly it concerns to rise the smartness of electric devices.

2.2 Literature Review

Moving object detection is achieved by Wu-Chih Hua, Chao-Ho Chenb et al. [1] they used using Kalman filter based on the center of gravity of moving object part in the minimum bounding box. They use two types of methods; background construction-based video object segmentation and foreground extraction-based video object segmentation. Moving object can be detect on based on video object segmentation. The experiment of video sequence captured by cameras is also an active research field. At first they tracking object then recognize what happening around those tracking

object. According to this proposed method, TP is the total number of true detection objects, and FN is the total number of false detection objects. The average true detection rate TR and false detection rate FR obtained using the proposed method are 79.33% and 2.32%. There no doubt that the proposed method has good performance in terms of true detection rate and false detection rate. But 19.5% is very high rate that they can't detect object. This method can't give direction as well as additional information about object that the system detected.

Betty Le Dem, Kazuo Nakazawa et al. [2] their proposed system is combine a CNN detector with VINS-Mono, a moving visual odometer system. Bounding Box State Estimator (BBSE) the system that they designed to overcome the Acc-Acc tradeoff. In order to perform accurate object detection and tracking, their BBSE creates three possible detection for the same object and it will rely on the CNN-detection. This method cannot detect any object on turbulence condition of various strength like (About object size, Moving direction, No specific range that how far the object is located). BBSE succeeds on improving the results for moving phases. The success rate of the detection during the acceleration (Acc) is always more than 20%better with BBSE than pure YOLO.

The method can get more than 50% more of accuracy if consider the detection during moving phases. Background subtraction method by Anaswara S Mohan et al. [3] proposed one of most popular methods for originality detection in video. In this method they use background subtraction to single moving objects from background. This method follow; Background subtraction, Morphological Process and Image segmentation steps. The moving object can be determined by taking the difference between the background image and the input image. Color space background model is used in this paper. The area of the holes is greater than 40% (determined by experiment) of the total area then the algorithm will combine this area with the total area enclosed by the boundary.

Kimin Yuna et al. [4] proposed a method of scene conditional background update method which adaptively updates the background model according to the scene condition. This method estimates three scene condition variables: Background motion, Foreground motion, and Illumination changes. In their experiment they showed that this method detected all same type of object like (human). But they can't detect multiple type object. In this experiment images there was car or

other various object beside human, but they can't detect that. The average accuracy rate of detecting object of that method is above 80%. It is also faster than the other methods.

Byeongho Heo et al. [5] proposed a method, which is moving object detection in moving camera. This method works for background modeling & camera motion specifically as well as it detect object if it is moving or not. However, there no additional information about the object like (what kind of object it is? No object name, about object size, Moving direction, No specific range that how far the object is located). Sometimes some objects aren't detected and the recall was dropped. In motion videos, this method failed to estimate camera motion and repeatedly initialized the background model. The accuracy of the proposed method is better than other existing method. The proposed method consists of a network focusing on the appearance as well as a network dedicated to the motion. The proposed method has a strong advantage in that it is capable of a real time operation speed of 50fps, which is suitable for actual application including the challenging situations in autonomous vehicles.

2.3 Comparative Studies

Object detection are concern for object acknowledgement. Different types of algorithms have been established to determination the object identification. We can identify one of the earliest work that Zhaleh Sadreddini et al. [6] in their proposed method they experimented a method based on a single-camera is raised where vision techniques is used. In this method efficient especially for indoor building like schools, shopping mall, museums, hospital, and airport that have regular lines. Experimental result put out by using MATLAB and it can be applied to real application. Random Finite Set (RFS) use to estimate a vehicle's in this method.

Gowrab Mohajan1, Pranab Kumar Dhar et al. [7] they presents moving object detection a method with sudden illumination change using background modeling. Their simulation result show that the implementation method gives wonderful result in illumination changing condition to detect moving object in background modeling. They use HSV color space model to illuminate the result. In their paper no extra information like; object types, name, size, moving direction, exact rang or location.

