International Journal of Engineering Research and Science & Technology

www.ijerst.org

ISSN : 2319-5991

Vol. 21 No. 4 (2025)

ijerst.editor@gmail.com

editor@ijerst.com

International Journal of Engineering Research and Science & Technology

ISSN 2319-5991 www.ijerst.com
Vol. 21, No. 4, 2025

Research Paper

LIVE VIDEO OBJECT DETECTION SYSTEM

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ABSTRACT

In Artificial Intelligence and computer vision have transformed way of the machine's world around them. In live video object detection system have gained significant attention due to the ability of identifying, classify and track objects in a real time. This project presents the design and implementation of powerful deep learning techniques to provide accurate continuous video. The objective to develop a detection system is accurate and adaptability across the different domains. The high-performance computing the platform on the resources constraint like Raspberry Pi and NVIDIA Jetson making in real world environment. By reducing the human introduction, minimizing the errors.

KEYWORDS: *Yolo (you only look once), CNN (conventional neural networks), Raspberry Pi, SSD (single shot detection), ML (machine learning), DL (deep learning)*

Received: 05-10-2025 Accepted: 14-11-2025 Published: 21-11-2025

INTRODUCTION

CCTV cameras in public areas, automobiles, factories, hospitals, and even our houses are all producing video data in the modern world. The majority of this video footage, however, is either manually watched or stored without adequate analysis, which frequently results in delays, mistakes made by people, and the omission of significant occurrences. Watching videos by hand takes a lot of time, is exhausting, and isn't always accurate. A live video object detection system is crucial to resolving this issue. Such a technology lessens the need for human monitoring by automatically detecting and recognizing items from a video feed in real time. This improves the process' accuracy, speed, and efficiency. The system will swiftly and reliably detect many objects using machine learning and computer vision techniques. Additionally, it will offer visual outputs, which will facilitate users' tracking and object analysis straight from the live video.

The project's scope initially be restricted to identifying frequently used or trained objects, but with more sophisticated models and datasets. While establishing the groundwork for upcoming advancements like activity recognition, predictive alerts, and integration with IoT-based smart systems, the project's overall scope encompasses real-time detection, efficiency, accuracy, and practical application in various industries

LITERATURE SURVEY

Recent years we have seen the and merge the records and development surrounding in real world environment. which makes the object track from the far distance. We have explored the content from the many research papers that makes to overcome the limitations of the live video object. By the first and most important paper used for the live object detect J Redmon in 2016 the new approach of object detection of repurpose of the per-form detection. From the another paper, W Yang in 2024 that the limitation of comparative analysis revealed the model with accuracy, average accuracy with remarkable processing speed of video. The last and for most paper by the F Wahab in 2022 that on deep learning algorithms for the investigate and develop on the real-time object that uses neural systems make the preprocessing of the object and training of the dataset that solved the problem.

RELATED WORK

In this project the object can be detect with the advancement of machine learning and deep learning, especially Convolutional Neural Networks (CNNs), object detection has significantly improved. Popular models such as R-CNN, Fast R-CNN, and Faster R-CNN were developed to increase accuracy, but they still required more processing time, making them less suitable for real-time applications. To overcome this, real-time detection frameworks like YOLO (You Only Look Once) and SSD (Single Shot Multi Box Detector) were introduced. YOLO provides a good balance between speed and accuracy, making it one of the most widely used models for live video object detection. SSD also performs efficiently for multiple object categories. These approaches have been applied in areas such as surveillance, traffic monitoring, robotics, and autonomous vehicles. Other works also focused on multi-object tracking and real-time analytics, combining detection with movement prediction to ensure continuous monitoring. Open-source frameworks like OpenCV, TensorFlow, and Py Torch have further supported researchers by providing tools and pretrained models for practical implementation.

EXISTING SYSTEM

Currently, most approaches are based on traditional image processing and early machine learning techniques. These methods usually focus on analyzing still images or recorded videos, rather than real- time live video streams. Techniques like edge detection, background subtraction, and feature extraction (HOG, SIFT) were widely used. object detection is generally performed on static images or pre-recorded videos rather than real-time video streams. Traditional methods rely heavily on manual observation or basic motion detection algorithms that cannot accurately identify or classify multiple objects dynamically. These systems typically use simple image processing techniques such as background subtraction, frame differencing, or colour thresholding. While they can detect motion or changes in scenes, they lack the capability to recognize specific object types (e.g., cars, humans, animals) or track them continuously across frames.

