

ML Algorithm-Based Virtual Eye Guidance System

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Abstract:

Object detection is used in almost every real-world application, including autonomous traversal, visual systems, and facial recognition, to name a few. The purpose of this study is to apply object detection algorithms to assist visually impaired people. It allows vision impaired people to be aware of their surroundings, enabling them to move freely. With promising findings, a prototype was developed on a Raspberry PI 3 using OpenCV libraries. This research looks at the many methods of detecting items with audio output using various object detection algorithms, such as a deep neural network for SSD constructed using the Caffe model. Along with vocal coaching, we've incorporated an emergency button to inform those nearby and a vibrator to alert deaf people to the obstruction in front of the camera.

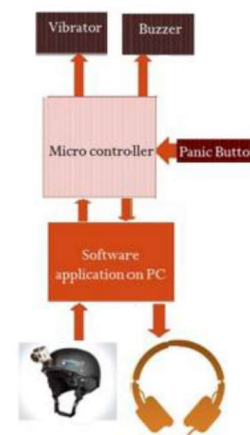
Keywords— Raspberry pi 3, Raspberry pi camera, Audio jack and Software is used.

1. Introduction

Advanced computer vision ideas such as neural networks and deep learning are gaining prominence. The real-time solutions provided by these approaches may be very adaptable and trustworthy. Visually impaired persons have historically navigated the outdoors using a white cane, which is ineffective. To increase assistance, a complicated system is necessary to assure safety and make the user highly aware of his or her surroundings. We must first grasp the distinction between object detection and picture classification before we can do object detection and classification. Image classification is the process of categorising a picture based on known qualities and patterns, while object detection is the process of precisely determining the bounding box of coordinates where a certain item is located in the image. In a single picture, we may identify many objects of the same class. Detecting items in an image may be accomplished in a variety of ways.

2. Materials and Methods

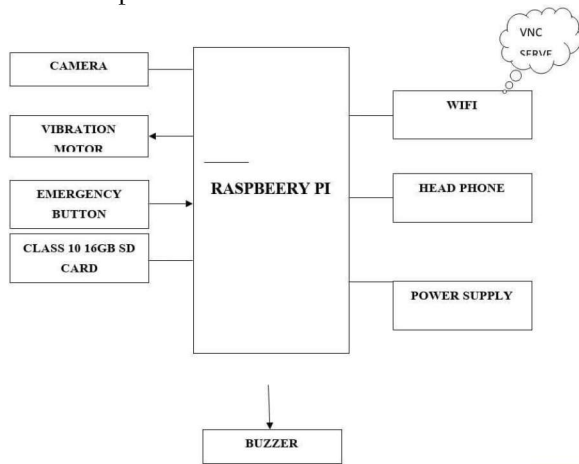
Object detection is aided by HOG properties. The SVM (Support Vector Machine) algorithm is used in this approach to construct classifiers by feeding hog characteristics calculated from each window generated by performing a sliding window. The HOG (Histogram of Oriented Gradients) feature descriptor splits a picture into small square cells, computes a histogram of oriented gradients in each cell, normalises the result using a block-wise algorithm, and produces a descriptor for each cell. Despite the fact that this method was invented decades ago, it is still one of the algorithms used for object recognition owing to its cheap processing cost.



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To overcome the obstacles in the current approach and develop a cost-effective and user-friendly solution for blind people. In our project, we utilise a Raspberry Pi

microcontroller, a camera, a vibrator, a pannic button, and an earphone.



The suggested Virtual eye for blind persons is shown in the figure as a block diagram. The block diagram contains a power supply, a RASPBERRY PI 3 microcontroller, a driver, a PC, a camera, and a headphone. The block diagram shows the basic operation of the whole system produced. The power supply circuit supplies the microcontroller module with a 5V regulated power source. The system's heart is a RASPBERRY PI microprocessor. A camera is used to recognise an image in front of a person. The driver circuit is used to connect the microcontroller to the PC. Headphones are used as an output to hear the speech.