Besides Yang Li1, Jinshen Wang et al. [8] proposed a method called Dim Moving Target Detection six technical part used and they proposed a novel spatio-temporal exception access to solve the dim moving target detection problem. They used spatial exception map, temporal exception map using anomaly detection algorithm from spatial domain and temporal domain. With the development of hyperspectral sensors (HIS), this sensors can be applied many types of image processing domains. In this paper the used principal component analysis (PCA) to reduce the dimension of the HIS data.

Nowadays Yu-jing Zhao et al. [9] proposed a fiction image stitching algorithm based moving object detection and motion prophecy reparation. They calculate the global vector and matching SIFT features based on calculate the relative difference of image. They improve a Davis's algorithm based on image segmentation. Moving object detection based on gray-scale projection by analyzing the curve of gray-scale projection in comparative difference sub-image. Firstly they used SIFT to detect interest points and secondly used filter at different scales, and calculate different-of-Gaussian (DOG), and thirdly matching with verify the property and remove nonmatching object and last proposed the transforming model.

Martin Hofmann et al. [10] proposed Calibration process to measurement image size by using mobile device. At first they ordain near distance and move phone away the full object to visible on the phone and then measurement the object to store size note. Also they different between two image by their color, circle, features and used ARANSAC algorithm to the filter outliers to matching the homographs.

2.4 Challenges

Our project "Moving object detection for blind people" is very challenging work for us. In our system we have to detect object to a video and recognize the object like (person, many types of freezes or moving objects) and saved data about them which is very challenging for us. We face many problems to implement this project. To detect object in a proper way by using OpenCV and python language perfectly it is more challenging for us.

Requirement

Creating a dataset by saving captured video was trained firstly to recognize a match of object. Showing object with proper information as; what types of objects like frees or moving which is detected is so challenging that we had needed the proper object shape for detecting. We classifying the object and the other one is detection object which contain a lot of information was much challenging for us.

Time Scheduling

Time scheduling is a very important part of our project because it refers a set of technique used to develop and offer design that mention when the whole work will be done. In this work our main concern was about time scheduling to complete this project in right time. If our implement was not completed in main time it will be a very big problem for us. We divided our working time and project work among us to complete whole projects.

Cost Reducing

Every decision in project development intuition cost so it was another challenging work to reduce cost and increase our profits.

Increasing Communication

In the time of implementing our project we had face many types of questions and problems so that we communicated with our supervisor and co supervisor. In this case, it was little challenging for us to increasing communication to our supervisor.

Skills for the Projects

Necessary skills to complete our whole project work taken completely.

CHAPTER 3
METHODOLOGY

3.1 Introduction:

In our last chapter we gave review as well as discuss about some algorithms and methods which are established for object detection. We also developed a system for objection detection. Our system not only an object detection system but also it was developed for detect all moving objects. So the algorithms are very highly related to our work procedure.

In this chapter we will discuss about our methodology what we have use to develop. At that time when we review the related works of our methodology we came to know that some algorithms are difference which we can use for develop a system that can detect as well as recognize any moving object. We have used a very smart and fast algorithm to detect real time object. We will discuss briefly about our algorithm what we used.

3.2 Methodology:

Using our system, we have to detect as well as recognize any object which is moving. For this real time object detection, we have used an algorithm named YOLO. Here we have used YOLOv3 to develop our system. It is very fast and appeasement than the other existing algorithms. This method is very useful for detect any moving object in front of camera. We think YOLO is the best than the other algorithms for purpose of detecting real time object. YOLO third version had come out and it is better. The speed of YOLO v3 in accuracy has been traded off for boosts. YOLO v3 has its own new features. Using YOLO v3 we can detect three different scales at three different places. To complete detection it applies 1X1 detection kernels on feature maps. Following steps are needed to complete our whole procedure:

A) Flow Chart:

Flow chart is very important step for planning how to complete a successful project. So we have also a flow chart in our plan to complete our project. We work as flowing flow chart:

