REAL-TIME OBJECT MOVEMENT DETECTION AND NOTIFICATION WITH WEBCAM AND MACHINE LEARNING

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ABSTRACT

Motion Detection of a Specific Interest Is Done Through A Variety Of Techniques. In one sense, every algorithm is found to be efficient. However, each of them has its limitations. This Work Offers a Technique for Tracking Motion in a Specific Area Under Study. Over the past few years, there has been a lot of interest in motion tracking surveillance. This system is implemented to alleviate the burden of the time-consuming reviewing process that comes with the standard video surveillance system. By Investigating And Assessing Products, We Provide A Motion Tracking System With Its Motion Detection Technique. We have eliminated those drawbacks from our proposed system and have created a new motion detection algorithm for our proposed motion tracking system by combining the best methods available.

Keywords: Webcam, Machine Learning, The Motion, Region, and Object Movement Detection.

1. INTRODUCTION

Building a system that can analyze webcam video streams to detect changes or movements in the scene is necessary for both object movement detection using a camera and machine learning alerts. Applications for this include item tracking, home automation, and security surveillance. Typically, the main elements of such a system consist of:

Webcam Setup: The first step is to set up a webcam, or any other appropriate camera, to record the video feed of the region you wish to keep an eye on. Data Acquisition: The video's frames, or basically images, are continuously taken by the webcam. The raw data that will be processed is contained in these frames. Preprocessing: You might need to preprocess the video frames before using machine learning algorithms. To improve the data quality, this may entail filtering, normalization, and scaling. Object identification/Tracking: To recognize and track things within the video frames, machine learning models like convolutional neural networks (CNNs) or object identification methods like YOLO (You Only Look Once) can be used. In order to detect movement, this stage is essential.

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

5. METHODOLOGIES MODULE

MODULES
1.Add Product Details
To build project I used some sample products image to train product identification models
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
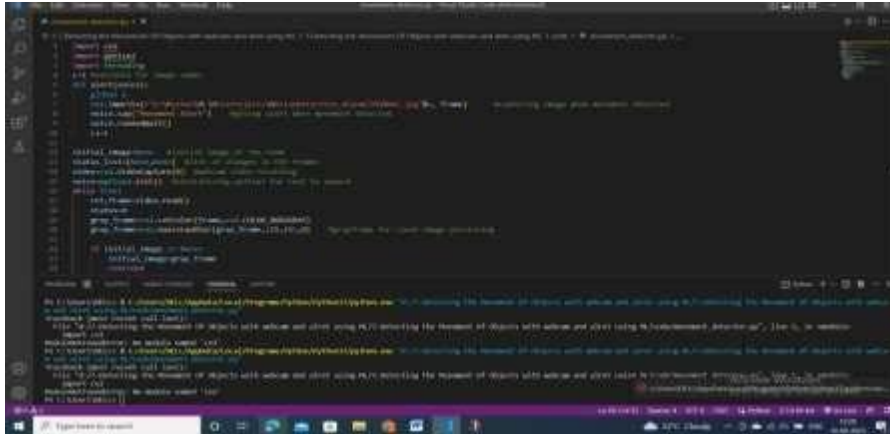
7. CONCLUSION AND FUTURE SCOPE

The literature review on "Detecting the movement of objects with a webcam and alerting using machine learning" concludes by highlighting the wide range of theoretical work and real-world applications that exist at the nexus of surveillance, computer vision, and machine learning. Some of the survey's main conclusions are: Real-time object tracking and motion detection are based on a number of well-known object detection techniques, including SSD, Faster R-CNN, and YOLO. The use of deep learning algorithms is essential for improving the precision and effectiveness of movement detection systems, especially when it comes to video surveillance. Real-time capabilities are highly valued since they are essential for prompt notifications in automation and security applications. Numerous survey papers offer thorough summaries of both conventional and machine learning-based methods for movement detection in video streams, offering in-depth analyses of the area. This technology has uses in fields other than security and surveillance, such as smart camera systems and remote sensing. Building reliable and efficient systems for using webcams to detect movement and employing machine learning to send out timely notifications requires keeping up with the most recent advancements in research and practical applications. For scholars and professionals working in this field, the reviewed literature offers insightful information.

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