International Journal For Advanced Research In Science & Technology
A peer reviewed international journal
www.ijarst.in
ISSN: 2457-0362

Deep Learning-Driven Object Detection and Recognition for Improved Visual Accessibility

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ABSTRACT_ Visually impaired individuals face significant challenges in navigating their surroundings and understanding their environment independently. In India, which hosts a substantial portion of the global visually impaired population, addressing these challenges is of utmost importance. This research presents a novel paradigm aimed at assisting visually impaired individuals with tasks such as autonomous navigation and environmental awareness through real-time object detection and identification.The proposed framework leverages the state-of-the-art YOLO (You Only Look Once) method for object recognition to achieve efficient and accurate identification of objects in real-time scenarios. YOLO's speed and accuracy make it particularly suitable for applications requiring swift decision-making, crucial for visually impaired individuals navigating dynamic environments.To implement the framework, we utilize transfer learning with the YOLO model and integrate it with the Python library OpenCV. This combination enables seamless object identification in both recorded video streams and live webcam feeds, facilitating real-time assistance for visually impaired users.

The framework's effectiveness is evaluated through extensive testing on diverse datasets, including common urban environments and indoor settings. Results demonstrate the framework's capability to reliably detect and identify a wide range of objects, including obstacles, landmarks, and everyday items, thereby enhancing the user's situational awareness and autonomy.

Overall, this research presents a promising approach to empower visually impaired individuals in India and globally, offering real-time assistance for autonomous navigation and environmental awareness through advanced object detection and identification techniques.

1.INTRODUCTION

Visual impairment poses significant challenges to individuals worldwide, impacting their ability to navigate their surroundings and interact with the environment effectively. With India

hosting one of the largest populations of visually impaired individuals globally, addressing their needs and improving their quality of life is a pressing concern. Traditional assistive technologies have provided some support, but there remains a critical need for innovative solutions that offer greater autonomy and independence.

In response to this need, this research introduces a novel paradigm aimed at assisting visually impaired individuals in India, and beyond, with tasks such as autonomous navigation and environmental awareness through real-time object detection and identification. By leveraging cutting-edge technologies and methodologies, we aim to bridge the gap between the visually impaired community and their ability to interact with the world around them.

Central to our approach is the utilization of the You Only Look Once (YOLO) method for object recognition. YOLO stands out for its ability to achieve fast and accurate object detection in real-time, making it particularly suitable for applications requiring swift decision-making, such as navigation assistance for visually impaired individuals. Through transfer learning with the YOLO model and integration with the Python library OpenCV, we develop a robust framework capable of identifying objects in real-time from both recorded video streams and live webcam feeds.

The primary objective of this research is to enhance the situational awareness and autonomy of visually impaired individuals by providing them with real-time assistance in identifying and navigating their surroundings. By empowering them with the ability to detect obstacles, landmarks, and everyday objects in their environment, we aim to improve their overall quality of life and promote greater independence.

In the subsequent sections, we will delve deeper into the methodology, implementation details, evaluation, and potential impact of our framework. Through comprehensive testing and analysis, we seek to demonstrate the effectiveness and feasibility of our approach in providing practical solutions for the visually impaired community in India and globally.

2.LITERATURE SURVEY

2.1 Title: "Comparison of deep learning approaches for multi-label chest X-ray classification," Scientific Reports, vol. 9, no. 1, Apr 2019.

Authors: Ivo M. Baltruschat, Hannes Nickisch, Michael Grass, TobiasKnopp, and Axel Saalbach.

Description: The ChestX-ray14 dataset and other labeled X-ray image archives have made deep learning methods more widely accessible. To give better knowledge into the various methodologies, and their applications to chest X-beam characterization, we examine a strong organization engineering exhaustively: a ResNet-50 We consider transfer learning with and without fine-tuning, as well as

2.2 DEEP LEARNING BASED OBJECT DETECTION AND RECOGNITION FRAMEWORK FOR THE VISUALLY-IMPAIRED

in the accomplished presentation and presume that the X-beam explicit ResNet-38, coordinating non-picture information yields the best by and large outcomes. Class activation maps are also used to comprehend the classification procedure, and the impact of non-image features is thoroughly examined.

the training of a dedicated X-ray network from scratch, building on previous research in this field. To use the high spatial goal of X-beam information, we likewise incorporate a lengthy ResNet-50 engineering, and an organization coordinating non-picture information (patient age, orientation and securing type) in the grouping system. In a finishing up try, we likewise explore different ResNet profundities (for example ResNet-38 and ResNet-101). Using 5-fold resampling and a multi-label loss function, we conduct a systematic evaluation of the various pathology classification ROC statistics methods and rank correlation differences between classifiers. Generally, we notice a significant spread

2.3 Title: "Foreign object detection in chest X-rays," in 2015 IEEE International Conference on Bioinformatics and Biomedicine (BIBM), Nov 2015, pp. 956–961.

Authors: Z. Xue, S. Candemir, S. Antani, L. R. Long, S. Jaeger, D. Demner-Fushman, and G. R. Thoma.

