SMART VOICE ASSITANCE FOR BLIND USING IMAGE PROCESSING

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ABSTRACT

Object detection is a modern computer technology related to image processing that deals with detecting instances of semantic objects of a certain class (such as humans, buildings, or cars) in digital images and videos. Well-researched domains of object detection for blind people include detecting the objects like chair, phone, table and other household objects etc. Object detection has many applications in many areas, including smart identification of objects for blind peoples this appliance can help to detect obstacles with the use of image processing techniques and minimize the possible risks due to obstacles. In this system some feature extraction algorithms are developed to extracting the important features of the object. After feature extraction the extracted values are trained and classified by the KNN classifier algorithm. The overall concepts are matched and recognized by MATLAB software.

Keywords: Image Processing, KNN algorithm, Blind assistance, Thresholding, SURF algorithm, Pre-Processing.

1.Introduction

Image Processing or Digital Image Processing is technique to improve image quality by applying mathematical operations. Image Processing Projects involves modifying images by identification of its two-dimensional signal and enhancing it by comparing with standard signal. The previous projects identify the obstacles in prior but only pops out buzzer sign as an indication to the user. The main drawbacks of the available project are that the obstacle type cannot be identified and the range for detection is too low. To overcome this, we hereby propose a project to identify the type of obstacle and refer them to the user with suitable naming audio.

The input image is read using the camera and digital image of the captured object(obstacle) is converted into binary image, fragmented, segmented and classified using KNN classifier algorithm, finally the image is converted into audio using specific MATLAB sketches the system proposed hereby drastically minimises the dangers faced by visually challenged by classifying and naming the obstacle with audio.

The rest of the paper is organized as follows. Chapter 2discusses the previous works on blind assistance projects. Chapter 3 presents the existing assistance tool. chapter 4 explains the smart voice assistance method. Chapter 5 contains the results of the proposed system. The paper is concluded in Chapter 6.

2.Related works

Various works have been done in the field of blind vision optics. The referred papers are as follows. The existing systems [13] and [14] has many drawbacks like short range, insignificant alarms etc. To overcome this in this system we use [1] Thresholding techniques and [5] edge detection techniques to convert the input image to audio by means of MATLAB software [10] and provide smart assistance to blind.

3.Smart voice tool

In this system using of image processing steps can going to identifying and classifying the objects. The thresholding algorithm segments the image after converting the colour image into Gray scale. Then some feature extraction algorithms are developed to extracting the important features of the object. After feature extraction the extracted values are trained and classified by the KNN-classifier algorithm. The overall concepts are developed and recognized by MATLAB software. The output of the recognized object is fed out in voice through speakers.

The figure 3.1 represents the block diagram of proposed system.

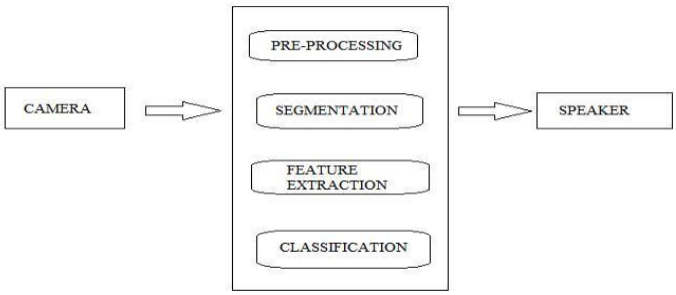

Figure 3.1 Block diagram of proposed system

a) INPUT:

Reads and Displays an input Image. Image is read using the imread command. In image processing, the image that is acquired is completely unprocessed.

b) IMAGE PREPROCESSING:

The aim of pre-processing is an improvement of the image data that suppresses unwanted distortions. Enhances some image features important for further processing. Neighboring pixels corresponding to one object in real images have essentially the same or similar brightness value. Thus, distorted pixel can often be restored as an average value of neighboring pixels.

RESIZING THE INPUT IMAGE: All the input images are resized into same dimensions. If the specified size does not produce the same aspect ratio as the input image, the output image will be distorted.

