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OBJECT DETECTION AND ALERT SYSTEM FOR VISUALLY IMPAIRED PEOPLE

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ABSTRACT

Many people suffer from partial or complete blindness in this world. Though the risk of blindness due to numerous diseases has decreased by the means of medications given, it is awell-known fact that after a particular age fears of missing out on opportunities in life. Advancedtechnologies have proved to gain even the impossible. This project aims at helping people whoare visually impaired with their navigation. The main objective revolves around implementing object detection with an alert system and embedding it into a web application that is blind- friendly. Good vision is a precious gift but unfortunately, loss of vision is becoming common nowadays. To help blind people, the visual world has to be transformed into the audio world with the potential to inform them about objects as well as their spatial location.

1. INTRODUCTION

Object recognition is an overall term to depict an assortment of related Computer vision tasks that include recognizing objects in digital photos. It locates the existence of an object by creating bounding boxes around it.

A way to deal with implementing an object detection model is to initially fabricate a classifier that can classify firmly cropped pictures of an item. Figure 2 shows an instance of a comparable model, where a model is set up on a dataset of edited photos of a vehicle, a car, and the model predicts the probability of an image in that vehicle.

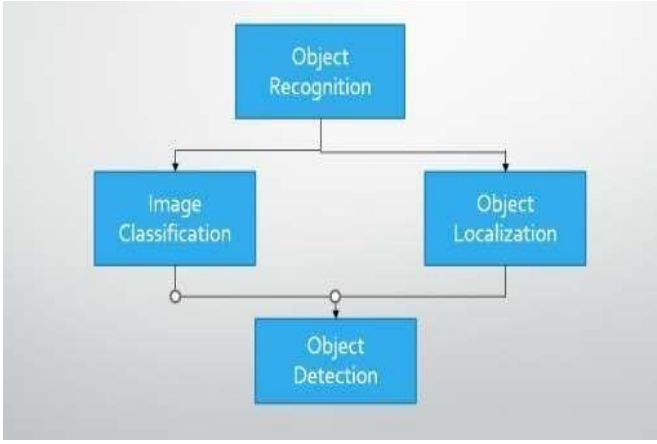

Fig 1 Object Detection Flow Diagrams

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Guiding blind persons in moving is a major factor in the enhancement of communityservice, support for disabilities, and providing for the special needs of all members of the community. This electronic assistance could help blind people be normal and productive members of society. Blind need to navigate in a known or unknown environment indoors oroutdoors. This requires knowledge about his location, direction, building entrances, distance to object/place around, and routing to reach a specific destination. This model is now used further to detect this vehicle by following the sliding window mechanism. This mechanism is applied to the whole image. A finer model that handles the problem of anticipating exact boundary boxes by utilizing the convolutional sliding windowmechanism is the YOLO algorithm. YOLO represents You Only Look Once and was createdin the year 2015 by Ross Girshick, Santosh Divvala, Ali Farhadi, Joseph Redmon, and Ross Girshick. It's famous in light of the fact that it accomplishes high accuracy while running in real-time.

This algorithm is popular on the grounds that it needs just one forward propagation pass across the network to put together a prediction. The algorithm dissects the picture into smallgrids and runs the classification of the image and localization algorithm on every one of the grid cells. For instance, we have an input picture of size 256 x 256 and we use a grid of 4 x
4. The object detector YOLOv3 helps achieve high accuracy considering real-time performance. It is an improved version of YOLO. YOLOv3 helps in predicting the object's position using only a single neural network and only in one iteration. To achieve this, this problem is considered a regression problem. It changes the input to class probabilities and positions.

PROBLEM STATEMENT

Problem Statements

Good vision is a precious gift but unfortunately, loss of vision is becoming common nowadays. To help blind people the visual world has transformed into the audio world
with the potential to inform them about objects as well as their spatial locations.

Specific problem statement

A huge number of people suffer from partial or complete blindness in this world. Our main objective revolves around implementing object detection with an alert system and embeddingit into an app that is blind-friendly. Our project aims at helping people who are visually impaired or blind with their navigation.

How this project solves the problem

We will use Computer Vision technologies to implement the same. We will be able to detectand recognize objects in front of the user. We will also design and implement an alarm systemto notify the user about the recognized objects using a voice assistant and give out a warningif there is any problematic situation.

