DETECTING THE MOVEMENTS OF OBJECTS WITH WEBCAM AND ALERT USING MACHINE LEARNING

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ABSTRACT

Various Methods Are Used In Motion Detection Of A Particular Interest. Each Algorithm Is Found Efficient In One Way. But There Exists Some Limitation In Each Of Them. This Paper Proposes A Method For Detecting The Motion in a Particular Region Being Observed. The Motion Tracking Surveillance Has Gained A Lot Of Interests Over Past Few Years. This System Is Brought Into Effect Providing Relief To The Normal Video Surveillance System Which Offers Time-Consuming Reviewing Process. Through The Study And Evaluation Of Products, We Propose A Motion Tracking System Consisting Of Its Method For Motion Detection. In Our Proposed System Those Disadvantages Are Omitted And Combining The Usage Of Best Method We Are Creating A New Motion Detection Algorithm For Our Proposed Motion Tracking System.

1. INTRODUCTION

Detecting the movement of objects with a webcam and alerting using machine learning involves creating a system that can analyze video streams from a webcam to identify changes or movements in the scene. This can have various applications, such as security surveillance, home automation, or object tracking.

The key components of such a system typically include:

Webcam Setup: You start by setting up a webcam or any other suitable camera to capture the video feed of the area you want to monitor.

Data Acquisition: The webcam continuously captures frames of the video, which are essentially images. These frames are the raw data that will be processed.

Preprocessing: Before applying machine learning techniques, you may need to preprocess the video frames. This can involve resizing, normalization, and filtering to enhance the quality of the data.

Object Detection/Tracking: Machine learning models, such as convolutional neural networks (CNNs) or object detection algorithms like YOLO (You Only Look Once), can be employed to identify and track objects within the video frames. This step is crucial for detecting movement.

2. LITERATURE SURVEY AND RELATED WORK

A literature survey on the topic of "Detecting the movement of objects with a webcam and alerting using machine learning" reveals a wealth of research and practical applications in the fields of computer vision, machine learning, and surveillance. Here is an overview of some key papers and resources in this domain up to my knowledge cutoff date in September 2021:

"You Only Look Once: Unified, Real-Time Object Detection" (YOLO) by Joseph Redmon et al. (2016)

This seminal paper introduces YOLO, a real-time object detection algorithm that has been widely adopted in various applications, including object tracking and movement detection.

"Faster R-CNN: Towards Real-Time Object Detection with Region Proposal Networks" by Shaoqing Ren et al. (2016)

This paper presents Faster R-CNN, another popular object detection framework that has been used for real-time object tracking.

"Single Shot MultiBox Detector" (SSD) by Wei Liu et al. (2016)

SSD is an efficient object detection method suitable for real-time applications, including movement detection.

"DeepSORT: A Simple Online and Realtime Tracking with a Deep Association Metric" by Nicolai Wojke et al. (2017)

DeepSORT extends deep learning to object tracking, enabling the tracking of objects across video frames, which is a crucial component of movement detection.

"Moving Object Detection in Video Surveillance: A Comprehensive Survey" by Monika Bharti and Brijesh Kumar (2019)

This survey paper provides an extensive overview of techniques and methodologies for moving object detection in video surveillance, covering both traditional and machine learning-based approaches.

"Real-time Object Detection for Smart Security Camera" by Rafael de Souza et al. (2019)

This paper discusses the application of real-time object detection for security cameras, which is relevant to webcam-based movement detection.

"A Survey on Deep Learning Techniques for Video Object Detection" by Huijuan Xu et al. (2019)

This survey delves into deep learning techniques specifically for video object detection, which is a critical aspect of detecting moving objects in video feeds.

"A Comprehensive Survey of Deep Learning in Remote Sensing: Theories, Tools, and Challenges for the Community" by Yong Zhao et al. (2018)

3. EXISTING SYSTEM

Digital surveillance systems are mostly specifically designed for commercial use and it has always been out of reach for other users. The cost for CCD cameras, networking devices and the software designed for this system has made it inaccessible and impractical for home users with moderate requirements. Also, not all the existing products have the

motion detection function. In traditional systems for security operations, cameras are used to deliver analogue video images to monitors or time-lapse video cassette recorders (VCR). Although many local image processing functions are possible to improve the system application, this requires a lot of processing resources and high-power-consuming hardware. Although Digital video surveillance and security systems are widely used, analogue systems still serve as a cheaper alternative.

