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SMARTASSISTANCE FOR VISUALLY IMPAIRED AND BLIND PEOPLE

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Abstract:This study proposes the creation of a smart application that will benefit those with visual impairments. Visually handicapped people are at a disadvantage in today's society since they have no knowledge of the environment. The general populace has prejudices about blind people that they believe to be true. The large number of non people believe that blind people are unable to work or live a normal life. The difficulty of traveling from one location to another without the support of others is one of the key challenges. Other difficulties include recognizing people, spotting obstructions, and so forth. Some products on the market can assist them in overcoming some of these obstacles. There are always a bunch of new studies underway with the sole purpose of developing technologies to assist these visually impaired individuals. As a result, with advanced new technologies, it is possible to expand the assistance provided to them. The notion is accomplished using a Mobile application that includes functions such as voice command, image processing, and others. The device is a vocal style device that helps visually impaired people with daily duties.The system combines a variety of accessible technologies into an administrating application that may be used by the sight impaired. The goal is to guide blind or visually impaired people around impediments in their path.

***Keywords*—blind, visually impaired, obstacle detection, voice warning messages, mobile application**

I. Introduction

Blindness is a misunderstood type of disability.The general populace has prejudices about blind people that they believe to be true. The large number of non-people believe that blind people are unable to work or live a normal life. Blind individuals follow their own set of rules and lead normal lives. However, they face challenges as a result of inaccessible infrastructure and social problems. They are affected not just by vision loss, but also by a decline in the general quality of their life, which has an impact on their level of independence.

The country's legally blind population is so huge that it has a substantial effect. In reality, in today's fast-paced society, the average person does not have time to notice these individuals with special needs. As a result, those who are blind or visually impaired require ongoing assistance in their daily activities.

Getting from one area to another without the help of others is one of the most challenging undertakings. Being reliant on someone can lead to a sense of demotivation and, in certain situations, a loss of self-confidence. Other difficulties include recognizing people and sensing barriers in their path.

Some products on the market can assist them in overcoming some of these obstacles. There are always a bunch of new studies underway with the sole purpose of developing technologies to assist these visually impaired individuals.

As a result, there is a need to create an application that can assist the visually impaired in detecting objects while on the move. The proposed technology, which is entirely dependent on voice commands, employs Artificial Intelligence to aid visually impaired persons. It can also recognize images from still images or video data.

II. Proposed System

Tools and Libraries:

TensorFlowis a machine learning platform that's also open source. It includes a diverse set of tools, modules, and community programs that enable researchers to gain expertise of machine learning while also allowing developers to quickly construct and deploy ML applications.

a) SSD Architecture

Tensorflow has a bunch of pre-trained models. Depending upon system specifications, SSD detection is used to provide faster and accurate results.

There are two pieces to a Single Shot Detector (SSD): a model with an SSD head and a one with a backbone The backbone model, as a feature extractor, is simply a learned image classification network. The SSD head is made up of one or more convolutional layers that are added to the backbone and read as bounding boxes and object classifications in the spatial position of the final layer activations. SSD divides an image into grid cells, each of which is in charge of identifying things in its own zone. Detecting objects entails predicting an object's class and location inside a certain area.

b) Anchor Box

Each single pixel in SSD can have many anchor boxes attached to it. These predefined anchor boxes are individually accountable for a specific size and shape within a grid cell.During training, SSD uses the matching phase to ensure that the anchor box and the enclosing enclosures of each real data object within an image are a good match.The anchor box that bears the strongest likeness to an item can forecast the object's class and position. This feature is used to train the system as well as to predict the identified objects' locations once it has been trained. In effect, each anchor box is given an aspect ratio and a zoom level.

c) Zoom Level

All objects do not have the same shape. Some are narrower, some are wider, and some are shorter, longer, or both. The SSD architecture supports this by allowing the anchor boxes to havepre-determined aspect ratios. The ratios parameter of the anchor boxes paired with each grid at each zoom level can specify multiple aspect ratios.It's possible that the anchor boxes don't have to be the same size as the grid cell. Within a grid cell, the user may be looking for both smaller and larger items. The zooms option specifies how much the anchor boxes of every given pixel should indeed be adjusted up or down.

Methodology:

- The system is set up such that the programme may capture actual pictures and transfer them to a PC that serves as a server for all of the computations.

- A detection model which is trained using coco datasets will be used by the laptop which acts as a server. The model will test, and accurately detect the output class.