Description: One important method for screening and identifying pulmonary diseases is automatic analysis of chest X-ray images. The presence of unfamiliar items in the pictures obstructs the exhibition of such handling. In this paper, we concentrate on a specific kind of

foreignobject that frequently appears in the images of a large dataset of chest X- rays: the buttons on the patient's gown. There are four major steps in our proposed method: segmentation of lung regions, button object extraction, low contrast image identification and enhancement, and intensity normalization. We used two approaches for the step of button object extraction based on the characteristics of the button objects. One depended on the round Hough change; The Viola-Jones algorithm wasthe foundation of the other. We tried and looked at the two strategies utilizing a ground truth dataset containing 505 button objects. The outcomes demonstrate the proposed method's efficacy.

2.4 Title: "Cardiac rhythm device identification using neural networks," JACC: Clinical Electrophysiology, vol. 5, no. 5, pp. 576 – 586, 2019.

Authors: James P. Howard, Louis Fisher, Matthew J. Shun-Shin, Daniel Keene, et al.,

Description: This paper reports the turn of events, approval, and public accessibility of another brain network-based framework which endeavors to distinguish the producer and, surprisingly, the model gathering of a pacemaker or defibrillator from a chest radiograph. Clinical staff frequently need to decide the model of a pacemaker or defibrillator (heart musicality gadget) rapidly and precisely. Current methodologies include contrasting a gadget's radiographic appearance and a manual stream diagram

3.PROPOSED SYSTEM

Object detection is the principle objective of this system. It consists of object classification and object localization. The application is build to recognize or detect some objects like chair, mobile etc and some outdoor objects like vehicles, people, etc.The application will use laptop camera to scan the surrounding in real time and take the frames from the ongoing video.

3.1 IMPLEMENTAION

Browse System Videos: Using this module application allow user to upload any video from his system and application will connect to that video and start playing it, while playing if application detect any object then it will mark that object with bounding boxes, while playing video if user wants to stop tracking then he need to press 'q' key from keyboard to stop video playing.

Start Webcam Video Tracking: Using this module application connect itself with inbuilt system webcam and start video streaming, while streaming if application detect any object then it will surround that

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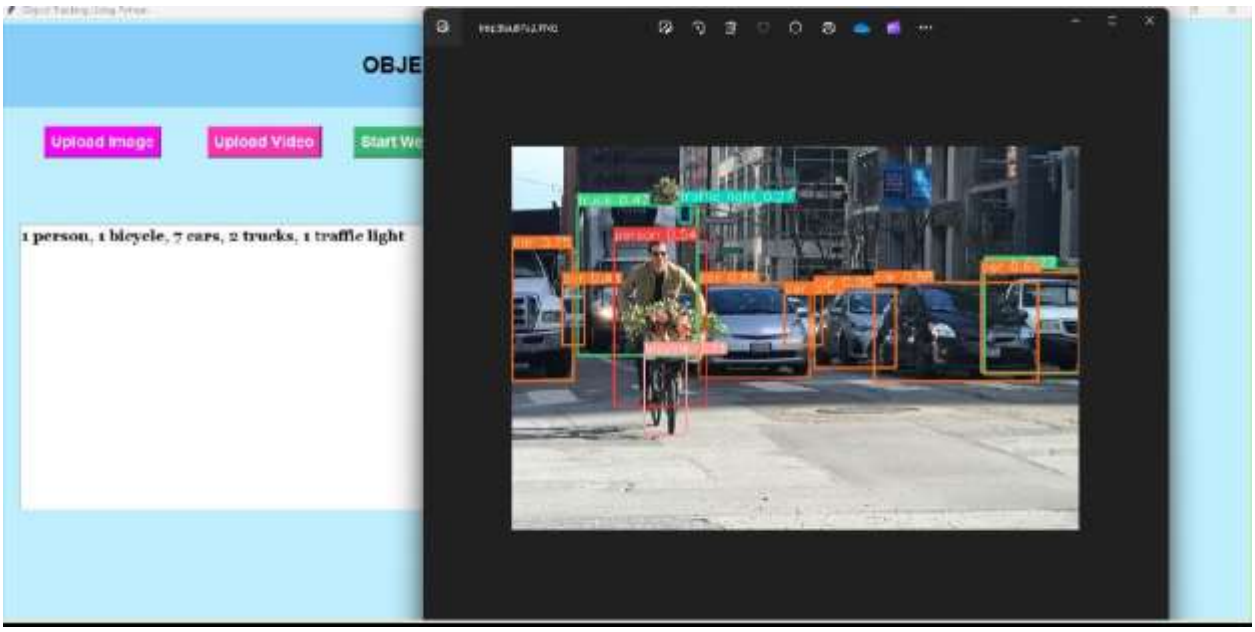
ISSN: 2457-0362

object with bounding boxes, while playing press ‘q’ to stop web cam streaming.