PROPOSED SYSTEM

The proposed system provides real-time object detection using live video streams. It aims to detect and classify multiple objects instantly with high accuracy. Unlike traditional methods, it works continuously on video frames instead of static images. The system uses advanced deep learning algorithms for faster and more precise detection. It efficiently processes frames to identify objectsin various environments. A user-friendly interface displays detected objects with labels and confidence levels. The framework ensures better speed, scalability, and adaptability for real-world use. Overall, it delivers an accurate and efficient live video object detection solution.

SYSTEM ARCHITECTURE

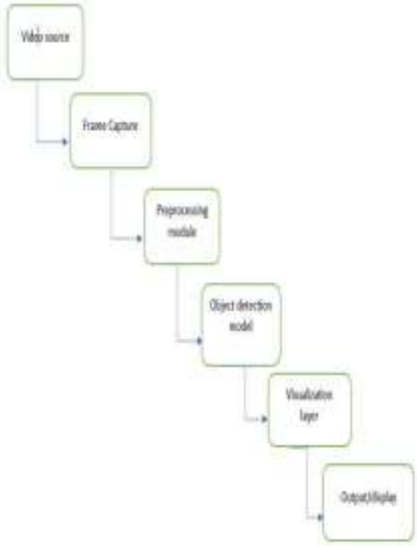

Fig:1 Architecture of live video object detection system

METHODOLOGY DESCRIPTION

The streaming begins by capturing real- time video streams from surveillance cameras, providing high-resolution.

VIDEO SOURCE:

This source can able to capture the video layer. The captured frames are preprocessing through resizing and ensure the compatibility. These frames are then with bounding boxes, labels and space and confidence scores.

FRAME CAPTURE:

This frame can make the video for the confidence score and the evaluation of each frame and preprocess them.

PREPROCESSING MODULE:

Enhances image frames for resizing, normalization and noise reduction.

OBJECT DETECTION MODEL:

It tracks the movements and head orientation of the object and moving objects, multi-face detection.

VISUALIZATION:

The visualization that predicts the images that captured by the video of the objects that can be framed.

OUTPUT/DISPLAY:

Real-objects that can detect by preprocessing technique which makes the confidence score of object and accuracy of the object.

RESULTS AND DISCUSSION

The main results of the project that gives the assumed results for the accuracy.

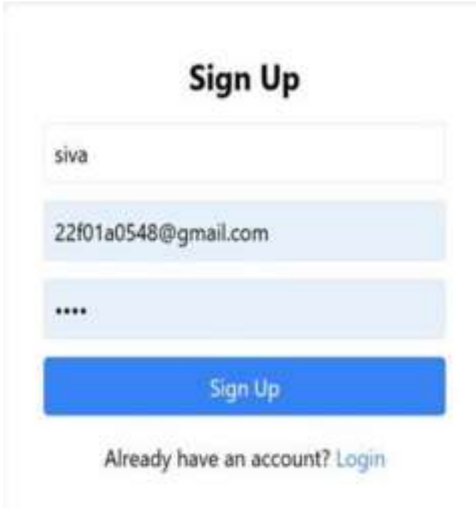

Fig :2 Signup

This figure shows the process of signup of the project. If they already have an account then use the login option.

Fig :3 Dashboard

It displays the user profile, a detection summary with total detections and objects detects, and visual analytics including a line graph of detections over time and a pie-chart showing the breakdown of detected objects.