- After testing, with speech modules, the object's class will be turned into a set of default voice notes, which will be provided to the blind victims for aid.

- In addition to the object detection, we used an alarm system that will calculate an estimate. If the Blind Person is very close to the frame or in a safer location, it will generate voice-based outputs as well as distance units.

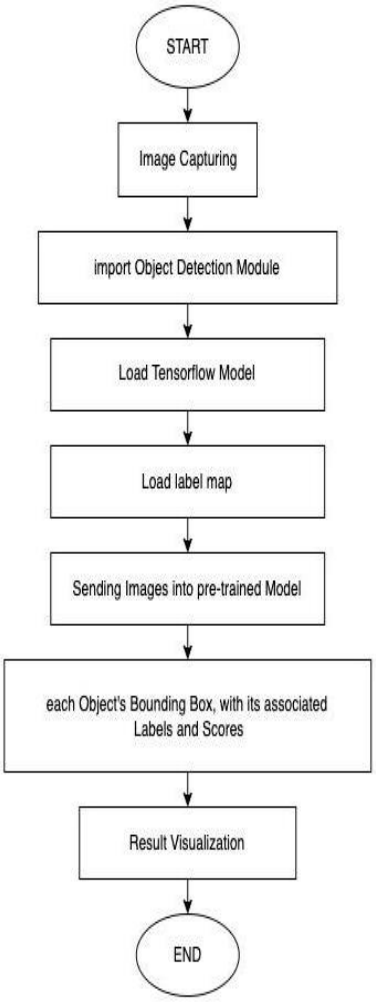

Fig 1. Workflow of Object Detection Algorithm

III.Literature survey

Joe Louis Paul I et al.[1] proposed a device made up of a Raspberry Pi computer connected to a camera, sensors, headphones, and other peripherals. GPIO pins are used to link all of the components (General Purpose Input Output).On the device, an LRD circuit is also coupled to a Light Emitting Diode (LED). The device continuously monitors the user's current location via GPS. Route navigation and facial detection and identification are two subsystems used by the gadget. It is not reliant on the internet. The device takes pictures of items from a certain distance away.

Divya .S, et al.[2] presented a methodology that uses ultrasonic and infrared waves generated by the relevant sensors to determine the obstruction. During an emergency, the device uses GSM and a GPS module to send alarm messages and track its whereabouts. When a blind person is in danger, he or she can send an emergency message. The device is powered by a battery with a 12 hour capacity. The walking stick has the problem of being stuck in cracks and uneven surfaces.

Kasthuri R et al.[4] proposed a device that allows the blind and visually impaired people to connect to all the web servers easily through their smartphones. It uses a Speech Recognition Engine (SRE) which converts speech into text for easy immediate actions and it is also added with an interface which allows the visually impaired individuals to get the newest information from their smartphones. This makes it easier for them to access Google maps and Music systems. Once the battery of the smartphone goes below 10% then it does not give the users the optimal results.

Arjun Pardasani et al.[5] proposed a glass that will classify and detect objects. It identifies the name of the object and gives the user the output in terms of audio. It will also change text to braille which is kept for further processing like printing the output in braille for the blind individuals. The second type of device is a pair of shoes which is joined using sensors and are used to alert the visually impaired individuals of the obstacles close to them. This proposed system is very complicated and the final output is very slow.

Shubham Melvin Felix et al.[6] present an approach that uses Artificial Intelligence, Machine Learning, Image and Text Recognition to assist people who are blind or visually challenged. The idea is realised using an Android smartphone app that includes a vocal assistance, image recognition, money recognition, an e-book, a chat bot, and other functions. Voice commands can be used to detect items in the immediate vicinity, and text analysis can be used to detect words inside a text document. The

equipment will be difficult to use for someone who is unable to speak. It also aids in the detection of full intensity and major color directions.

S.Durgadevi et al.[9] this presents a model where the images are captured using the camera on their smartphones and then these images are interfaced with a board called raspberry pi to process the next steps. After passing the images through raspberry pi it is then sent to the processing board. They use ROI (region of interest) to change and identify the text from the images. Python language is used for image processing because it helps the device adapt well with the current trends.

IV. Output

The figures below show object detection module identifying objects based on pre-defined model.