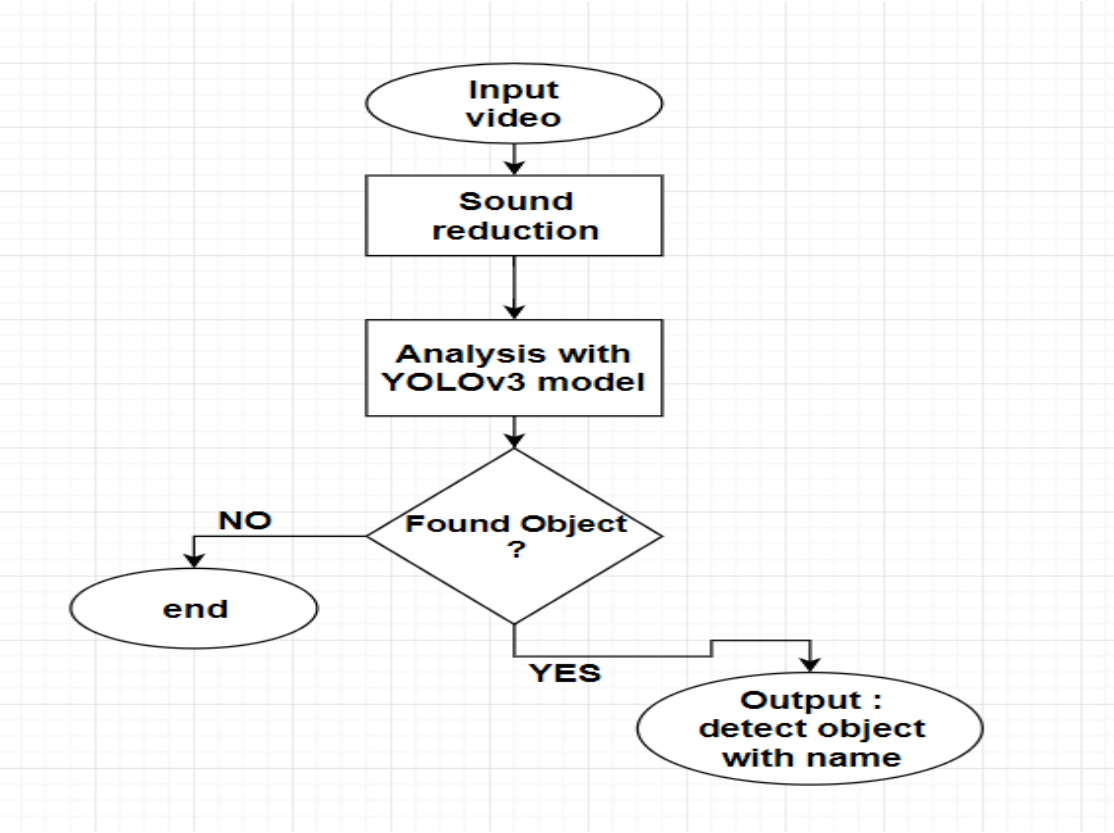

Figure 3.1: Flowchart Diagarm.

B) Data Collection:

As our plan at first we collect our dataset for our system. We use those data as input in our system methodology. We collect data from different environment. We take a smart phone and take some short videos in outdoor environment. After we also take video in indoor environment. There are many objects located into those videos. From those videos there are several moving object whose are important for our system. Because our target is to detect those moving object. So we use those videos as input of our system. There is another way to directly import video in system by opening webcam in computer.

C) Procedure:

The following diagram shows YOLO v3 procedure:

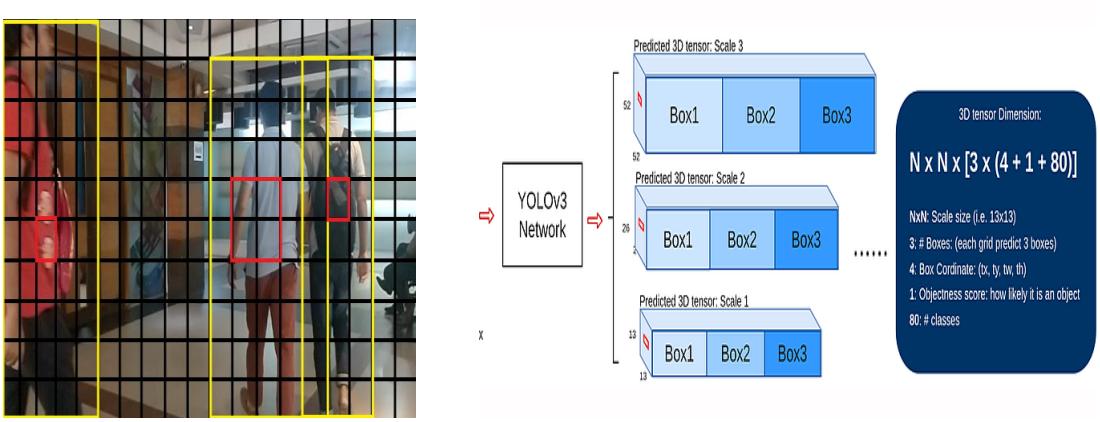

Figure 3.2.1: YOLO v3 Workflow

In the first place, during preparing, YOLOv3 system is bolstered with info pictures to foresee 3D tensors (which is the last component map) comparing to 3 scales, as appeared in the center one in the above graph. The three scales are intended for identifying objects with different sizes. Here we take the scale 13x13 for instance. For this scale, the info picture is separated into 13x13 matrix cells, every network cell relates to a 1x1x255 voxel inside a 3D tensor. Here, 255 originates from (3 x (4+1+80)). Qualities in a 3D tensor, for example, bouncing box organize, objectives score and class certainty are appeared on the privilege of the graph.

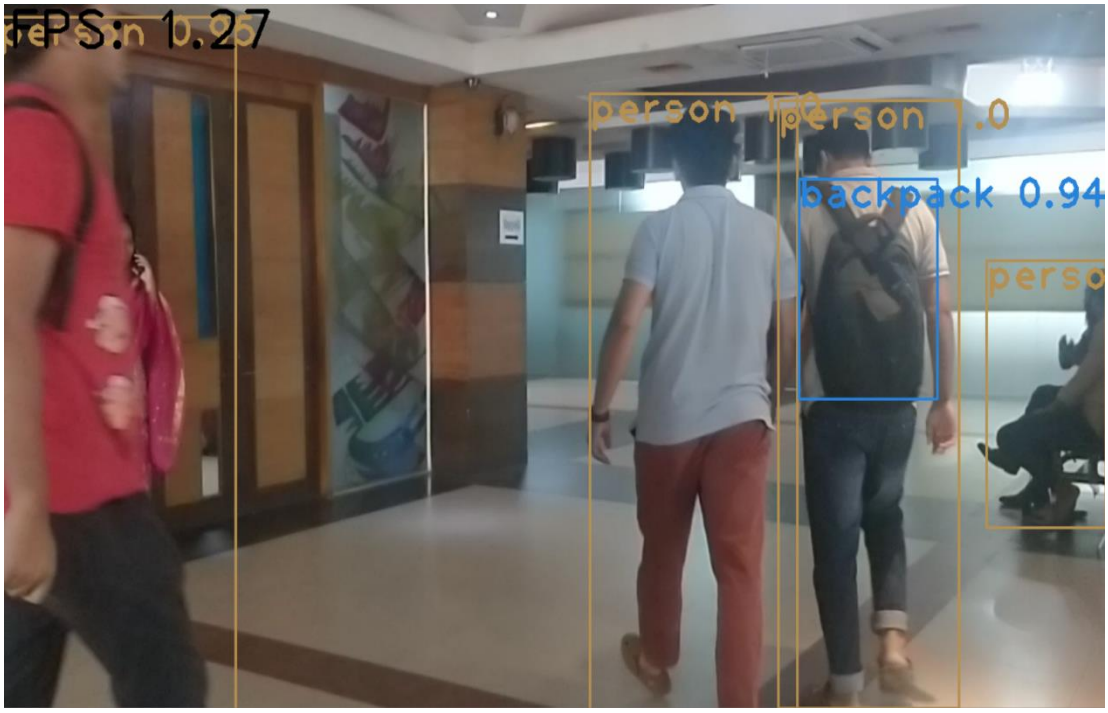

Figure 3.2.2: Detected Multiple Objects

Second, if the focal point of the items ground truth jumping box falls in a specific matrix cell (i.e. the red one on the fledgling picture), this matrix cell is liable for anticipating the article's jumping box. The relating objectives score is "1" for this matrix cell and "0" for other people. For every network cell, it is doled out with 3 earlier boxes of various sizes. What it realizes during preparing is to pick the correct box and figure exact balance/organize. Be that as it may, how does the framework cell realize which box to pick? There is a standard that it just picks the container that covers ground truth jumping box most.

