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AI Based Pilot System for Visually Impaired People

Bharathi Reddy M A[1], Nallajodu Chandra Mohan[2], Lavanya B V[3], Nandini C[4], Jagadish N[5]

[1,2,3,4] *Department of Computer Science Engineering, S J C Institute of Technology, Chikkaballapur, India*
[5]*Faculty in Dept. of Computer Science Engineering, S J C Institute of Technology, Chikkaballapur, India*

Abstract- Significantly analysing visual defectiveness people represents more of the population around the world roughly speaking more than 10 million. Their incorporation in the public is an essential point. In order to give Audible environment for the blind people this project mainly concentrates on the field of Assistive devices for Visually Impairment Persons. To make their daily life comfortable like to travel from one place to other place many supporting systems is developed and being developed. So, the basic idea for our proposed method is to design Auto-Assistance system for visually impaired person. Model is skilled in a way that if input is given it starts generating the Sentences about the Image. Experiments show that it is often generating exact descriptions for image. A new dataset has been collected in real time which consists of 300 images as of now with different categories like Vehicles, Animals and indoor objects. We have applied our algorithm to several images gathered in real time i.e. our own data set and found that the conversion is completely successful. The system is light weight and socially useful.

Key Words:

1. INTRODUCTION

People start communicating with Each other via a Mediator called Language, whether it is written or oral. They make use of this with the objective of illustrating the world which is around them. For Physically Challenged people, Images, symbols and Signs are the way of Communication. Generating Automatic Sentences from image is a bit tricky task, but it has an immense impact on Visually Impaired Persons and it can help them better understanding the Environment and Situations. Many efforts have been made by different fields of people on order to make sure that proper care is being provided for those people. Different Kinds of Assisting Systems has developed and are being developed for Visually Impaired people that would guide them I their daily life while they travel inside (or) outside surroundings. Advanced Technologies like Image Processing and Computer Vision is used for development of assisting systems that would provide best performance related to speed and processing. In real time, the system that is developed has to work with great speed and has to take the action with no time Irrespective of Technology used. While the Visually Challenged person is travelling irrespective of any Environment, The Main Aspire of Assisting Technology is to notice objects, recognize it, and then produce voice alert. The system is proposed in order to guide the blind people about the objects and obstacles that are present near them. The Images of the object can be downloaded from any source (or) it can be captured at live. Images are classified based on class label and it is called Localization of object if around the image object there is a bounding box drawn. After combining these two process together is for Recognizing Object.

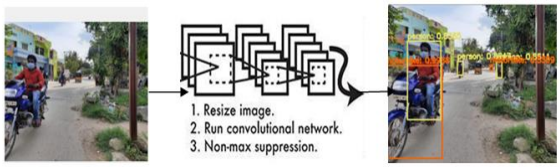


Fig. 1. Design of Yolo

2. LITERATURE SURYEY

Sarthak K et al [1] proposed a system in the fog time many problems will be caused to human beings because of decrease in the visibility. This may cause accidents on road and risk during driving. So the objects and obstacles need to be detected in the surroundings in this situation. A solution is proposed using YOLO algorithm the saliency map image during fog is detected and a sensor called VESY is used.

Aishwarya S et al. [2] proposed a system, human beings have a capacity to recognize and detect the objects since they can distinguish and find out through their eye. This is not the case with machines and they cannot find out. So this issue can be overcome by NN (Neural networks) also known as ANN (Artificial Neural Network).

Jeong H J et al. [3] proposed a system, for detecting and recognizing the data fromdataset or from video frame it has to undergo with training. The images that are downloaded from the crawler are not processed images means they cannot be used as a data for training. Hence a preprocessing model is built for refining the data downloaded from crawler.

Yawei H et al. [4] proposed a system, for the network systems that are complex the output must be with good recognition. These complicated network system takes a huge time in training and it would be difficult. BP system and CNN is introduced with Mnist dataset to recognise with good and simple model.