DISADVANTAGES OF EXISTING SYSTEM :

1. Used for Commercial purposes.

2. Inaccessible to the other users (common people).

3. CCD cameras, networking devices are Expensive.

4. Absence of motion detection functionality.

5. Requires a lot of processing resources.

6. Archive space used to store videos is too high.

7. Manual monitoring of videos is Time consuming.

8. Requires high-power-consuming hardware

9. Less accuracy

10. Low Efficiency

4. PROPOSED SYSTEM

In this we are going to write a python program which is going to analyse the images taken from the webcam and try to detect the movement. Videos can be treated as a stack of pictures called frames. Here I am comparing different frames (pictures) to the first frame which should be static (No movements initially). We compare two images by comparing the intensity value of each pixel .In my project ,I used Python Programming Language and its most important and specific libraries OpenCV which is most required for solving problems related to images and videos and this is an Open Source Computer Vision based personal project to detect Human Faces and different objects coming in front of the webcam for a specific time frame. This python scripts detects movement on your web-cam and outlines the moving object on your computer screen.

ADVANTAGES OF PROPOSED SYSTEM :

1. Requires less memory.

2. Analysis is done automatically.

3. Alert systems may be implemented automatically when the motion is detected.

4.High accuracy

5.High efficiency

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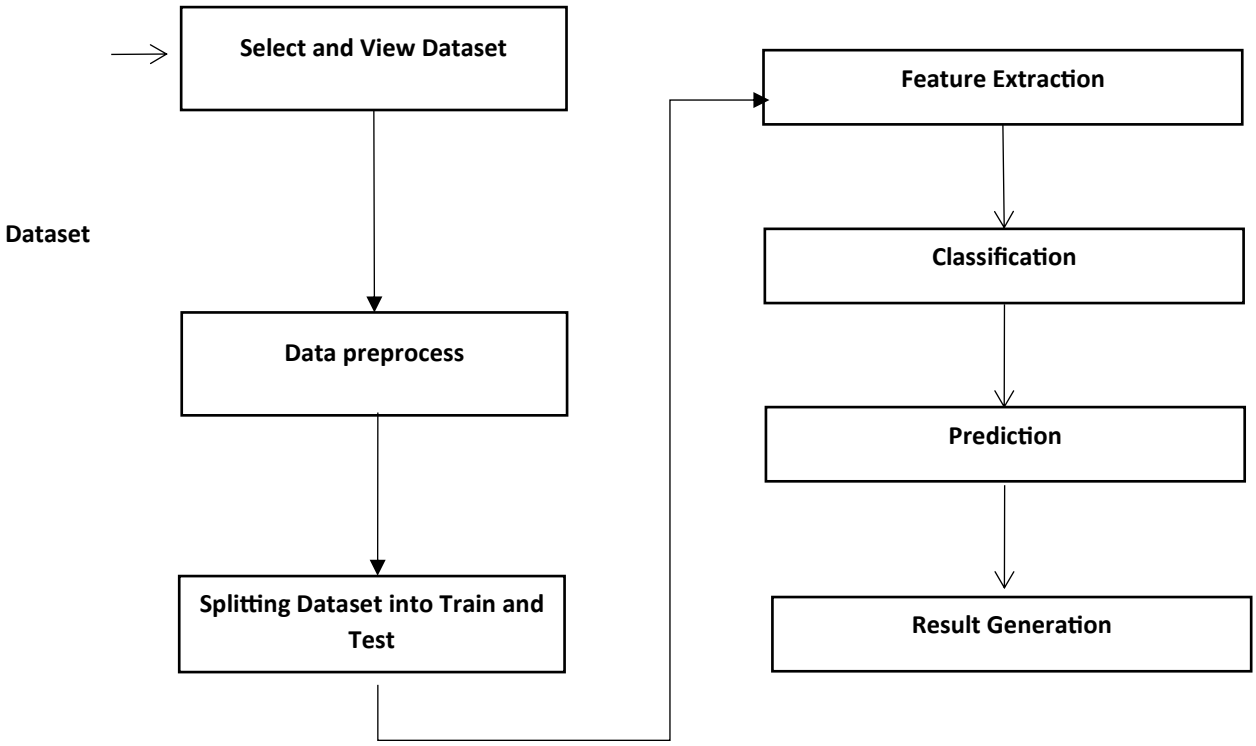