Finally, how to pick the underlying size of those 3 earlier boxes? The creator utilizes K-mean grouping to arrange the all the out boxes from COCO dataset to 9 bunches before preparing. Those outcomes in 9 sizes looked over 9 bunch, 3 for 3 scales. This earlier data is useful for the system to figure out how to register box balance/organize correctly in light of the fact that instinctively, terrible decision of box size makes it harder and longer for the system to learn.

After detecting object, it classifies that object and show output with object name.

3.3 Analysis:

In this section of methodology, we will discuss as well as analyze in detail about this procedure. If we think analytically we can see what actually happen in this system with the input data.

Figure 3.3.1: Indoor Image

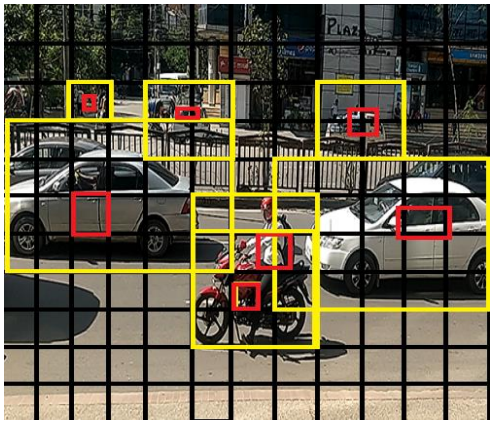

Figure 3.3.2: Outdoor Image

3.4 System Requirements:

We implemented a methodology for moving object detection. For any kinds of implementation some tools are needed. To implement our system, we used some tools and software. For the very beginning we had to take a computer with update all features, that can use all version of our needed software. Then we installed python version 3.7(64-bit) and as optional python version 3.7(32-bit). We can use for run the system any one among the both. We use a smart phone with minimum resolution of camera. We take some videos by this smart phone. Those videos contain some object those are moving. Moving objects are also our requirement. We used those videos in our system as input dataset

3.5 Description:

We use YOLO v3 model for detecting object by our system. YOLO is the best than any other algorithm in field of object detection as well as real time object detection. It is faster than all the

others. On the other hand, the accuracy rate of object detection from video dataset is high than the other algorithms. We can compare YOLO v3 method with other existing methods. From the following compare table, we can make a decision of the best method:

3.5.1: Comparison Table

Model	Train	Test	mAP	FLOPS	FPS
YOLOv2 608X608	**COCO trainval**	**Test-dev**	**48.1**	**62.94 Bn**	**40**
Tiny YOLO	**COCO trainval**	**-**	**-**	**7.07 Bn**	**200**
FPN FRCN	**COCO trainval**	**Test-dev**	**59.1**	**-**	**6**
YOLOv3-320	**COCO trainval**	**Test-dev**	**51.5**	**38.97 Bn**	**45**
YOLOv3-416	**COCO trainval**	**Test-dev**	**55.3**	**65.86 Bn**	**35**
YOLOv3-416	**COCO trainval**	**Test-dev**	**57.9**	**140.69 Bn**	**20**

From the above table we can say that the YOLOv3 is the best in object detection. So we used it for our system implementation. We specially working on the system for blind people. So YOLOv3 was our final choice to implement our system so that we can do our job easily and faster and this method is essential as well as helpful for our system. The table 3.5.1 it is clear that Yolov3 is only the algorithm that can give high rate accuracy as well as faster.

We also add here an audio sound system to ensure the blind peoples about object, if any object situated in front of them. It will make aware the blind people by giving a ton. How many times the system will detect object the system will ton one time for each time of object detection.

