WWW.IJRPR.COM

International Journal of Research Publication and Reviews

Journal homepage: www.ijrpr.com ISSN 2582-7421

Research Paper on Blind Assist System Using Ml and Image Processing

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DOI: https://doi.org/10.55248/gengpi.5.0524.1356

ABSTRACT –

This paper presents a Blind Assist System (BAS) leveraging Machine Learning (ML) and Image Processing (IP) techniques to enhance the autonomy and safety of visually impaired individuals. The system utilizes a convolutional neural network (CNN) to process real-time image inputs from a wearable camera device. Through ML classification, it identifies objects, obstacles, and environmental cues. The IP module further refines data, providing depth perception and spatial awareness. Leveraging ML's adaptability, the system continuously learns and improves its recognition accuracy. Integration with auditory feedback facilitates intuitive interaction, conveying vital information to users. In evaluations, the BAS demonstrates promising results in aiding navigation and increasing users' independence. The fusion of ML and IP offers a robust solution for empowering the visually impaired in navigating complex environments.

I.INTRODUCTION

The significance of eyesight in human perception cannot be overstated, as it enables individuals to comprehend and navigate their surroundings effectively. However, for visually impaired individuals, this fundamental sense is compromised, impeding their ability to experience and interact with the world around them. The International Classification of Diseases 11 (2018) categorizes vision impairment into distance and near presenting vision impairment, highlighting the diverse challenges faced by individuals with visual impairments.Globally, vision impairment is predominantly caused by uncorrected refractive errors, cataracts, age-related macular degeneration, glaucoma, diabetic retinopathy, corneal opacity, trachoma, and eye injuries. These conditions severely limit the ability of visually impaired individuals to navigate, perform daily tasks, and engage with their environment independently. Traditional solutions to address these challenges, such as the Eye-ring project, text recognition systems, hand gestures, and face recognition systems, have been introduced. However, these solutions often suffer from drawbacks such as being heavyweight, expensive, less robust, and low acceptance rates among users.In light of these limitations, there is a pressing need for advanced technologies to assist visually impaired individuals more effectively. To address this need, we propose a novel system that leverages the breakthroughs in image processing and machine learning. This system captures real-time images, preprocesses them to separate background and foreground elements, and applies a Deep Neural Network (DNN) module with a pre-trained YOLO model for feature extraction. The extracted features are then matched with known object features to identify objects present in the scene. Subsequently, the system utilizes text-to-speech conversion to provide auditory feedback, stating the names of recognized objects. This innovative approach aims to enhance the autonomy and quality of life for visually impaired individuals by providing real-time assistance in navigating their surroundings.

II.METHODOLOGY

Our project consists of two steps to achieve blind assist using image processing and machine learning

The steps are :

1: Designing and training the neural network to identify objects :

A convolution neural network is designed with multiple dense layer, with several activation functions such as relu and sigmoid.This neural network is trained with 1000’s of images of objects which are used in day to day life.The images used to train are collected using open source data sets available on the internet.The trained neural network is saved and used to identify object.

2: Object recognition and audio conversion

Live video acquisition using camera is the first step.video will be converted into frames of images which will be used to detect object.

The image is then pre processed to achieve required resolution using open cv library.

Preprocesses image will be sent to Convolution Neural Network to classify and detect object.The detected object is then announced using speaker

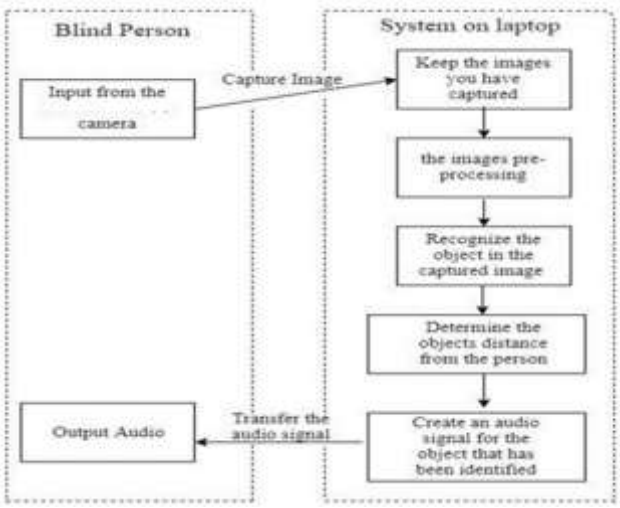

Fig 2: System Methodology

III.FLOWCHART

Camera Captures the Object:

The process begins with the camera capturing video frame of the surroundings.the scene. This involves taking a real-time image or

To gather visual data from the environment which will be used for further processing.

Detection of the Object Pattern from Captured Scene:

The system analyzes the captured image to detect patterns that may represent objects.

Feature Extraction from Object:

Once objects are detected, features are extracted from these objects to help in their identification.

This could include shapes, colors, textures, and other distinguishing characteristics.

Object Detection:

Using the extracted features, the system attempts to detect and classify the object.

Machine Learning Models: Convolutional Neural Networks (CNNs) or other deep learning models trained on a labeled dataset of objects are typically used for detection.

Cloud Storage Database: The system can refer to a cloud storage database that contains pre-trained models and labeled data to enhance detection accuracy and update models dynamically.

Matching?:

The detected object is compared against known patterns or objects stored in the system's database to check for a match.

Decision Point: If a match is found, the system proceeds to the next step. If no match is found, the process may loop back to object detection for further attempts or adjustments.

Producing Audio Output of the Recognized Text:

Once an object is successfully matched and recognized, the system produces an audio output to inform the user about the recognized object.

Text-to-Speech (TTS):

The recognized object's name or description is converted to speech using TTS technology, providing auditory feedback to the user.

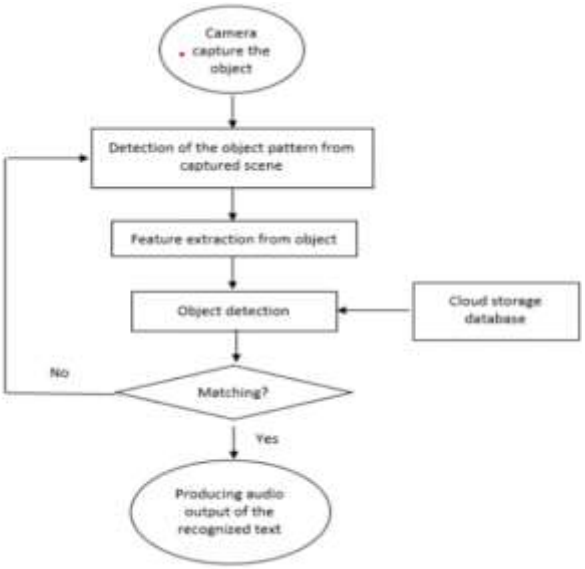

Fig 2: Flow chart

IV.CONCLUSION

In recent years, some solutions have been devised to help blind or visually impaired in recognizing objects in their environment but they are not efficient. Our purpose is toprovide a robust and comfortable system for the blind to recognize their surrounding objects. Our advanced system uses a USB camera to seize real-time images in front of the users. The machine learning and feature extraction technique for image to object detection using pre trained COCO model and in this model we have around 91 different objects trained perfectly and it can be used for detection of objects in real time for blind people, On the other hand we have book reading feature for the blind because for the blind people there are limited books to read because the format of the books are quite different from the useal book so this book reading feature will read the book and make the audio output of the book for the blind person.

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