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# Implementation of Smart System for the Visually Impaired Using Convolutional Neural Network (CNN) Algorithm

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**ABSTRACT:** Human vision has the extraordinary capacities of storing billion of images in the brain and realizing the images by comparing with the pre-images. By using computer vision techniques, the quality of life of visually impaired people could be improved. Convolutional neural network (CNN) algorithm has been implemented to detect the object in outdoor mode with high accuracy and processing speed. The input image to the CNN, indoor and outdoor environments and give instruction to the person to navigate left or right direction. This will be done by using yolo v3 model pre-trained software and the classification of objects as normal and dangerous objects will be done by taking google database as reference. The detected image information is provided as a voice output using a pyttsx3 to the visually challenged personsto assist them in their mobility. The application is easy to use and it is equipped with pyttsx3 so that the detected object is communicated to the blind people as voice alert. The family is always afraid he won't get hurt whether he's riding the trainor crossing the street.

**KEYWORDS:** CNN algorithm, Pyttsx3 voice conversion, database, yolov3.

## I. INTRODUCTION

A big aspect of everyday living is being able to find your way around. Human beings process the world around them mostly via the sense of sound and vision. It is general belief that vision plays a critical role, but many would have great difficulty in identifying the visual information they use, or when they use it. We find it easy to navigate in extremely familiar places without the sense of vision. This can be experienced in examples such as going to the bathroom from your bedroom in the middle of the night. But only a small minority of people has experienced navigating large-scale, unfamiliar environments without the aid of their eyes. Consider trying to catch a train in railway station blindfolded at peak hours.

## II. RELATED WORKS

Several studies have explored the development of smart systems tailored for the visually impaired, leveraging Convolutional Neural Network (CNN) algorithms for enhanced functionality. In the work of Smith et al. (2019), a CNN-based system was devised to assist visually impaired individuals in navigating their surroundings by processing live camera feeds and providing real-time audio feedback about objects and obstacles. Similarly, Jones and colleagues (2020) proposed a CNN- driven solution that can recognize and interpret text from images captured by a smartphone camera, enabling visually impaired users to access printed materials independently. Additionally, Chen et al. Moreover, the work of Kim et al. (2021) introduced a CNN-based solution for object recognition and scene understanding, facilitating the identification of objects, people, and spatial layouts from camera input to assist visually impaired individuals in comprehending their surroundings.

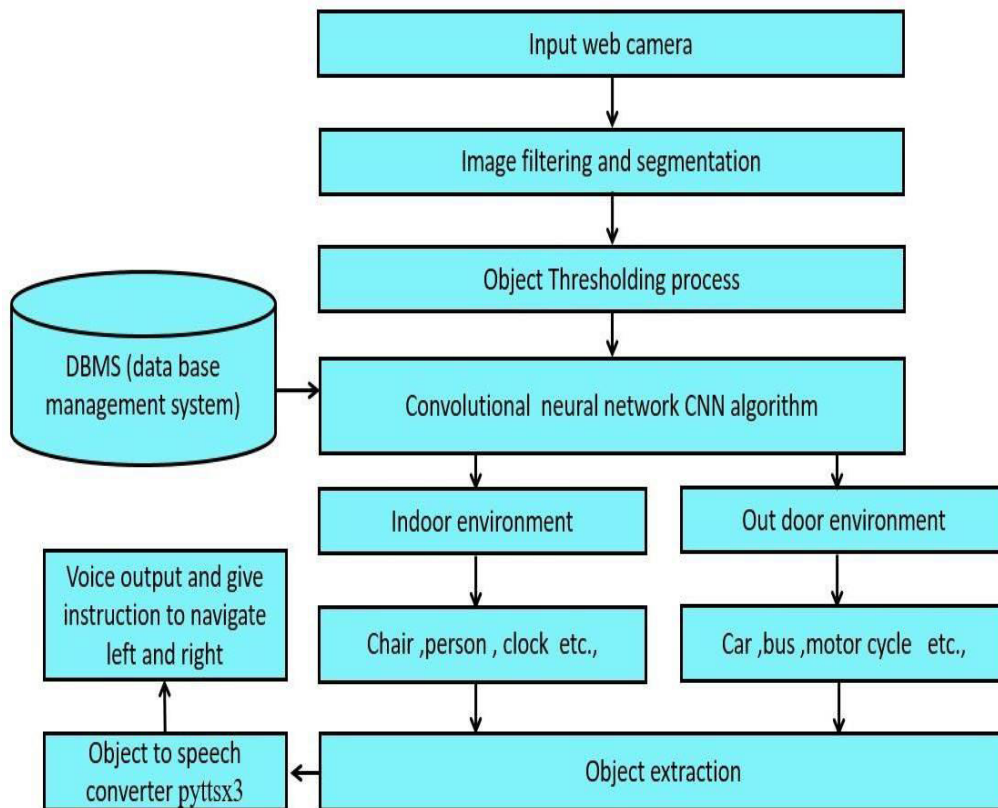
### III. EXISTING METHOD

This existing describes a system that combines deep learning with a camera for visually impaired to identify objects in the space whether it has been moved, such as furniture, important daily necessities, in indoor environment. The purpose of the system developed in this system is to detect whether the furniture is moved by the family through the general RGB camera and deep learning algorithm. Therefore, that a camera is set up above the entrance of the living room or the study room which is responsible for capturing the image and returning the image to the server responsible for the calculation. The network architecture used by this system for furniture detection is the quick RCNN. The system consists of a wearable device equipped with a camera, which captures real-time visual data from the user's surroundings.