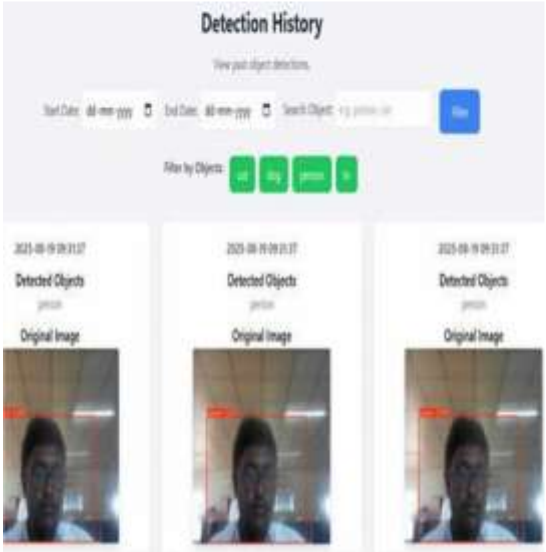

Fig 4: Multiple images captured

With the live camera feed option, users can view real-time object tracking directly from the camera, along side features like upload images, checking detections history and logging out , making it an effective interface for continuous object monitoring.

CONCLUSION

It integrates computer vision and machine learning to deliver accurate and efficient object recognitions. The system achieved good performance in live environments with reliable detection speed and precision.

FUTURE SCOPE

In the future, the system can be enhanced by improving detection accuracy under low light or crowded scenes. Integration with cloud computing and IoT can enable large- scale, distributed video analysis.

REFERENCE

[1] Harini, D. P. (2017/10). Collective Model Based Objective Retrieval With Multi Scale Top Models. International Journal of Advance Research in Science and Engineering, 6.

[2] Ren, S., He, K., Girshick, R., & Sun, J. (2015). *Faster R-CNN: Towards Real-Time Object Detection with Region Proposal Networks.* IEEE TPAMI.

[3] Liu, W., Anguelov, D., Erhan, D., Szegedy, C., & Reed, S. (2016). *SSD: Single Shot MultiBox Detector.* ECCV.

[4] Bochkovskiy, A., Wang, C.-Y., & Liao, H.-Y. M. (2020). *YOLOv4: Optimal Speed and Accuracy of Object Detection.* arXiv:2004.10934.

[5] Girshick, R. (2015). *Fast R-CNN*. IEEE International Conference on Computer Vision (ICCV).

[6] He, K., Zhang, X., Ren, S., & Sun, J. (2016). *Deep Residual Learning for Image Recognition (ResNet).* CVPR.

[7] OpenCV Documentation. (2024). *Open Source Computer Vision Library.* Retrieved from: https://docs.opencv.org **[8]** TensorFlow Object Detection API. (2024). *Machine Learning Framework for Object Detection.* Retrieved from: https://www.tensorflow.org

[9] PyTorch Documentation. (2024). *Deep Learning Framework.* Retrieved from: https://pytorch.org/docs/

[10] Kaggle Datasets. (2024). *Object Detection and Image Classification Datasets.* Retrieved from: https://www.kaggle.com/datasets

[11] COCO Dataset. (2023). *Common Objects in Context (COCO) Dataset Overview.* Retrieved from: https://cocodataset.org

[12] RealPython. (2024). *Introduction to Computer Vision with OpenCV and Python.* Retrieved from: https://realpython.com/opencv-python

[13] Brownlee, J. (2024). *Machine Learning Mastery with Python.* Machine Learning Mastery Publications.

[14] Goodfellow, I., Bengio, Y., & Courville, A. (2016). *Deep Learning.* MIT Press.

[15] OpenAI. (2024). *Computer Vision and AI Model Research Overview.* Retrieved from: https://openai.com/research

[16] NVIDIA Developer Blog. (2024). *Real-Time Object Detection Using GPUs and Deep Learning.* Retrieved from:

https://developer.nvidia.com

[17] Google AI Blog. (2024). *Advancements in Real-Time Computer Vision Systems.* Retrieved from: https://ai.googleblog.com

[18] GitHub. (2024). *YOLOv5 and YOLOv8 Repositories for Object Detection Implementation*. Retrieved from: https://github.com/ultralytics/yolov5

[19] Szeliski, R. (2022). *Computer Vision: Algorithms and Applications (2nd Edition).* Springer.

[20] MathWorks. (2024). *Real-Time Video Processing with MATLAB and Simulink.* Retrieved from: https://in.mathworks.com