CONVERTING COLOUR FORMAT: For many applications of image processing, color information doesn't help us. To store a single-color pixel of an RGB color image we will need 8*3 = 24 bits (8 bit for each color component), but when we convert an RGB image to grayscale image, only 8 bits is required to store a single pixel of the image.

c) FEATURE EXTRACTION:

Feature is a piece of information about the content of the image. Feature may be specific structures in the image such as points, edges or objects. Feature extraction is related to **DIMENSIONALITY REDUCTION.** When the input data to an algorithm is too large to be processed and it is suspected to be redundant (e.g., the same measurement in both feet and meters, or the repetitiveness of images presented as pixels), then it can be transformed into a reduced set of features. Determining a subset of the initial features is called feature selection. The desired task can be performed by using this reduced representation instead of the complete initial data.

d) CLASSIFICATION:

Image classification refers to the task of extracting information classes from a **MULTI BAND RASTER IMAGE**. By creating a raster image, we can display a single band of data or colour composite from a multi band image. There are many classification algorithms are available and we use **KNN** (K-NEAREST NEIGHBOUR MACHINE CLASSIFICATION). KNN is one of the simplest algorithms used in Machine Learning for regression and classification problem.

4.Results and discussion:

INPUT IMAGE

The input image which is taken using a webcam. The input image(object) can be any object. The figure 4.1 shows the input object.

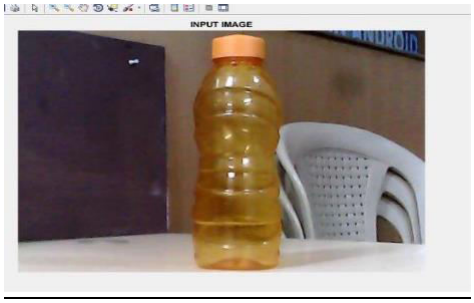

Figure 4.1 Input image

4.2 RESIZED IMAGE

The input image taken at any proportion is resized using pre-processing method. The image is resized to default value of 256 (rows and columns). The figure 4.2 represents the resized image.

Figure 4.2 Resized image

4.3 GRAY SCALE SCALED IMAGE

The resized image is later converted from RGB to Gray scale image for easy processing of the image. The figure 4.3 shows the Gray scale converted image of the object.

Figure 4.3 Gray scale converted image

4.4 SURF SEGMENTED IMAGE

The SURF algorithm takes all the important surf points of the image. The SURF algorithm is applied after the segmentation process. The figure 4.4 represents the surf segmented image.

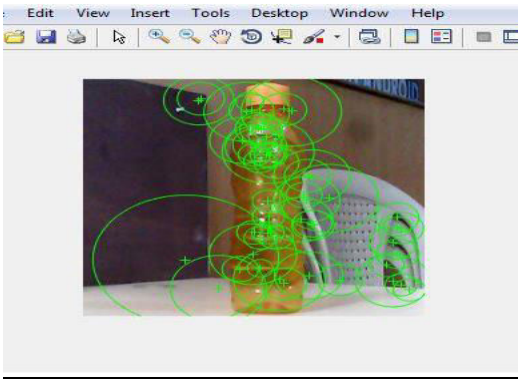

Figure 4.4 Surf segmented image

4.5 OUTPUT IMAGE

The final output is displayed in both verbal and voice representation of the input image. The figure 4.5 represents the output image in message box.

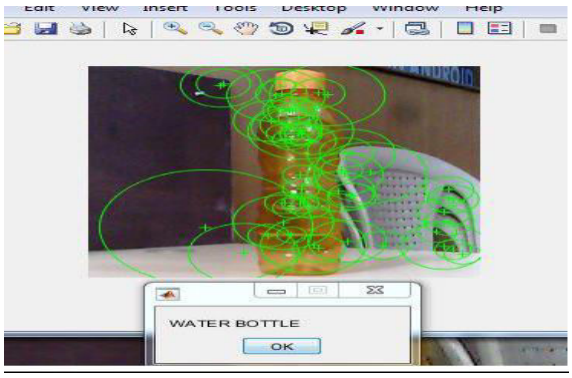

Figure 4.5 Output image

5.conclusion:

This paper presents the implementation of the object detection that helps the blind people for the purpose of secure and guaranteed safety. Object detection has many applications in many areas, including smart identification of objects for blind peoples this appliance can help to detect obstacles with the use of image processing techniques. In this system some feature extraction algorithms are developed to extracting the important features of the object. After feature extraction the extracted values are trained and classified by the classifier algorithm. The overall concepts are developed and recognized by mat lab software. In future, with more time and with more comprehensive research the proposed system can be made more accurate. Also new object detection algorithms can be added so as to give the blind for better recognition.

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