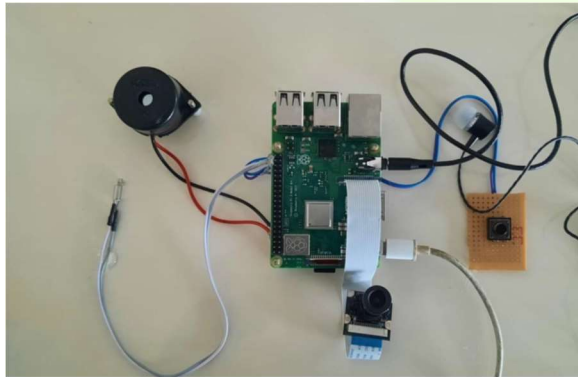


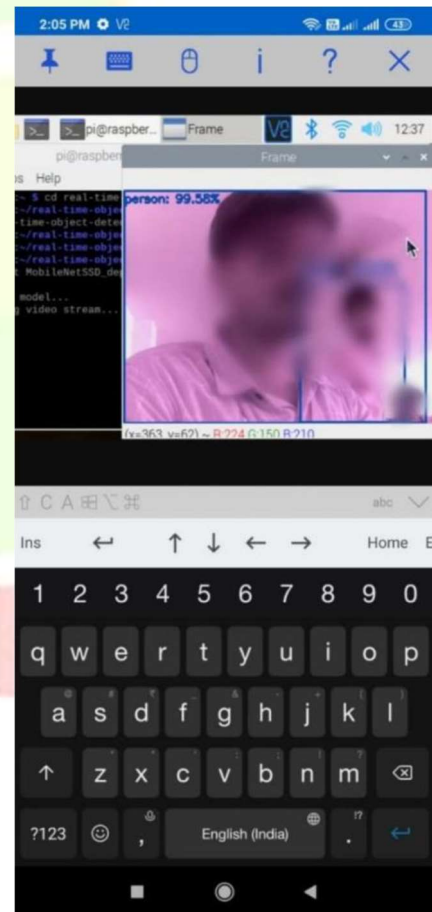
Figure 3: Experimental setup

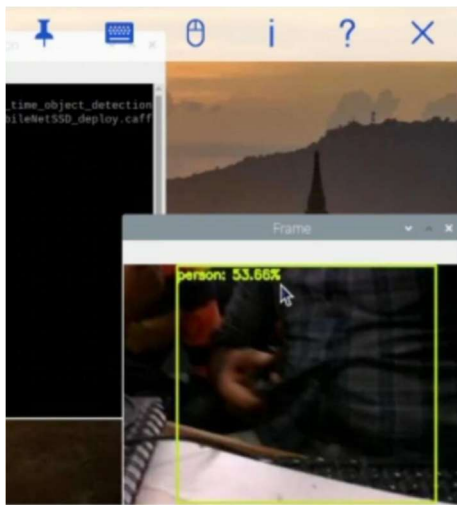
An electric power adapter may allow the connection of a power plug, also known as a power plug adapter, used in one location to an AC power socket used in another by providing connections for the various contact arrangements while without affecting the voltage. An AC adapter, often known as a "recharger," is a compact power source that converts home electric

current from distribution voltage to low voltage direct current (DC) ideal for consumer devices. Some change the power or signal characteristics, while others just change the physical shape of one electrical connection to another. One kind of serial port adapter for computers and associated goods allows connections between 25-contact and nine-contact connectors but has no effect on electrical power or signaling qualities.

3. Results

The camera views the person/object by detecting pictures, and the output is directed via the headphones. The items can be detected, and the output will be speech and vibrator. If a person is recognized, the voice will be identified as "PERSON" repeatedly. Similarly, the blind individual may identify and recognize any thing.





5. Conclusion

In this project, we discussed various approaches for object detection with its merits and demerits and successfully implemented the object detection with audio output. Along with voice guidance, we have implemented an emergency button to attract the nearby people and a vibrator to inform the deaf people about the obstacle in front of the camera.

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