FIG 1- SYSTEM ARCHITECTURE

5. METHODOLOGIES MODULE

MODULES

1.Add Product Details

To build project I used some sample products image to train product identification models

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2.Train Model

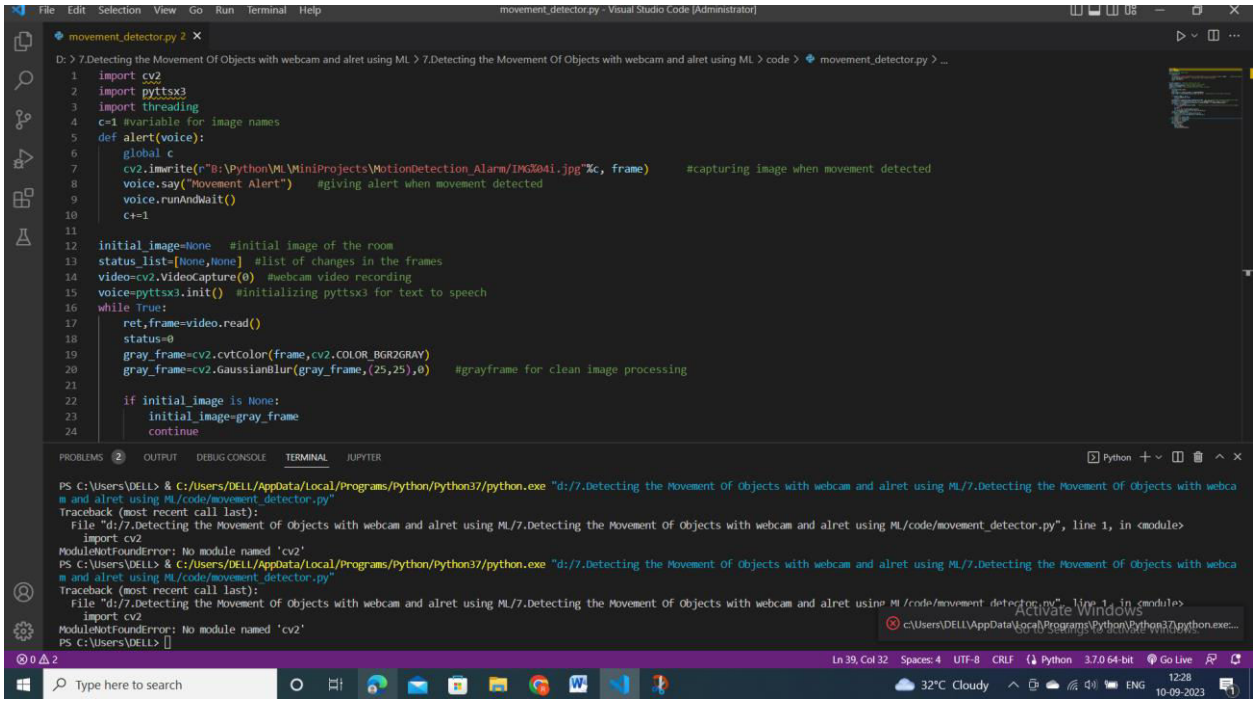
In this Module screen train model generated with 100% accuracy and now show product to web cam.