3. PROPOSED SYSTEM

We propose a new auto assisting system which will identify more than 3 classes from the video frames. So, the person can identify more obstacles in front of their way and avoid them. This makes the auto assisting system for visually impaired people more meaningful and helpful. After detecting the objects from the video frame this system will speak what object is detected. Here text-to-speech conversion is done so this system is really a boon for visually impaired people.

In the image the objects of some classes are located and identified using object detection which is a mostly used system vision. The identification of the objects that are available inthe images is called detecting objects. The capacity of computer and software to identify each object by locating them in an image or screen is object detection. It is widely used fortracking objects, pedestrian detection, self-driving cars, face detection and security systems.There are many other fields where object detection can be used for.

Here we are using trained objects which are trained using YOLO framework and CNN algorithm for training the captured image. The image can be captured using webcam or can be downloaded. The data must be equally balanced data. The dataset collected will be divided for training and testing purpose. Here preprocessing is done. Then the system is tested by converting the identified object to pytts (python text to speech). So, our system will be useful for blind people. Object detection includes two main aims:

- Identifying all the objects that are available in the image.
- The objects that are focused will be filtered.

This proposed system will be great boon for visually impaired person.

3.1 Advantages.

- Text to speech facility is available.
- Many objects are used for detection.
- Comfortable and safe.
- 'N' number of objects can be trained.

3.2 Motivation.

Vision loss or completely blind people cannot detect the object or obstacles in their surroundings because of their vision problem. They always need some assisting or supporting system in their life. Solution has been found many years ago for this now gradually the techniques are improving due to evolution and integration in technology. In daily life blind people are using assisting systems that are developed while some are still inthe research stage.

3.3 Objectives.

The project aims to facilitate the movement of blind and visually impaired. The plan definesa platform (vision based) for the identification of indoor objects to guide visually impaired people in real life. Using Python and OpenCV library functions, the software is developedand eventually ported to a laptop.

The main aim of the proposed system is:

- Studying and understanding the present vision module systems.
- Designing of frameworks for the image acquisition system.
- To study how to classify object using CNN.
- Finding objects position in the given input frame.
- Programming both the objects detected and position of the objects to a speech outputusing text to speech convert.
- Interfacing ultrasonic sensor to the system to alert obstacles.

3.4 Key Feature.

The application "CNN based Auto-Assisting system for purblind people" is mainly developed for detecting objects and assisting that detected object for vision loss or completely blind people. The object is captured or collected which is equally balanced. OpenCV library function is used for this process. Then the images are pre-processed andtransferred for training and testing method. CNN algorithm is used in this process. The trained model is then tested by speaking it to blind person using gtty (google text to speech) process.

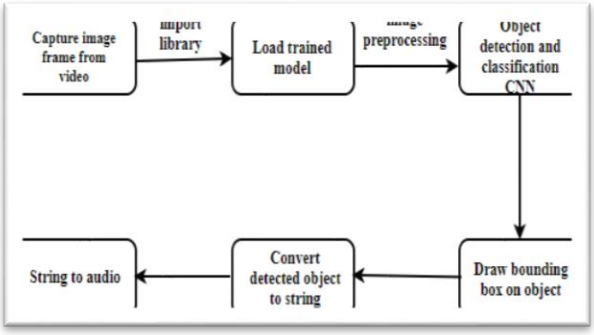
3.4. System Architecture.

The design part includes the system architecture. It explains the workflow of the system proposed. The architecture mainly explains the data is being modified. How it is being usedand how the results vary with it.

The scene for vision will be captured at different sampling rates. The images that are captured and acquired would undergo processing and that output would trigger an audio message for the person, the audio message will depend on the object detected.

Figure 1.1 System Architecture

3.4 Elements of Image



The memory the storage of images is done in multiple spaces of color. In that color space the most commonly heared by everyone is RGB which is used by the Win Os to the maximum. RGB would require other color system that is suitable for application in order to perform processing of image.