CHAPTER 4

RESULT AND DISCUSSION

4.1 Introduction:

In previous chapter, we discussed about the related works of object detection, our methodology that works for moving object detection. In this chapter we discussed about our procedure that how we use this system and implemented our result. Our main target is to increase the accuracy rate and make the system faster than other algorithms. From the table (3.5.1) we know which method is the most efficient for us. For this implementation, we use YOLOv3 model because it is the best model yet for multi object detection with their type and NumPy for adding multi-dimensional arrays & matrices and OpenCV for desired at real-time computer vision. YOLO applies neural network to the exhaustive image. Its partition the image into S x S grid and turn it into colorful bounding boxes and these boxes are predicted the probabilities of objects.

4.2 Result:

This experiment done by using Python 3.7 default IDE on windows 10. We also used OpenCv and NumPy and some library for implementation.

Figure 4.2.1: Multiple Object Detection

In fig-1, this detection of image is execute by using web cam video recording. This video is take by indoor. Here the box are bounding the object. In this image, person and cup are recognized. For recognize here used YOLO model. The accuracy of detect person is 0.83 percent and cup is 0.99 percent.

Figure 4.2.2: Sample Image of Video Recording

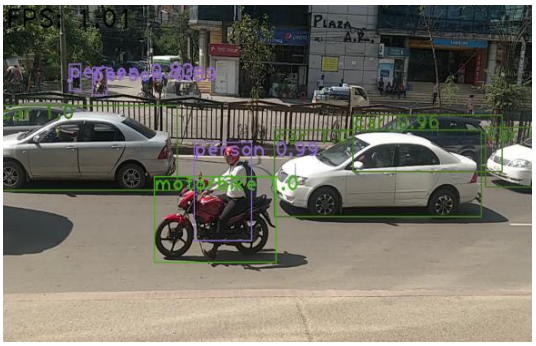

Figure 4.2.3: Detected Object With Name & Accuracy

Fig-2.2 recognized multi-object in image

In fig-2.1 , this image is executed by using mobile phone video recording. And in fig-2.2 , same image is used but some objects are detcted. This video is taken by outdoor. These Here motorbike, cars and persons are detected by this model. The average accuracy of detected bike is 1.0 percent , the car is 0.90 percent and person is 0.99 percent .

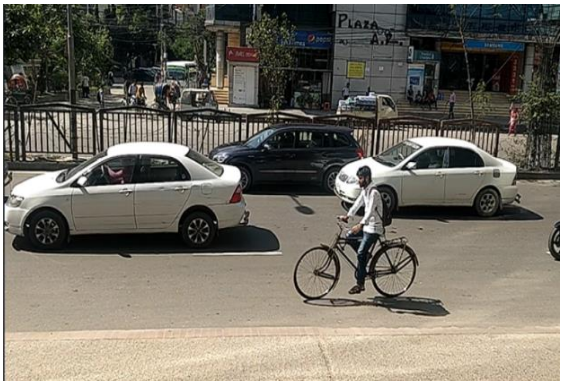

Figure 4.2.4: Sample Image of Video Recording

Figure 4.2.5: Detected Object With Name & Accuracy

In fig-3.1 and fig-3.2, these images are taken by using mobile phone video recording. This video is taken by outdoor. Here bicycle, cars and persons are detected by this model. The average accuracy of detected bicycle is 1.0 percent , the car is 0.97 percent and person is 0.85 percent .

Figure 4.2.6: Sample Image of Video Recording

Figure 4.2.7: Detected Object With Name & Accuracy

In fig-4.1 , this image is taken by using mobile phone video recording. And in fig-3.2 , same image is used but some objects are detcted on this image. This video is taken by indoor . Here persons, backpack and handbag are detected by this model. The average accuracy of detected person is 0.98 percent, backpack is 0.95 percent and handbag is 0.89 percent.

Figure 4.2.8: Sample Image of Video Recording

Figure 4.2.9: Detected Object With Name & Accuracy

In fig-5.1 and fig-5.2, these images are taken by using mobile phone video recording. This video is taken by outdoor. Here persons are detected by this model. The average accuracy of detected person is 0.94 percent, car is 0.84 percent.

The final accuracy of detected object are -

Object Name	Object detection Accuracy (%)
Bicycle	1.00
Car	0.95
Person	0.98
Motorbike	1.00
Backpack	0.95
Handbag	0.89

In above table we show some selected object and their detection accuracy rate in outdoor and indoor environment. Some objects have best accuracy rate and some have a good average. Out total average accuracy of our system is 96 %. It's a good average for real time object detection in different environment.

