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Object and Note Detection for Blind People & Gesture Detection for Deaf People

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ABSTRACT: In recent years, orientation and navigation technologies and support for people with visually impaired disabilities have increased. This paper proposes a model for the detection of objects and hand gestures for visually impaired individuals. We have developed a module for blind people to identify and match items scanned to a list of objects, such as currency notes, obstacles in path, and the hand gestures of the opposite person being detected from the camera. The model is based on image recognition from a database of objects.

KEYWORDS: YOLOv3 model, CNN algorithm, Machine Learning; Gesture Detection, Object and Currency Detection.

I. INTRODUCTION

There are number of blind people in the society, who are suffering while exercising the basic things of daily life and that could put lives at risk while travelling. There is a necessity these days to provide security and safety to blind people.
The blind traveller is dependent on other guide like white cane, information given by the people, trained dogs etc.
Also, the identification and detection of currency is difficult task for blind person.
So, here we are proposing a self-assistance system for blind people, which will be able to convey the person about obstacle/object and currency's value.

II. RELATED WORK

In the banknote or currency detection and recognition system based on the YOLO-v3 model is proposed which is standalone and working in real-time. The model is trained with multiple images of different denominations currency banknotes of different denominations as a separate class. Dataset of Banknotes is made in different conditions like cluttered background, rotation, occlusion, illumination level, scaling, etc. To overcome the overfitting of the data augmentation is done which results in the increase in the number of images having a wide variety, which ultimately helps to make detection and recognition system robust and accurate. After having the proper augmentation, annotation is done for all images that get included in the dataset. Thereafter, the dataset is split into two parts- Training and Validation set. Then, transfer learning is applied to the YOLO-v3 model and trained with the help of images and their resistive annotation files. The whole system is standalone and does not need any internet facility to perform its recognition taskRREP. Optimization function uses the individual node's battery energy; if node is having low energy level, then optimization function will not use that node.

In ultrasonic blind walking stick with the use of Arduino is described. This device helps blind people to detect obstacles and to do their work easily and comfortably. In normal stick, the detection of the obstacle is not done and it is not efficient for visually impaired persons. The device measures the distance between objects and Smart Walking Stick by Ultrasonic sensor. When the objects or obstacles come in range of the ultrasonic sensor, he/she can know about the obstacle by hearing the sound generated by the Buzzer. It allows the user to walk freely by detecting obstacles in front of him. This proposed methodology is used to determine the obstacle with help of ultrasonic waves and infrared waves produced by the respective sensors.

III. PROPOSED ALGORITHM

A. *Design Considerations:*

- Training Models:
    1. First, we take input image
    2. Pre-Processing on Image
    3. Features Extraction from Image
- Main Model:
    1. Any Obstacle or Currency is detected from the input image
    2. Input image in preprocessed for extraction of its features
    3. From the extracted features image is classified into different classes.
    4. The result is given as a final

B. *Description of the Proposed Algorithm:*

There are a few different algorithms for object detection; they can be split into two groups:

- Algorithms based on classification. They are implemented in two stages. First, they select regions of interest in an image. Second, they classify these regions using convolutional neural networks. This solution can be slow because we have to run predictions for every selected region. A widely known example of this type of algorithm is the Region-based convolutional neural network (RCNN) and its cousins Fast-RCNN, Faster-RCNN and the latest addition to the family: Mask-RCNN. Another example is Retina Net.

- Algorithms based on regression – instead of selecting interesting parts of an image, they predict classes and bounding boxes for the whole image in one run of the algorithm. The two best known examples from this group are the YOLO (You Only Look Once) family algorithms and SSD (Single Shot Multibox Detector). They are commonly used for real-time object detection as, in general, they trade a bit of accuracy for large improvements in speed.

With YOLO, a single CNN simultaneously predicts multiple bounding boxes and class probabilities for those boxes. YOLO trains on full images and directly optimizes detection performance. This model has a number of benefits over other object detection methods

- YOLO is extremely fast

- YOLO sees the entire image during training and test time so it implicitly encodes contextual information about classes as well as their appearance.

- YOLO learns generalizable representations of objects so that when trained on natural images and tested on artwork, the algorithm outperforms other top detection methods

eq. (3)

IV. CONCLUSION

- This system acts as an Intelligent virtual assistant which helps in bringing the world closer and helps in meeting different ends together.

- Through the use of object detection and hand gesture to assist and work with the environment to make it a better place to live for the blind.

- This system is using computer vision technology, a wavelet transform for feature extraction and YOLO for classification and recognition.

V. FUTURE WORK

- The future work on this system will focus to optimize the proposed system and to enlarge the training dataset by incorporating more banknotes of different countries as well. In addition, work will be done to develop an interactive interface so that it can have many functions like automatic counting of banknotes, summing of currency and detection of counterfeit notes.

- In future we can add audio output for best results

- In future, the system can be modified for identifying coins as the reflective nature of the material makes system less accurate. Asuitable lighting source like UV can be used to prevent this problem in the future.

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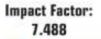
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