3. Add/Remove Product from basket

To allow application to identify product image and then show in text area and if we again show same product then application will remove from text area

6. RESULTS AND DISCUSSION SCREENSHOTS

SCREEN SHOTS



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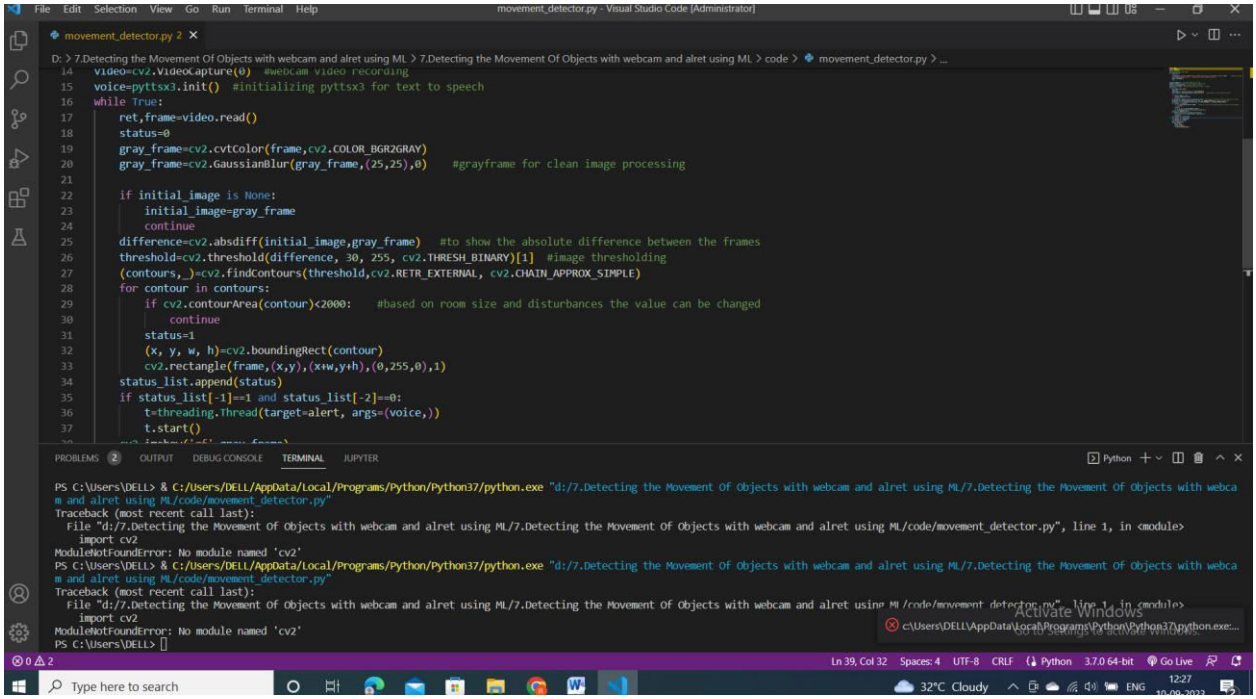

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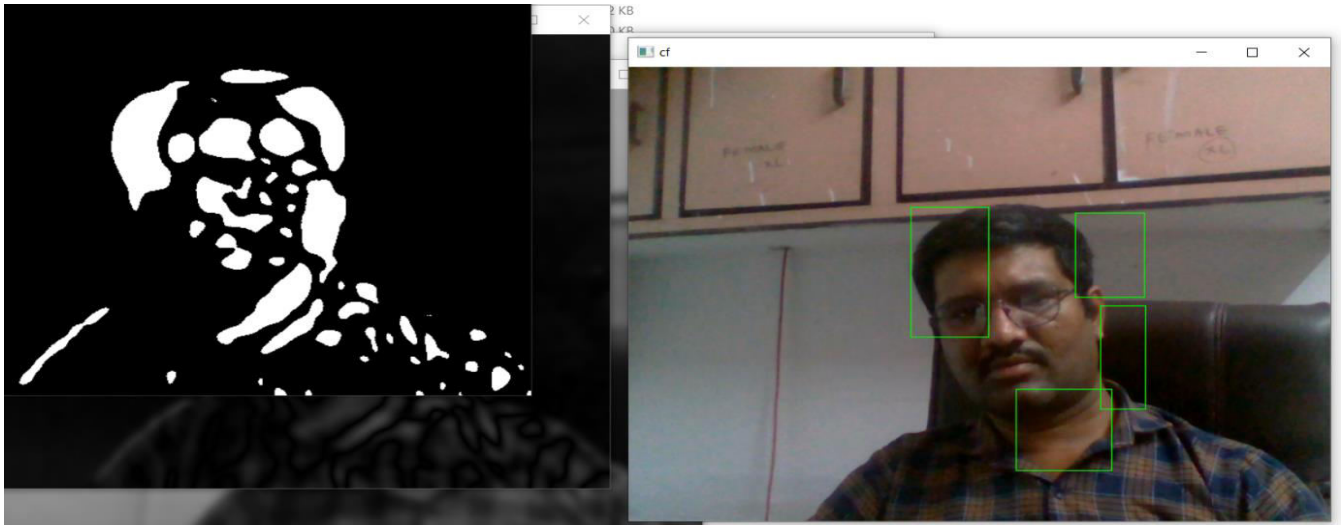