4.3 Discussion:

In our system, camera detect object form video and convert into image. Object detection is highest problem in computer vison. For this detection YOLO model is the best solution. YOLO detect object in real time. It predict the object inside the current window. However, it is very slow process. So it bounding the object into boxes and gave the result. That is why YOLO is fast and more accurate for object detection.

CHAPTER 5

CONCLUSION AND FUTURE SCOPE

5.1 Discussion and Conclusion:

Automation systems are effecting our life in many ways. All are very useful for mankind to make easier peoples life. Automatic object detection is one of those creative system. Here we vindicated a system for the purpose of automation.

In our system screen object detection, we had tried to detect object situated in screen. This system is developed for a magnificent purpose of mankind specially for those people who are visually impaired. It's going to be very useful for the blind people as well as normal people. It helps blind people in many purpose in their daily life. It'll make easier to spend life of a special class of people who are disable of vision. They can identify if there any object on their way as well as what kinds of object it is. It will make easier the road for the blind people at their walking time. On the other hand our system is going to be useful for all classes of people.

This system can be used in many ways as well as in many automatic system such as in smart home, in smart door, automatic car driving, in home for automatic home cleaner etc.

5.2 Future Scope:

We just developed here a simple system of object detection. There are many scope to in this field to work. We have also some very possible scopes as well as future plans with our established system. Our future work with the system is to establish a dynamic application for salvation for the people. Here we couldn’t implement audio system with our system. So our next implement will audio system. That will increase awareness among the blind people. In future we also implement a system that can calculate distance from blind people to object. We will work with more database. We will add more new features in our system like as audio system or vibration system, giving direction etc. So we hope in future our system will be a well-established system and it works with a good average accuracy. Also generate authentication to use.

References

[1] Hu, Wu-Chih, et al. "Moving object detection and tracking from video captured by moving camera." *Journal of Visual Communication and Image Representation* 30 (2015): 164-180.

[2] Le Dem, Betty, and Kazuo Nakazawa. "Exploiting the ACCuracy-ACCeleration tradeoff: VINS-assisted real-time object detection on moving systems." 2019.

[3] Mohan, Anaswara S., and R. Resmi. "Video image processing for moving object detection and segmentation using background subtraction." *2014 First International Conference on Computational Systems and Communications (ICCSC)*. IEEE, 2014.

[4] Yun, Kimin, Jongin Lim, and Jin Young Choi. "Scene conditional background update for moving object detection in a moving camera." *Pattern Recognition Letters* 88 (2017): 57-63.

[5] Heo, Byeongho, Kimin Yun, and Jin Young Choi. "Appearance and motion based deep learning architecture for moving object detection in moving camera." *2017 IEEE International Conference on Image Processing (ICIP)*. IEEE, 2017.

[6] Sadreddini, Zhaleh, Tuğrul Çavdar, and Hossein Barghi Jond. "A distance measurement method using single camera for indoor environments." *2016 39th International Conference on Telecommunications and Signal Processing (TSP)*. IEEE, 2016.

[7] Mohajan, Gowrab, et al. "Moving Object Detection against Sudden Illumination Change Using Improved Background Modeling." *2019 International Conference on Electrical, Computer and Communication Engineering (ECCE)*. IEEE, 2019.

[8] Li, Yang, et al. "DIM Moving Target Detection using Spatio-Temporal Anomaly Detection for Hyperspectral Image Sequences." *IGARSS 2018-2018 IEEE International Geoscience and Remote Sensing Symposium*. IEEE, 2018.

[9] Zhao, Yu-jing, Zhe-qi Lu, and Yang-ke Liu. "Video image stitching based on moving object detection and motion prediction compensation." *2010 3rd International Congress on Image and Signal Processing*. Vol. 6. IEEE, 2010.

[10] Hofmann, Martin, Marco Seeland, and Patrick Mäder. "Efficiently annotating object images with absolute size information using mobile devices." *International Journal of Computer Vision* 127.2 (2019): 207-224.