

BLIND ASSISTANCE USING MACHINE LEARNING

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Abstract — Visually impaired people face lot of inconvenience to move in and out without any proper assistance or help from others. Hence it becomes mandate to provide an user-friendly device to assist them. Thus, a solution for such people is proposed by an efficient technique like machine learning algorithm. In order to access machine learning technique. The necessary data input are obtained using a technique called Image acquisition. Multiple technologies like Convolutional Neural Network(CNN) is implemented. Convolutional Neural Network (CNN) is an algorithm used for image processing. It is a class of artificial neural networks that has been successfully applied to analyze the visual image. Using image processing we can recognize object and identify gender. The object in the vicinity is captured as images using camera. It can detect every object and identify gender precisely with in some prior distance. The captured images are then converted into audio signals for providing convenient means for assisting blind people. Thus, a flexible guiding mechanism with user friendliness is developed for helping blind people.

Keywords— *OBJECT, Keras, OpenCV, GENDER, Tensorflow,gTTS.*

INTRODUCTION

We know that the blind ones need to have assistor for each and every basic functioning so it's the right to do something for their survival with less dependence. The Object Detection system is proposed so that the blind ones can come to know about the things in his/her vicinity. This system existed long time ago where objects are given as the input and system was trained to identify them. So, the system didn't give proper output since there where only few input object added only for those it would have worked. To overcome this problem we have a real time system with pretrained dataset that is MobileNet.SSD and OpenCV as the platform where the image acquisition process takes place and finally the object detection id done. The main agenda is to help the blind ones to make them confident to live by their self so that at least 50% dependence will be reduced. The first task of identification of gender is done by OpenCV for Increased classification and identification. Now we have the Gender detection which are classified as male and female by their facial characteristics. When the object and gender both are present at a time it identifies both simultaneously one after the other. This is one of the advantages for the blind people to identifying both in a stretch. Gender detection is necessary as machine Learning and artificial intelligence is very good platform for classification and identification. Now after the object and gender are identified the incompleation takes since this message doesn't reach the blind ones this need to reach them because that is the main agenda. The object and gender after identification and recognition it needs to reach the blind with the help of the audio streaming. For this we have the text to speech conversion TTS that is textto speech system where the blind ones can know what object and gender in his/her vicinity.

RELATED WORK

In detection of object and gender this two were different system Here, in this the object and gender both are combined together in this proposed system a person face is identified from a picture that carries extra attributes in it. Consistent with, facial detection research requires reputation of expression, face tracking, and estimation of facial characteristics. With an image alone, the challenging mission is to discover the folks face from the photograph. There may be more issue in detecting the face because there are unique faces of various sizes, shapes, and colouring and many others. It's a hard task for blurred or grimy photos troubling via some other various things but not tough camera, and so forth.

The proposed System process as the following steps-

- 1) Datasets are taken and usage of OpenCV as the platform for the identification of the object.
- 2) Gender pre-trained dataset for the classification of gender by training them with CNN algorithm and classify based on the facial characteristic's features.
- 3) After the object and gender identification is done this needs to be conveyed to the blind ones for this we have the Google TTS that is text to speech conversion. By this we can come to know the working of the blind assistant proposed system it

gives the acknowledge. This helps the blind ones to be independent and can fulfill their basic requirement.

DATASET

Two datasets have been used for experimenting the current method. Dataset Mobilenet.SSD free source for object detection like book, pen , person , animal , car , train. Fig.1 shows different Object Detection.



Fig.1 Object Detection

Dataset 2 consists of 2597 images which consists of male and female. Dataset Cafemodel.SSD for gender detection. fig.2 shows the Gender Detection.



Fig. 2 Gender Detection

INTEGRATED PACKAGES

A. TensorFlow

TensorFlow is an open source library for mathematical calculation and enormous scope for ML. TensorFlow packages together a large number of Machine Learning and deep learning models and calculations and makes them valuable via a typical representation. It utilizes Python to give a helpful front-end API for building applications with the structure, while executing those applications in superior C++. It is also known as attribute application for identification. When we have Tensorflow all the basic libraries will be installed like numpy, pandas.

B. Keras

For the development of deep models we use Keras it is the updated version of Tensorflow. Keras is also used for disbursed training of deep getting to know models. Keras is used by organizations along with Netflix, Yelp, Uber, and so forth. in data processing, it helps to collect the general version.

C. OpenCV

OpenCV (Open-supply laptop vision Library) is an open- supply pc imaginative and prescient and gadget learning software program library. OpenCV was constructed to provide a not unusual infrastructure for pc imaginative and prescient applications and to boost up using machine notion within the business products. OpenCV is used in wide variety of utility which includes street view picture sewing, computerized inspection and surveillance, robotic and driving force-much less car navigation and manage, clinical photograph evaluation, Video/image seek and retrieval, films - 3-d shape from movement, Interactive art installations.

