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OBJECT DETECTION AND RECOGNITION USING TENSORFLOW FOR BLIND PEOPLE

Ms. P Devika[*1], S P Jeswanth[*2], Billu Nagamani[*3], T Anuja Chowdary[*4], Madhan Kaveripakam[*5], Nama Chandu[*6]

[*1]Associate Professor, Department Of Computer Science And Engineering, Siddartha Institute Of Science And Technology, Puttur, India.

[*2,3,4,5,6]Students, Department Of Computer Science And Engineering, Siddartha Institute Of Science And Technology, Puttur, India.

ABSTRACT

Computer Vision impairment or blindness is one such top ten disabilities in humans, and unfortunately, India has the world's largest visually impaired population. For this we are creating a framework to guide the visually impaired on object detecting and recognition, so that they can navigate without others support, and be safe within their surroundings. In this system the captured image is taken and sent it as input using camera. SSD Architecture is used here for the detection of objects based on deep neural networks to make precise detection. This input will be given to the software and it will be processed under the COCO datasets which are predefined in the Tensor flow library used as training dataset for the system in general this data set consist of features for nighty percent of real world data objects and distance is calculated by depth estimation and also by using voice assistance packages the software will produce the output in the way of Audio.

The System is implemented completely using Python Programming Language since python consist of many inbuilt packages and libraries which will make the complication of writing code more number of lines into simple any less number of lines.

Keywords: Object Detection, Tensor Flow, COCO Datasets.

I. INTRODUCTION

The fast progress of data and organize technology has advanced from the Internet and computerization systems that were initially utilized for authoritative offices and mechanical and economical applications to the application of these innovations every one's life. Once you think of technology like augmented reality, one of the key components to consider is object acknowledged innovation, moreover known as object detection. This term specifies to a capacity to distinguish the frame and shape of diverse objects and their position in space caught by the camera. It's a known reality that the number of visually disabled individuals within the world is almost more than 280 million, roughly break-even with the 25% of the Indian population. They suffer-normal and difficult challenges in regular activities particularly when they are on their own. They are generally dependent on somebody for gettingto their day-to-day works. So, it's a very challenging and the nonphysical arrangement for them is of most extreme significance and much required. One such solution from our side is that we came up with an Machine Learning Framework permits the blind activities to distinguish and classify general Time-Based day-to-day object and produce voice outputs and calculates distance using mathematical calculations which produces alerts whether user is exceptionally near or far absent from the source. The same framework can be used for Obstacle Detection Instrument. The primary reason for object detection is to find different things, which draw rectangular bounding boxes around them, and decide the course of each item found. Applications of object discovery emerge in large no of diverse domains counting recognizing people on foot for self-driving vehicals, checking crops, and indeed real-time ball following the basket.

II. OBJECTIVE

The project goal is to incorporate an art of techniques for object detection to achieve high accuracy with real-time detecting performance. In this project, we use Python programming language with an TensorFlow-based solution for solving the problem of object detection in an end-to-end solving fashion. The proposed system will be fast and effiecient. A TensorFlow based application approach for an mobile device, using its built-in hardware component camera is used for detecting objects, more specifically:

The framework is prepared in such a way where an mobile application (assuming you're using it on an

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Android/ios device) will capture real-time frames and will send them to the backend of the application where all the predefind computations takes place.

Fig 1: Objects for object recognition which consist a dog and a duck on the beach

- Along with the object finding, we have used an alert framework where distance will get calculated. In case the Blind Person is especially close to the object or is far away at a safe put, it'll produce voice-based outputs yields alongside distance units.
- The backend of the application is where the video clip is sent and is taken as an input, which goes through the COCO DATASETS object detection model one of the datasets predefined and which tests and detects with accurate metrics.
- After testing output of the application will sent to voice modules the course of the object will be changed into default voice notes which can at that point be sent to the users for their needs.
- Along with the object finding, we have an alert voice framework where figure out distance. In case the Blind victim is especially close to the source or is distant far away at a more secure place, it'll generate voice notes alongside distance measure units.

III. LITERATURE SURVEY

OBJECT DETECTION USING CONVOLUTIONAL NEURAL NETWORK

In 2019, "Object Detection using convolutional Neural Networks". As Vision systems are essential in building a mobile robot. That will complete a certain task like navigation, surveillance, and explosive ordnance disposal (EOD). Vision systems are essential in building a mobile robot. A project was proposed based on CNN, which is used to detect objects in the environment. Methodology used- Two state of art models are compared for object detection, Single Shot Multi-Box Detector (SSD) with MobileNetV1. Another methodology is A Faster Convolutional Neural Network (Faster-RCNN) with the help of InceptionV2.

IMAGE BASED REAL TIME OBJECT DETECTION ALONG WITH RECOGNITION IN IMAGE PROCESSING

In 2019, "Image Based Real Time Object Detection and Recognition, In Image Processing" Object detection and tracking mainly for human and vehicle is presently most active research topic. It is used in applications such as surveillance, image retrieval. A solution was proposed which has reviewed recent technologies for each phase of the object detection. The methodology used here is four different methods for object detection which is nothing but a computer technology related to computer vision with image processing that deals with detecting instances of semantic objects of a certain class in digital images and videos and, they are feature based detection, region based detection outline based detection illustrations and model based detection.