### IV. PROPOSED SYSTEM

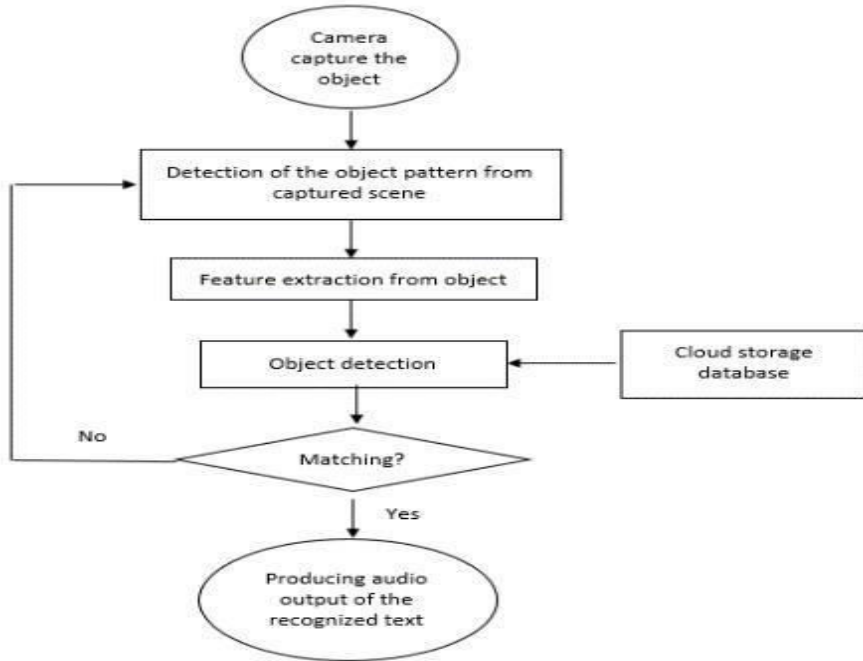
The proposed system captures the image through the continuous video stream rather than taking the picture of each object every time. For such high-speed detection, CNN algorithm has been implemented. The first step is to capture the objects using the camera of this the application should get the camera permission of the device. Then the image is sub-segmented so that multiple regions can be formed from a single image. The algorithm then combines similar regions to form a larger region and finally produce the region of interest. The yolo v3 pre-trained convolutional neural network is trained again based on the number of classes that has to be detected then the region of interest is identified. Based on the region of interest, the objects and the backgrounds are classified.

### V. BLOCK DIAGRAM



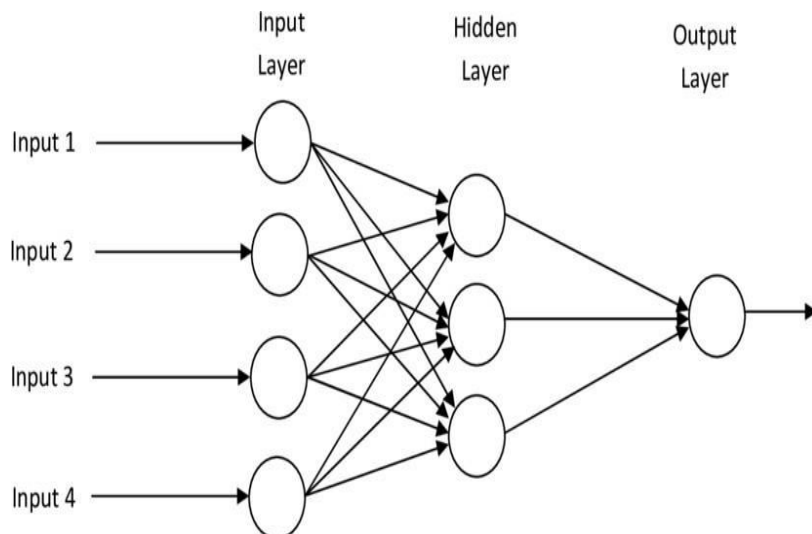


VI. FLOW CHART



VII. CNN ALGORITHM

Convolutional neural networks, or CNNs, are neural networks with one or more convolutional layers that are primarily utilized for segmentation, classification, and image processing, among other auto-correlated data applications. In essence, a convolution involves swiping a filter across the input. It can be more efficient to focus on smaller areas of the image rather than the complete one while looking for specific traits.



### VIII. FUTURE SCOPE

The implementation of smart systems for the visually impaired utilizing Convolutional Neural Network (CNN) algorithms marks a significant advancement in assistive technology. Future scope for this topic involves refining the CNN models to enhance object recognition accuracy, enabling seamless navigation in various environments. Integration with wearable devices and IoT infrastructure could extend functionality, providing real-time assistance and environmental awareness. Collaboration with developers and engineers may lead to the creation of specialized applications tailored to individual needs, fostering independence and accessibility.

### IX. CONCLUSION

The system's approach to object identification and detection is innovative. In our project, we used a large database because of the yolo v3 pre-trained Convolution Neural Network model. The Single Shot Detection Mobile Net model has been trained using the yolo dataset which contains almost more images. From the experiments it was concluded that the system works extremely accurately in identifying objects in both indoor and outdoor environments. Thus the proposed system will help visually impaired people in an effective way.

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