METHODOLOGY

Methodology of this system has been explained by dividing into parts- **Image processing, image classification and Voice Generation. The main purpose of image processing is visualization, image sharpening and restoration, image retrieval, measurement of pattern and image recognition. It includes the following steps-**

1. Importing images
2. Analyzing and manipulating the image
3. Output results can be altered image or a report based on analyzing that image

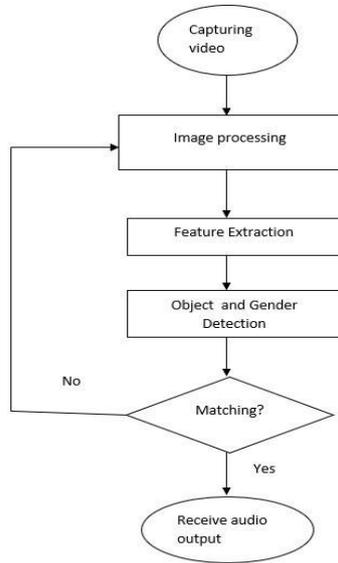


Fig.3 Flow chart of methodology

Image Processing

Image is defined in two dimensional array which are arranged in rows and columns. It is composed of finite number of elements which have particular value and particular location. They are referred as picture elements, image elements and pixels. Image can be binary image, black and white image, 8 bit color format or 16 bit color format. The binary image contains only two pixel elements 0 and 1. Black and white image contains only black and white image. 8 bit color format contains 256 different shades of colors which are commonly known as Grayscale Image. In this format 0 stands for Black, 255 stands for white and 127 stands for gray. 16 bit color format has 65,536 different colors known as High Color Format. This format has further three formats they are red, green, blue which are known as RGB format. There are several phases in image processing they are as follows-

1. Image Acquisition- In this phase, an image is sent in digital form which undergoes the process of scaling and color conversion.
2. Image Enhancement- To extract some hidden details from an acquired image such as brightness, contrast.
3. Image Restoration- It is the phase in which the appearance of the image is improved. It is based on the mathematical model.
4. Color Image Processing- It includes color modeling, processing in a digital domain.
5. Wavelets and Multi-Resolution Processing- It represents image in various degrees of resolution. It is divided into smaller regions for data compression and for the pyramidal representation.
6. Image Compression- It deals with image size or resolution. It develops some functions to perform this operation which is necessary to compress the data and to reduce the requirement of storing data.
7. Morphological processing- It extracts image components that are useful in representation and description of shape.
8. Segmentation Procedure- It divides image into constituent parts or objects. It is the most difficult task which requires lots of time for the successful solution of imaging problems.
9. Representation and Description- It follows the output of segmentation stage. Representation is part of solution for transforming raw data into processed data. Description is used to extract information to differentiate one class of object from another.
10. Object detection and Recognition- It processes the image and detects object in it and assigns a label to an object. Image Recognition is a ability to detect the object, classify and recognize it.

Image Classification

When a person is asked to look at a picture, it is easy for a person to identify. But the same doesn't go with computers it finds this task as difficult. They cannot identify the same way that human do. That is where image classification comes in. A machine can analyze an image and identify the class that the image belongs to. It is the process of finding model which helps in

separating the data into multiple categorical classes. Data is categorized into different labels based on some parameters received from input and labels are used for that data. Earlier image classification is based on raw pixel data which would breakdown images into pixels. But the problem is that two pictures can have same thing but can look different. For example they can have different backgrounds, angles, poses and so on. It is quite challenging for machines to recognize and categorize correctly. Therefore, image classification involves convolution neural network.

Convolution neural network is a class of deep, feed forward artificial neural networks which can be applied to analyze the visual image. It is an algorithm which can take input image, assign importance to various objects in the image which helps to differentiate one from the other. It is composed of multiple layers of artificial neurons. When we input an image each layer generates several activation functions that are passed on to the next layer. First layer extracts basic features such as horizontal edges. This output is passed to next layer which detects more complex features such as combinational edges. This community can run both on CPU and GPU.

Voice Generation

After the detection, it is important to acknowledge the person about the presence of obstacles on his/her way. For voice generation we have used gTTS library. It is library and Common Line Interface (CLI) tool to interface with Google Translate text to speech API. This will help to convert the processed information into speech which will assist blind people using speakers.

APPLICATIONS

The proposed system is user friendly so the blind people can get used to it easily as fast as possible. In future this can be an IOT model so that it is easy to use. In text to speech conversion the blind person can get the information about their surroundings. They can move independently like others without any inconvenience. Object detection is breaking into a wide range of industries, with use cases ranging from personal security to productivity in the workplace. Object detection and recognition is applied in many areas of computer vision, including image retrieval, security, surveillance, automated vehicle systems and machine inspection. It can be used in optical character recognition, self-driving car, object extraction from an image or video. Gender recognition can be used in many applications, such as video surveillance, human computer interaction and customized advertisement. It is focusing mostly on facial features for recognition. This system can also be used for Face detection and face recognition, Smile detection, Pedestrian detection. Text to speech conversion technology can be used for optical character recognition, smart homes, business function applications.

RESULTS AND ANALYSIS

The challenge was to identify the object and gender one after the other. Previously there were two different systems that are one object detection and the other one is gender detection so the challenging part of the project was to combine these two processes. We have used CNN for better accuracy since we have used machine learning as a platform for our project. Gender detection is based on characteristics of gender and face expressions. We have used pre-trained datasets for both object and gender detection. After detecting the information is converted from text to speech which helps to assist blind people through speakers.

CONCLUSIONS

Vision is the most important thing a human may have, and it plays a crucial role in a person's life. The life of a blind person is difficult because they can't analyze the situation like how the normal person does. Our system is used to assist blind and visually impaired persons to let them know what is around, by using CNN for detecting objects within images and video streams quickly based on neural network to make accurate detection. OpenCV and TensorFlow under Python and text to speech conversion to assist the blind people through voice message. The obtained results indicated the success of the proposed model in giving blind users the capability to move around in unfamiliar indoor outdoor environment, through a user friendly device by person and object identification model.

FUTURE ENHANCEMENT

This is currently a unidirectional system this can be implemented in all the directions. The present software is done using ML as the platform in future this can be implemented as an IOT model and can be implemented as a mobile application using Java codes. In this system object and gender is identified without measuring the distance between the obstacles and blind people in future they can implement to identify the obstacles within some prior distance.

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