SALIENT OBJECTS DETECTING WITH SEGMENT FEATURES USING MEAN SHIFT TECHNOLOGY

In 2020, "Salient Object Detection with Segment Features Using Mean Shift Algorithm". The object recognition has attracted high attention for its diverse applications in everyday life. It is used in applications such as surveillance, image retrieval. A solution was proposed which introduced a new fast method for saliency object detecting within images. The main aim was detection of objects in complex images. The methodology used has four steps: regional feature extraction, segment clustering, saliency score computation and post-processing.

REAL-TIME OBJECT DETECTION USING DEEP LEARNING

In 2020, "Real-Time Object Detection Using Deep Learning". Object detecting, recognition in images and videos is one such major thing today. For this a solution was proposed using deep learning. The methodology used

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here includes feature extraction with the help of Darknet-53 along with feature map up sampling and concatenation. Model includes various changes in object detection techniques.

ASSISTIVE OBJECT FINDING SYSTEM FOR VISUALLY IMPAIRED PEOPLE

In 2020 ,"Assistive object Recognition/finding System for visually impaired" The issue of visual impair or blind people is faced worldwide, for this a solution was proposed where two cameras placed on blind person's glasses, GPS free service, and ultrasonic sensors are employed.

To give information about the surroundings. The methodology used here is system takes real-time images as input, then images are pre-processed based on the job, their background and foreground work are separated and then the DNN module with the help of pre-trained YOLO model is applied for resulting in featured extraction.

IV. PROBLEM FINDING

The Populated number of people visually impaired in the world is more than 290 million. In this 42% are blind and 58% have no vision. They are an important part of our society. It's very difficult for them to live the outside world independently. Today in the fast moving society, visually impaired people require supportive instruments in their day-to-day life. Our thought primarily centered on developing an assistive framework for impaired people to detect objects effectively which can be helpful to live.

PROBLEM DESCRIPTION

The system is designed in such a way where an mobile application will capture real-time objects and will send it to a laptop based networked server where all the important computations take place and utilizing a pre-trained SSD detection model which is trained on COCO datasets the objects will detect and recognized by the system. After that distance will be calculated and the output for this will be in audio form where the system gives warnings with calculated distance.

V. EXISTING SYSTEM

Most of the computer vision systems exist now-a-days to help the people who are visually impaired in their life. These include technological Augmented Reality approached wearable goggles, video calling applications for the visually impaired to ask for assistance, AI and GPS based navigation systems, etc. These systems are developed to work in specific cases or conditions, and cannot be used broadly. There are cases wherein the people with visual impairment have to accept about their surroundings, which is not possible with the existing systems.

DISADVANTAGES OF EXISTING SYSTEM

- They are expensive.
- Most of the visually impaired people (assume single person) cannot afford such highly economical products.
- These systems may be complex in functionality, making it difficult to be used by the blind people.
- Some systems are not real-time.

VI. PROPOSED SYSTEM

In this proposed system, we are using Python with an Tensor Flow-based approach to find the solution for the problem of object detection in an end-to-end fashion. We used SSD Detection Model for the detecting of items based on deep neural networks to make effective detection and OpenCV library for real time picture capturing. Among ImageNet, Google Open, COCO datasets we are using COCO since it will provided class of classified feature for more than 90% of the real world objects. The image is sent as an input to the model and meanwhile distance is calculated using depth estimation with the help of voice modules predefined by python the output of the object name will be converted into default voice notes which are sent to the blind people for their help with calculated distance along with measures.

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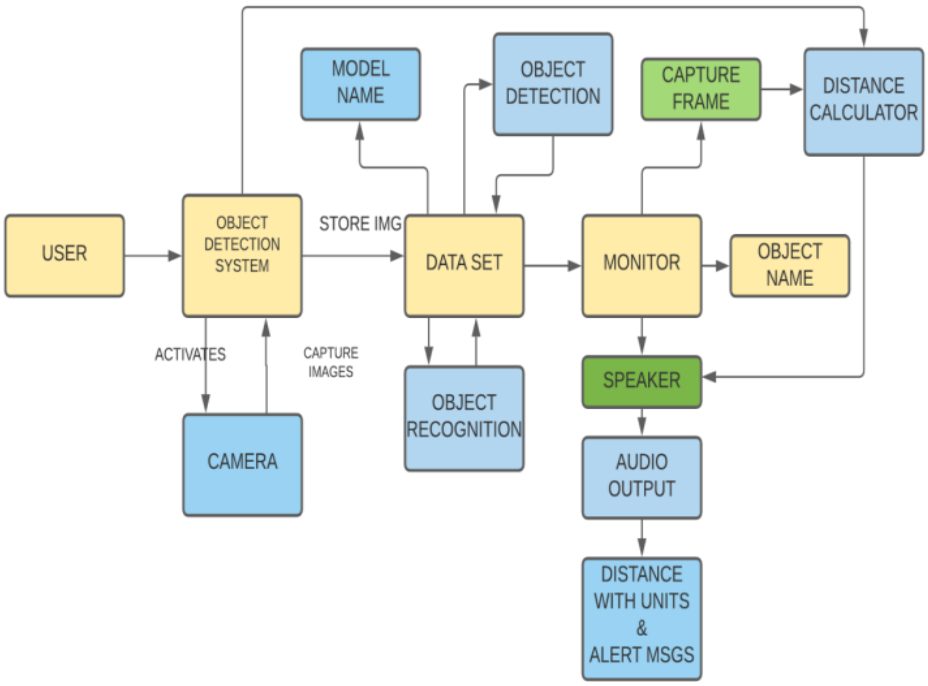