2. LITERATURE SURVEY

YOLO can accurately identify objects, for instance, dustbins, within a reach of about 2-5 m ahead however the things that are beyond this reach are either not recognized or misclassified.YOLO is a real-time object detection algorithm. It is the most effective and efficient object detection algorithm. It recognizes what object is present in an image and where it is present.It uses a clever Convolutional neural network to detect objects in real- time. An image is divided into regions and boundaries are predicted with probabilities for each region. The mainadvantage of YOLO is that it is extremely fast, it learns generalizable representations of objects and it scans the entire image during training and testing. The subsequent issue detailedby the visually impaired users is the hindering of encompassing sound by

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utilizing earbuds. The third issue announced by the visually impaired users is "data over-burden" because the software is trying to advise users of different articles at the same time. We can settle this by delaying the notifications.

1) Prof. Seema Udgirkar, Shivaji Sarokar, Sujit Gore, Dinesh Kakuste, Suraj Chaskar, "Object Detection System for Blind People" The author of this work attempts to demonstrate how their smart vision, the goal of which is to move about the environment using a user-friendly interface system, was proposed. These writers created a system thatcan detect obstacles that are close to his head, particularly while entering through a door. Simply put, it is designed to protect his head from harm. This item is made to help blindpeople traverse any area. It uses the user's buzzer and vibration as two output modes todirect the user toward an object and provide information about an impediment. There aretwo different operating modes: buzzer mode and vibration mode. These outputs are madeavailable for blind people.
2) Jigar Parmar, Vishal Pawar, Babul Rai, Prof. Siddhesh Khanvilkar," Voice Enable Blind Assistance System -Real-time Object Detection". In this study, authors tried to identify a presented object in front of a webcam. They trained and tested the TensorFlow Object Detection API frameworks using made a model. To alleviate Input / Output concerns, a goodframe-per-second solution is needed because reading a frame from a web camera causes a lot of issues. As a result, they concentrated on threading technology, which dramatically reducesprocessing time for each item while improving frames per second. The item detected box takes about 3-5 seconds to move over the next object in the video, eventhough the application correctly identifies everything in front of the webcam.

. SNo.	Existing state of art	Drawbacks in existing state of art	Overcome
1	Visual Aid (Technology Dynamics Inc)	A different output device to alert the user of the objects.	Using audio as the output, which is present in the application. No need for a different device.
2	Object Detection Device (George Brandon Foshee, Timothy Allen Zigler)	An IoT device using proximity sensors helping to identify objects and alerting the user.	IoT devices may not be available to everyone, therefore we introduce an application for this purpose.
3	Object detection system consisting of a digital camera mounted on the person's eyeglass	Cost of the final product is high and therefore not accessible to all.	Our project does not cost much in terms of hardware used. Easy integration with mobile or web apps.

Table 1 Patents Studied

3. EXISTING SYSTEM

- A number of dedicated devices for navigation and object recognition are in use. These wearable devices have the disadvantage that they are expensive in comparison to software.Also, blind users are required to carry a number of gadgets and devices, each for a differentpurpose such as object identifiers.

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- ❖ Previously, they use a Convolutional Neural Network (CNN). The existing, PIR motor sensor detects movable vehicles or objects. The existing system was proposed to only object detection and give a voice command to the user.

DISADVANTAGES:

- o High complexity.
- o Time-consuming.
- o IoT devices may not be available to everyone.

A different output device to alert the user of the object.

4. PROPOSED SYSTEM

A Huge number of research and developments are going on in the domain of machine learning and object detection. A large number of new kinds of tools also came into existence. Few of those developments are similar to our idea. But all those projects' implementation has distinctions and differences in object detection like using different algorithms and different libraries for the processing. Our dataset contains nearly 90 objectnames that are useful and observed by a common man in our day-to-day life, which is enough for real-time object detection. we use the YOLO algorithm for object detection and Text to Speech conversion technique for voice alerts.

ADVANTAGES:

- Using audio as the output, which is present in the application. No need for a different device.
- IoT devices may not be available to everyone, therefore we introduce an application forthis purpose.
- Our project does not cost much in terms of the hardware used. Easy integration withmobile or web apps.
- Reduces time complexity.