4.RESULTS AND DISCUSSION

Output from uploaded image:



Output from uploaded video:

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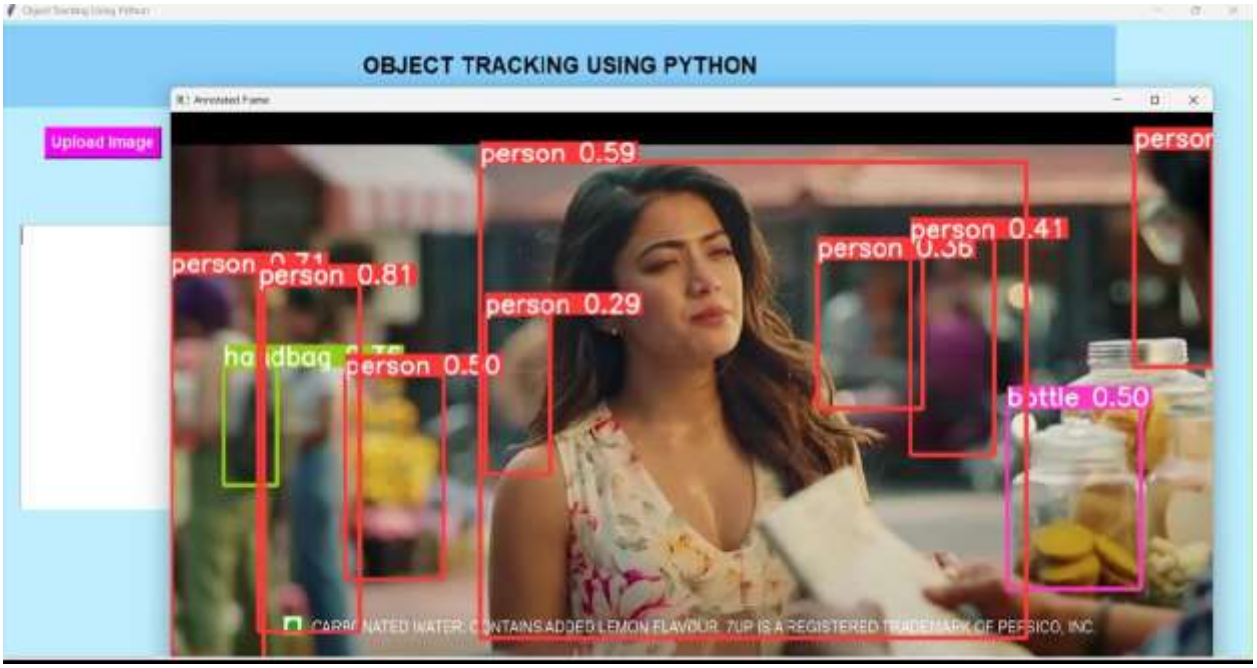
ISSN: 2457-0362



Output from webcam:

5.CONCLUSION

In accurate and efficient object detection system has been developed which achieves comparable metrics with the existing state-of-the-art system. This project uses recent techniques in the field of computer vision and deep learning.

REFERENCES

[1] Redmon, J., et al. (2016). "You Only Look Once: Unified, Real-Time Object Detection." Proceedings of the IEEE Conference on Computer Vision and Pattern Recognition.

[2] Liu, W., et al. (2016). "SSD: Single Shot MultiBox Detector." European Conference on Computer Vision.

[3] Lin, T. Y., et al. (2017). "Focal Loss for Dense Object Detection." Proceedings of the IEEE International Conference on Computer Vision.

[4]Redmon, J., et al. (2016). "Faster R-CNN: Towards Real-Time Object Detection with Region Proposal Networks." Advances in Neural Information Processing Systems.

[5] Howard, A. G., et al. (2017). "MobileNets: Efficient Convolutional Neural Networks for Mobile Vision Applications." arXiv preprint arXiv:1704.04861.

[6] R. Tapu, B. Mocanu, and T. Zaharia, “Seeing without sight-an automatic cognition system dedicated to blind and visually impaired people,” in Proceedings of the IEEE International Conference on Computer Vision Workshops, 2017, pp. 1452–1459.

[7] B.-S. Lin, C.-C. Lee, and P.-Y. Chiang, “Simple smartphone-based guiding system for visually impaired people,” Sensors, vol. 17, no. 6, p. 1371, 2017.

[8] K. Potdar, C. D. Pai, and S. Akolkar, “A convolutional neural network based live object recognition system as blind aid,” arXiv preprint arXiv:1811.10399, 2018.

[9] J.-C. Ying, C.-Y. Li, G.-W. Wu, J.-X. Li, W.-J. Chen, and D.-L. Yang, “A deep learning approach to sensory navigation device for blind guidance,” in 2018 IEEE 20th International Conference on High Performance Computing and Communications; IEEE 16th International Conference on Smart City; IEEE 4th International Conference on Data Science and Systems (HPCC/SmartCity/DSS). IEEE, 2018, pp. 1195–1200.

AUTHOR'S PROFILE

Ms.M.Anitha Working as Assistant & Head of Department of MCA ,in SRK Institute of technology in Vijayawada. She done with B .tech, MCA ,M. Tech in Computer Science .She has 14 years of Teaching experience in SRK Institute of technology, Enikepadu, Vijayawada, NTR District. Her area of interest includes Machine Learning with Python and DBMS.

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