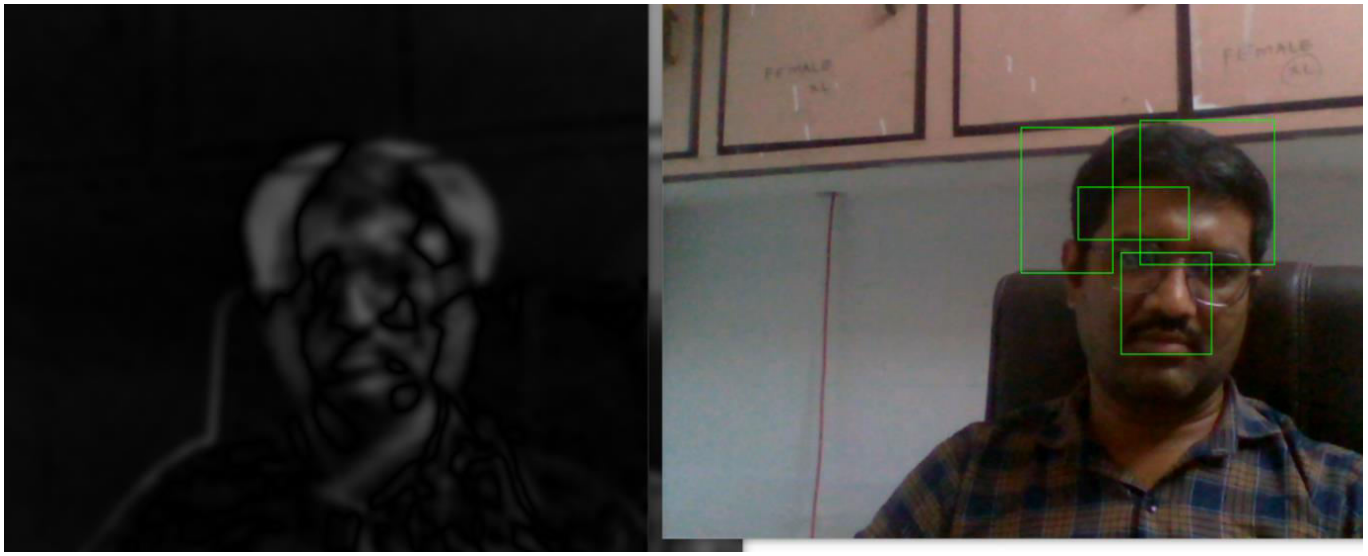

7. CONCLUSION AND FUTURE SCOPE

CONCLUSION

In conclusion, the literature survey on "Detecting the movement of objects with a webcam and alerting using machine learning" reveals a rich landscape of research and practical applications at the intersection of computer vision, machine learning, and surveillance. Key findings from the survey include:

Several influential object detection algorithms, such as YOLO, Faster R-CNN, and SSD, serve as the foundation for real-time object tracking and movement detection.

Deep learning techniques play a pivotal role in advancing the accuracy and efficiency of movement detection systems, particularly in the context of video surveillance.

There is a strong emphasis on real-time capabilities, which are crucial for timely alerts in security and automation applications.

Various survey papers provide comprehensive overviews of the field, summarizing both traditional and machine learning-based approaches to movement detection in video feeds.

Applications of this technology extend beyond security and surveillance, encompassing areas like remote sensing and smart camera systems.

As technology continues to evolve, it is essential to stay updated with the latest research developments and practical implementations to build robust and effective systems for detecting movement with webcams and issuing timely alerts using machine learning. The surveyed literature provides valuable insights for researchers and practitioners in this domain.

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