An Intelligent Motion Detection Using OpenCV

Article · March 2022

DOI: 10.32628/IJSRSET22925

International Journal of Scientific Research in Science, Engineering and Technology
Print ISSN: 2395-1990 | Online ISSN : 2394-4099 (www.ijsrset.com)
doi : https://doi.org/10.32628/IJSRSET22925

An Intelligent Motion Detection Using OpenCV

Shubham Mishra*[1], Mrs Versha Verma [2] Dr. Nikhat Akhtar [3], Shivam Chaturvedi [4], Dr. Yusuf Perwej[5]

[1*] B.Tech Scholar, Computer Science & Engineering, Ambalika Institute of Management & Technology, Lucknow, India
[2]Assistant Professor, Department of Computer Science & Engineering, Ambalika Institute of Management & Technology, Lucknow
[3]Associate Professor, Department of Computer Science & Engineering, Ambalika Institute of Management and Technology, Lucknow
[4]Assistant Professor, Department of Computer Science & Engineering, Ambalika Institute of Management & Technology, Lucknow
[5]Professor, Department of Computer Science & Engineering, Ambalika Institute of Management and Technology, Lucknow, India

Article Info
Volume 9, Issue 2
Page Number : 51-63

Publication Issue :
March-April-2022

Article History
Accepted : 05 March 2022
Published: 19 March 2022

ABSTRACT

A computer vision system's basic goal is to detect moving things. For many applications, the performance of these systems is insufficient. One of the key reasons is that dealing with numerous restrictions such as environmental fluctuations makes the moving object detection process harder. Motion detection is a well-known computer technology associated with computer vision and image processing that focuses on detecting objects or instances of a specific class in digital photos and videos (for example, humans, flowers, and animals). Face detection, character recognition, and vehicle calculation are just a few of the well-studied applications of object motion detection. Object detection has a wide range of applications, including retrieval and surveillance. Object counting is a step after object detection that gets more exact and robust with the help of OpenCV. For object detection and counting, OpenCV includes a number of useful techniques. Object counting has a variety of applications in the fields of transportation, medicine, and environmental science, among others. Computer vision and image processing research is progressing rapidly and is being used to improve human lives. To avoid the drawbacks of current and newly established techniques, the suggested algorithm was tested on many open source images by imposing a single set of variables. The motion detection software system proposed in this paper allows us to see movement around an item or a visual area.

Keywords : Motion Detection, Object Recognition, OpenCV, Image Processing, Baseline Frame, Pixel, Background Subtraction.

I. INTRODUCTION

With the growth of technology, there is a growing worry for safety and security everywhere nowadays [1]. To solve this issue, the number of surveillance cameras has recently increased. Despite this, manually storing and monitoring data [2] on a continuous basis is tough.

There are various ways to complete this task without involving humans. In visual surveillance systems, detecting moving objects in real time is a difficult task. It's frequently used as a starting point for more advanced processing, such as classification of the detected moving item. In the processing of video in a surveillance system, object identification and tracking are critical. It is frequently used as a starting point for more advanced processing, such as classification of the detected moving item. In the processing of video in a surveillance system, object identification and tracking are [3] critical. It allows multiple processor vision applications to extract information from frames and video sequences, such as CCTV surveillance, understanding an activity in focus, analyzing traffic flow, and classifying and tracking an object. This demonstrates that detecting and tracking an item is a critical area of research in computer vision, with applications in a variety of surveillance systems. In today's world, motion detection [4] surveillance and security systems are increasingly widespread. Retail outlets, banks, supermarkets, airports, business buildings, and even private residences all have this type of system. Analogue and digital video surveillance and security systems [5] are the two types of systems available. Cameras are employed in traditional security systems to provide analogue video images to monitors or time-lapse video cassette recorders (VCR). Although numerous local image processing [6] functions can be used to improve the system application, this necessitates a large amount of processing power and high-power hardware. Despite the widespread use of digital video surveillance and security systems, analogue systems remain a cost-effective alternative. The most common cameras utilized in the system are charge coupled devices (CCD) cameras and digital cameras. The ability to detect movement is referred to as motion detection. There are numerous methods for detecting motion [7]. The traditional method is to use either an active or a passive sensor. "Vision motion detection" is a new approach for detecting motion. It is a machine vision system's artificial approach of detecting motion in comparison to human vision.

So our plan was to take a picture from a webcam at regular intervals (make it the current picture) and compare it to a previous picture; if there was a significant difference, we would save both pictures otherwise, we would free memory from the old picture and make the new picture the current picture. The detection and recording of the entire movement process is included in motion detection. The goal of motion detection [8] is to detect movement in a certain area automatically. The goal of motion detection is to find movement in a specific area. This region is always embodied in a zone of awareness, which is referred to as the field of vision in camera geometry. It's also referred to as a monitored area of the environment. The environment with moving items and activity is the area of attention in this scenario. A human, an animal, or an item can all be considered a zone of interest, which is defined by the phrase moving object.