Fig 2. System identifying umbrella with 64% accuracy

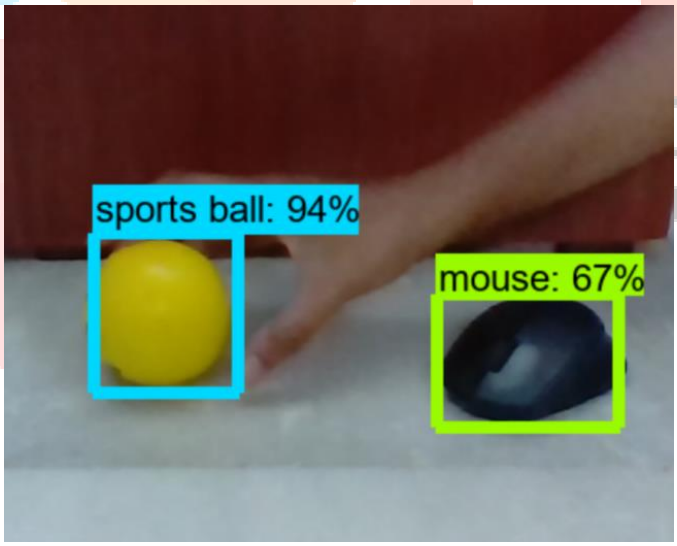

Fig 3. System identifying a sports ball and mouse with accuracy 94% and 67% respectively

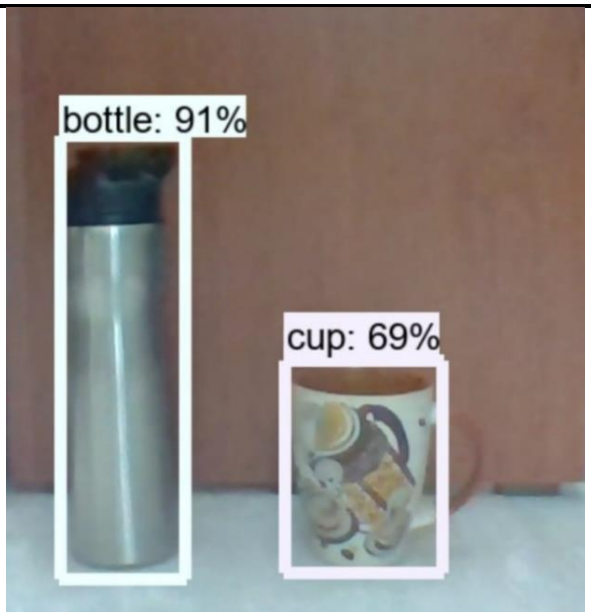

Fig 4. System correctly identifying a bottle and a cup

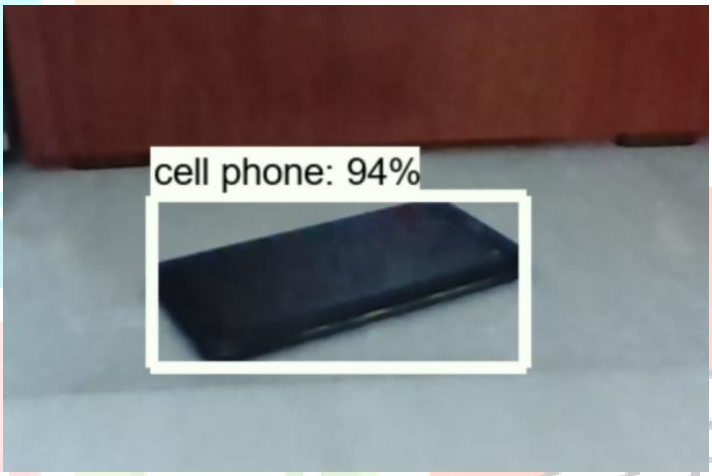

Fig 5. System identifying a cell phone with 94% accuracy

V. Conclusion

The suggested system combines the functions of the various components to produce a flexible smartphone for blind or visually impaired people. It is easy to use the application as it makes use of smartphones which are handy and portable. The application is designed for visually impaired persons and includes features such as object detection and voice guidance. It includes a user-friendly interface designed specifically for visually impaired persons, with the detection results spoken out loud so the user can hear them clearly. Hence, making their lives easier. Our proposed approach may be used in a multilingual application, allowing individuals to use it in their native language without difficulty. More information about the image obtained can help enhance image recognition. It's also compatible with Internet of Things (IoT) devices [3][12].

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