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Object Detection And Recognition For Blind Assistance.

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Object Detection and recognition for Blind Assistance

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Abstract-

The aim of this is to explore different methods for helping computers interpret the real world visually, investigate solutions to those methods offered by the open source computer vision library, OpenCV, and implement some of these in a Raspberry pi based application for detecting and keeping track of objects. The main focus rests on the practical side of the project.

The result of this thesis is a GNU/Linux based C/C++ application that is able to detect and keep track of object by reading the pixel value of frame captured by the Raspberry Pi camera module. The application also transmits some useful information, such as coordinates and size, to other computers on the network that send appropriate query.

Keywords: Object Detection, Object Recognition, Computer Vision Technique.

INTRODUCTION -

People are witnessing the dawn of the new era of Deep Learning and embedded devices. Real life applications whether it be in the domain of Image recognition , Driver less cars , better preventive health care are all here today or on the horizon. The primary motivation which drives our team is how we can build a real-world application , in a cost effective manner which can benefit a section of society namely "blinds".

A. Problem Statement

One of the major problems faced by Blind people is detecting and recognizing an obstacle in their path. The projects approach lies in developing a system based on Raspberry Pi 3, which is capable of labeling objects with the help of OpenCV and Tensor flow libraries and converting the labeled text to speech and producing output in the form of audio signals to make the blind person aware of the object in front of him. The scope also includes measurement of the distance of the object from the person and reporting the same. Most of the Object Detection algorithm has been tested on GPU with high computation abilities and are less likely to achieve same speed and accuracy with less powerful devices with microprocessor only, which are in high demand in current scenario. We choose Pi 3 as our platform because it is a standard representative of embedded device and is widely being used for devising low cost-system. We would like to have a prototype that can successfully perform real time detection in about 5-10 fps on Pi, with decent accuracy.

B. Major Challenges

- Exploring OpenCV and Tenser flow libraries, discovering, selecting and applying their those aspects which will help in achieving our target (Object Detection and Recognition)
- Installing Tensorflow on Raspberry pi , embedding the code in it and working with Raspbian (Jessie) OS.
- Making command over Advanced Linux Sound Architecture (ALSA) , setting up Text-to-speech engine (eSpeak) and making use of alsa-utils package and alsamixer program to produce audio signals.

C. Significant contribution

BLOCK DIAGRAM

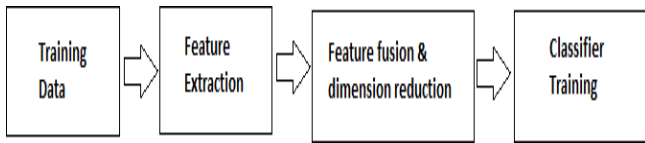
Fig. 1. Block Diagram of System

Raspberry Pi:-

The Rasberry Pi is a series of small single board computers developed in the united kingdom by the Rasberry Pi foundation to promote the teaching of basic computer science in schools and developing countries. The original model became far more popular than anticapated,selling outside its target market for uses such as robotics.

Fig.2. Raspberry pi

It does not include peripherals (such as keyboards, mice and cases). However, some accessories have been included in several official and unofficial bundles.

Raspberry Pi3 model B was released in Feb 2016 with a 64 bitquad core processor, and has on-board wifi, Bluetooth and USB boot capabilities.

OpenCV:

(Open Source Computer Vision) is a library of programming functions mainly aimed at real time computer vision. Originally developed by Intel, it was later supported by Willow Garage then Itseez(which was later acquired by intel). The library is cross-platform and free from use under the open source BSD license OpenCV .

GNU Octave is a high level interpreted language, primarily intended for numerical computations. It provides capabilities for the numerical solution of linear and non linear problems, and for perform other numerical experiments.

PI camera:-

The Raspberry Pi camera module v2 is high quality 8 MP image sensor custom designed by add-on-board for Raspberry pi.

Tensor flow:-

It is an open source software library for high performance numerical computation. Its flexible architecture allows easy deployment of computation across a variety of platforms(CPU's, GPU's, TPU's) and from desktop to clusters of servers to mobile and edge device

Matlab:-

(Matrix Laboratory) is a multi-paradigm numerical computing environment and proprietary programming language developed by Math works. MATLAB allows matrix manipulations, plotting of functions and data, implementation of algorithms, creation of user interface and interfacing with programs written in other languages including C, C++, C#, Java, FORTRAN and python.

Although Matlab is intended primarily for numerical computing, an optional toolbox uses the Mu PAD symbolic engine, allowing access to symbolic computing abilities.

PYTHON:-

It is an interpreted high-level programming language for general purpose programming. Created by Guido van

Rossumand first released in 1991, Python has a design philosophy that emphasizes code readability, notably using significant whitespace. Ot providex constructs that enable clear programming on both small and large scale. In july2019, the creator van Rossum stepped down as the leader in the language community after 30 yrs. Python features a dynamic type system and automatic memory management. It supports multiple programming paradigms, including object oriented, imperative functional and procedural, and has large and comprehensive standard library. Python interpreters are available for many operating systems. CPython, the reference implementation of Python, is open source software and has a community-based development model, as do nearly all of Python's other implementations. Python and CPython are managed by the non-profit python software foundation.

FLOWCHART
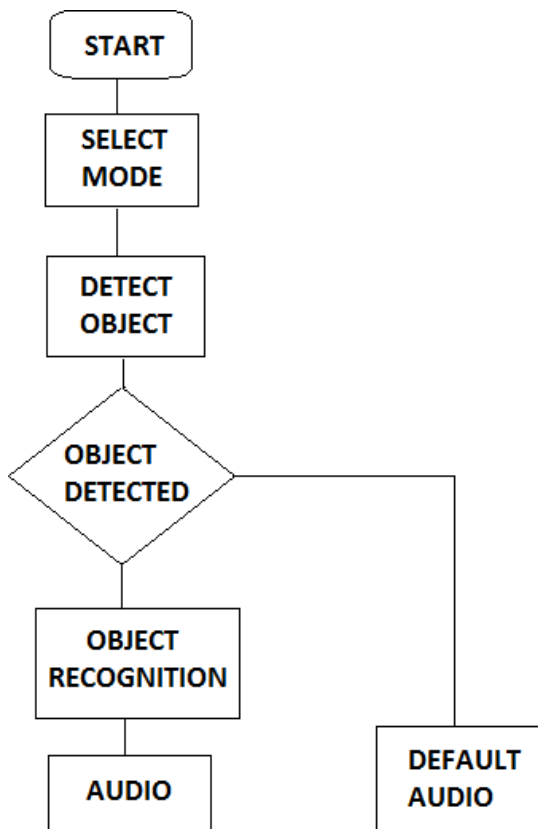
CONCLUSIONS

This assistive system will help the blind people to lead an independent life by giving them auditory input regarding their nearby objects. This system takes the images from user's environment and recognizes them, then adaptively learns about the frequently used objects thus making it more efficient. This system will also help other fields to identify objects, pedestrians, anomalies, etc thereby making system more visually capable and smart.

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