Fig 2: System Architecture

User starts the System, after that the system will activate the camera and capture instant real time images which will be considered as input. After capturing images it will store and send to the dataset where using SSD Architecture the internal computations will takes place mean while after the computations the model will detect the object and recognition will be done.

After detection of object next it will be displayed on the monitor where frames are captured to the detected object along will the labels. Next distance will be calculated using depth estimation by finding mid ranges to the frames. Now using speakers which are based on voice module packages the detected object images will be read as text and it will be the output.

ADVANTAGES

- Easy to use.
- Provides real-time results and this result is in the voice format with distance.
- Depending on the video quality, difference between various objects like chair and table etc can be easily differentiated.
- Due to usage of COCO datasets it will provide the 90% of results efficiently.

VII. MODULES

Video Capturing Module:

When the system is turned on the system capture images using camera. We have to connect this as input to the COCO dataset and classification of pixels and features takes place. The captured frames can be seen in the monitor with drawn boundaries and label. The method videocapture( ) is used to start the camera and capture the video.

Image Processing Module:

OpenCV (Open Source Computer Vision) is a library in python which functions mainly aimed at real-time computer vision. It is mainly used to do all the computational operation related to images. cv2 is used to perform image processing and make use of methods which are used to detect and capture the frames and specifies names. This module is processed after the input is taken from the camera.

Object Detecting Module:

The algorithm will take the image as input and all the computations will take place like divding the image into neurons nothing but pixels and classification of features which will be done on Neural Network. Image will be read as string for the next computation and it will be compared under trained dataset. This can be achieved

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here by using category index where 90 objects are trained separately. Here we used SSD Architecture which comes under Tensor Flow API .

Distance calculation Module:

To find the distance of the object numpy is used, which is pip package used for mathematical calculation. Finding distance can be approach by using depth estimation, using detected objects visible on the monitor frames the depth estimation will take place by finding mid ranges and rounding the estimation scale to 0-10.

Audio Output Module:

Next after detecting the object and calculating the distance our aim is to give the output in the audio using voice notes. In the output we are going to specify the distance along with units and the warning messages to alert the user. For audio output the pyttxs3 pip package which is predefinded python built in module used for converting text to speech.

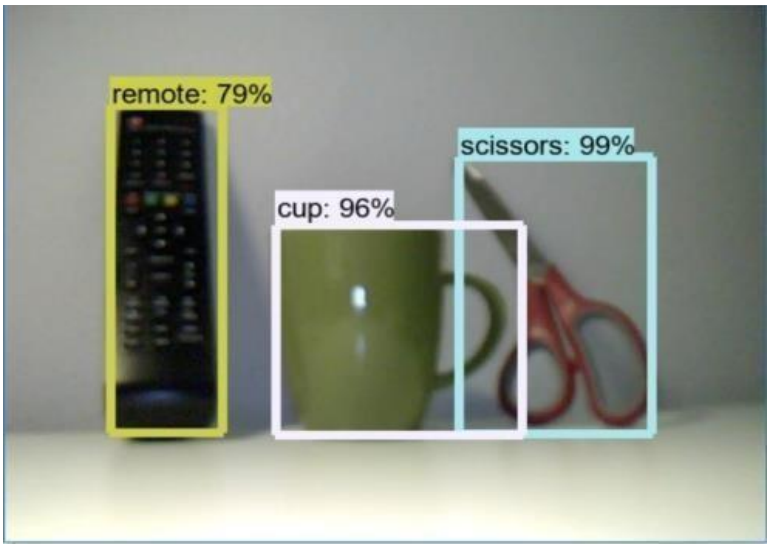

Fig 3: Object Detection

VIII. CONCLUSION

Previous studies have proposed a number of methods to detect object. After doing literature survey, different techniques has been found for detecting and Recognition of Object and they use different types of data as input for their methodology. After the survey of different types of methods, it is found that using SSD Architecture model which was trained under COCO datasets is the easy method which can be easily applied and appropriate in all conditions. We decide to explore this method of computer vision and proposed a noble method to detecting and recognize the objet based on Tensor flow and finding distance, sending output through voice assistance like speaker, by this blind person can live without depending on others for their day to day life on detection and recognizing the object and will alerted because of voice outputs. As per future work we are willing to make an application software for the IOS devices.

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