3.5. Grayscale Image

There must be an information about the intensity of particular pixel brightness in grayscaleimage. If the pixel values are more than the intensity of the image would be more. There are total of 0 to 255 shades in gray color system. Each of the pixels are little less brightnessthan the other one. This can be represented in the below figure 4.2. Each pixel in the grayscale would be occupying 1 byte which is all required and it would store from 0 to 255pixels which is all the shades.

The grayscale system in the storage is denoted as a 2D array byte. The h and w (height andwidth) of image would be same as the array size. This array created is a channel where grayscale has one which would denote the white brightness.

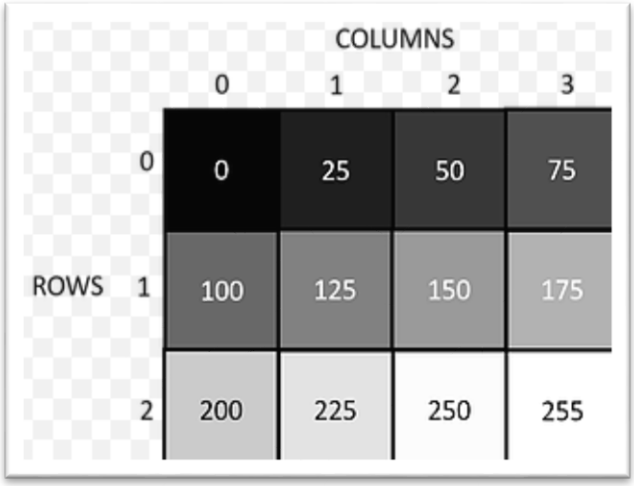


Figure 1.2 Grayscale Image representation

3.6 Color (RGB) Image

Pixel which is of three bytes are splitted into three parts: each byte for each color (red,green and blue) these colors are the primaries which will allow to get different colors by mixing up with each other in a correct proportion. RGB color system too has multiple shades of each color which is of 0 to 225 and each bytecan be storing these shades values. To obtain the color user wanted to have all the three colors are mixed based on the proportion the color required. This color system is inbuilt.This is used by everyone without our knowledge. Each pixel byte is allocated for each color and all these three colors are combined to with their bytes to get required color which is called dedicated. All these dedicated shades of colors are allocated in separate channel. Below

OpenCV stores RGB channels in reverse order. While we normally think in terms of Red, Green, and Blue, OpenCV actually stores the pixel values in Blue, Green, Red order. Why does OpenCV do this? The answer is simply historical reasons. Early developers of the OpenCV library chose the BGR color format as this particular format is very famous in producers of camera and in the time of developing software. It's a small caveat, but an important one to keep in mind when working with OpenCV.

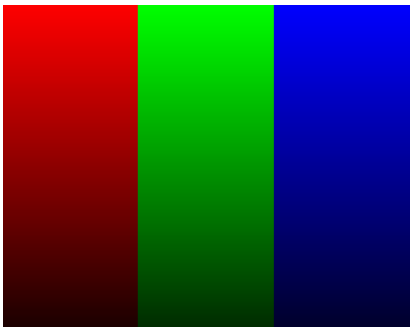
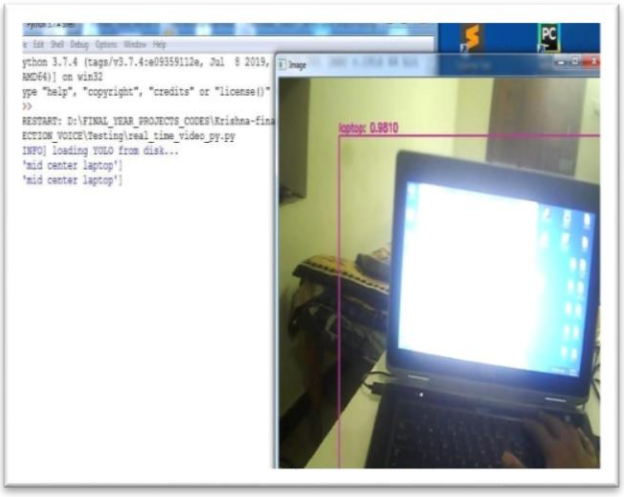


figure 1.3 represents color (RGB) image.