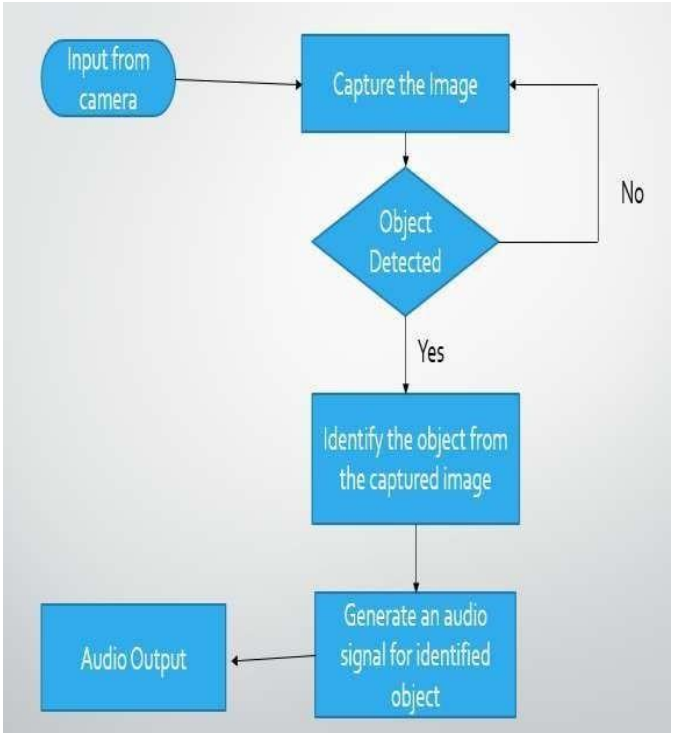

Fig 3. System Architecture

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5. RESULTS

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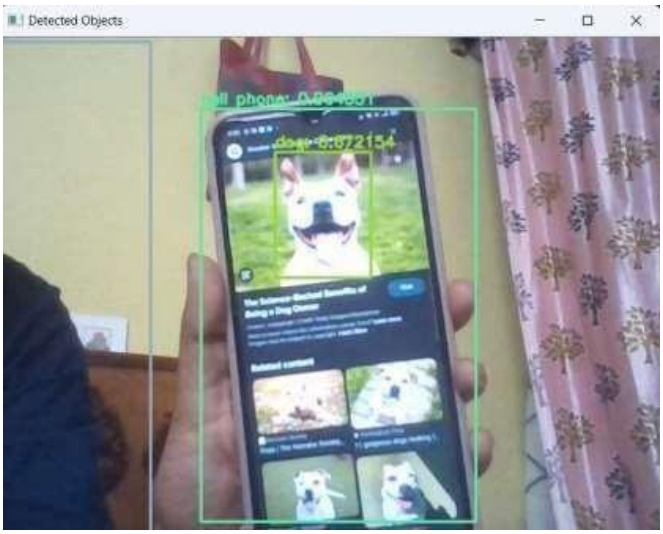

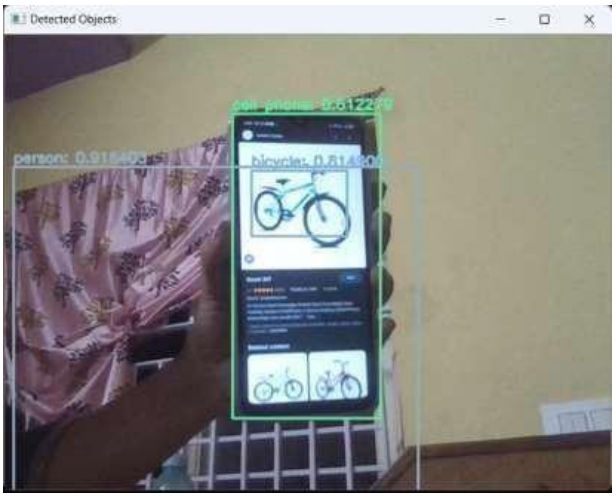

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6. CONCLUSION

In this project, YOLOv3 has been applied and proposed to utilize for object identification in light of the fact that of its favorable circumstances. It was used to settle the genuine issue of navigation for the blind and visually impaired people in real time. An audio alert system was also included that will tell the user about the objects in front. This project is integrated into a web app for better usability. The visually impaired person will beable to sense and feel the environment in a better way using our app. This project can be further scaled and integrated with other accessories used by blind people such as their walkingsticks.

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