4.RESULT ANALYSIS

The system consists of two GUI (output screen). The input is the object of the image whichwould be captured as soon as the system executes. The captured image name would be the acoustic message and the object name with accuracy would be displayed on the output screen. Below is the figure 4.4 of the output screen which represents a GUI.

Figure 4.1 Output screen (GUI)



The editor or the GUI that is used for developing the code to build the system is also a GUI.The editor used is python IDLE which is a GUI for the development of the python. This would allow user for editing, executing and debugging the python code in a simple environment. Below is the figure 4.5 of the python IDLE.

Figure 4.2 IDLE screen (GUI)

5. CONCLUSION

A system based assisting network has been proposed in order to assist the purblind people and completely blind people. The template that are matching the procedures conducted by experimenting using OpenCV has formed a successful method that is multiscale and useful for the applications used inside the surroundings. The constraints that are based on time and the range of detection are the optimum numbers which need to be founded depending on the values of the factors based on the scaling and the length and width of the image. The objects detected are finally output as an acoustic message with the name of the object detected. The accuracy will be depended upon the clarity of the image captured by the user.If the image looks similar to other objects there may exist an ambiguity which would reducethe accuracy of the object detected. Model is trained to detect 78 objects with a maximum of accuracy. The distance of the image getting captured depends on the camera. The visionof the system for the accuracy it can be made better by improving the constraints that are adapted for illuminating and changing for real life surroundings

REFERENCES

1. K Sarthak, Sanjay K, Ronak S, Samarth G, “Object Detection in Foggy Conditions by Fusion of Saliency Map and YOLO,” 12th International Conference on Sensing Technology (ICST), IEEE 2018 Dec 4.
2. Arakeri MP, Keerthana NS, Madhura M, Sankar A, Munnavar T, “Assistive Technology for the Visually Impaired Using Computer Vision,” in 2018 Sep19, InternationalConference on Advances in Computing, Communication and Informatics (ICACCI), IEEE.
3. Kun S, Hayat S, Tengtao Z, Tu T, Y Du, Yu Y, “A Deep Learning Framework Using Convolutional Neural Network for Multi-class Object Recognition,” International Conference on Image, Vision and Computing (ICIVC) in 2018 3rd Jun 27 (pp. 194- 198) IEEE.
4. Aishwarya S, Kaiwant S, Anandji C, Tatwadarshi N, “An Innovative Machine Learning Approach for Object Detection and Recognition,” in 2018 2nd International Conference on Inventive Communication and Computational Technologies (ICICCT), Apr 20, IEEE.
5. Jeong H J, Park K S, Ha Y G, “Image Preprocessing for Efficient Training of YOLO Deep Learning Networks,” IEEE International Conference on Big Data and Smart Computing,, (pp 635-637), 2018 Jan 15.
6. Yawei H, Huailin Z, “Handwritten Digit Recognition Based on Depth Neural Network,”IEEE, ICIIBMS Track2 2017 Nov 24.
7. Malay S, Rupal K, “Object Detection Using Deep Neural Networks,” International Conference on Intelligent Computing and Control System, 2017 ICICCS IEEE. June15.
8. Xinyi Z, Wei G, Wenlong F, Fengtong D, “Application of Deep Learning in Object Detection,” IEEE, 16th International Conference on Computer and Information Science,ACIS May 24 2017.
9. Ani R, E Maria, J.J, V Sakkaravarthy and M A Raja, "Smart Specs: Voice assisted text reading system for visually impaired persons using TTS method", IGEHT, IEEE, Mar 16 2017, pp. 1-6.
10. Tianmet G, Jiwen D, Henjian L,Yunxing G, “Simple Convolutional Neural Network on Image Classification,” IEEE in 2017 2nd International Conference on Big Data Analysis (ICBDA), (pp. 721-724) Mar 10.