II. Related Work

In recent years, a large variety of moving object detection algorithms has been reported. Mahbub et al. [9] suggested a statistical backdrop modeling-based technique. This method matches every edge segment of the current frame with every edge segment of the background to detect moving objects. This approach, however, fails to detect a moving edge segment that intersects with a backdrop edge segment. Geetha priya. S et al. [10], is to detect objects utilizing the You Only Look Once (YOLO) technique. When compared to other object detection methods, this technique has significant advantages. . Other algorithms, such as Convolutional Neural Network and Fast Convolutional Neural Network, do not look at the image completely, whereas YOLO does, by predicting the bounding boxes using convolutional networks and the class probabilities for these boxes, and detects the image faster than other algorithms. Tahkker and Kapadia built OpenCV for Android in [11]. Their goal was to offer readers a sense of what they'd need to get started using OpenCV on Android. The effects of applying several filters to an image, such as color conversion, grey scale, and dilation, were exhibited by the authors. The authors also put the features to the test on three different devices to see how long it took the algorithms to complete. The authors created an instruction guide with theory behind it on how to use OpenCV for image recognition in [12]. The paper covers image processing and OpenCV many machine learning [13] techniques.

The authors [14] attempt to develop a good motion detection system for critical sectors such as banks and businesses. They begin by taking sample images from a web cam that is recording images, then storing those images in a buffer to calculate the difference between the sampled images. When they detect movement, a counter is raised, and when it reaches a specific level, they transmit a message to a mobile phone indicating that movement has occurred and sound a buzzer. This paper discusses certain image processing techniques that we selected to use in our solution. [15]Wei, Li, and Yue offer a foreground-background motion detection system for tracking moving objects from a video camera in [15]. The authors achieved this by basing their approach on a probability density function called the Gaussian Mixture Model (GMM). To reduce processing time, the scientists tweaked the classic GMM algorithm by modifying the Gaussian parameters and number of components. To make foreground-background segmentation, the authors employed their GMM algorithm on each pixel in each frame. The authors make the frame binary once the foreground and background have been established, with the foreground becoming white (moving items) and the backdrop becoming black (none moving objects). The authors then apply filters to the binary images to reduce noise such as wind, light, and shadows.

In recent years, a large variety of moving object detection algorithms has been reported. A approach based on statistical background modelling was proposed by Mahbub et al., [16]. This approach detects moving objects by comparing every edge segment of the current frame to every backdrop edge segment [17]. This approach, however, fails to detect a moving edge segment that intersects with a backdrop edge segment. Islam and Lee [18] proposed a particle filter-based technique for moving object tracking in which the shape similarity of a template and estimated regions in a video scene is assessed by their normalised cross-correlation of distance transformed pictures. Dunne and Matuszewski [19] proposed an object detection system that uses a localised temporal difference change detector and a particle filter type likelihood detector to determine a spot within a detected item where a particle filter tracker may be initialised. Shin and Hong [20] described a method for restoring a crisp outline of an object and a loss part by applying edge information and a boosting factor in response to a change in the input image [21]. Finally, the item is recovered by analysing and removing the shadow cast by the object during the entire procedure.

III. Computer Vision

Computer vision (CV) is a branch of computer science concerned with enabling computers to comprehend images. Martin Minsky challenged his undergraduate Gerald Jay Sussman in the early 1970s/late 1960s to link a computer to a camera and have the machine describe what it saw [22]. Computer Vision (CV) is a topic of study that aims to create techniques that allow computers to "see" and interpret the content of digital pictures like photographs and movies. Because people, including very young children, can solve the problem of computer vision, it looks to be straightforward. Despite this, it is still largely an unsolved subject, owing to both a lack of understanding of biological vision and the complexity of vision perception in a dynamic and nearly infinitely altering physical reality. The 1990s and 2000s were known as the "golden era" of computer vision [23], as this was when modern computer vision became a reality. Feature extraction and object recognition algorithms were developed, as well as computer vision tools like OpenCV. Today, computer vision is frequently combined with machine learning algorithms, which can be trained to detect specific properties or objects, such as the number of people in an image [24]. Computer vision may be employed in a variety of fields, including medicine, where a computer can analyse photographs of patients to spot tumours [25]. It's also utilised in smart cars like Mobileye [26] to recognise people and barriers on the road in order to avoid collisions.

For tracking things in video frames, the author [27] suggested using an object detection technique. The simulation results suggest that this technique is effective, precise, and robust for detecting generic object classes with good performance. The focus should also be on improving categorization accuracy in real-time object identification. By using big data analytics, Ben Ayed et al. [28] proposed a method for detecting text data based on a texture in video frames. The video frames are broken down into fixed-size blocks, which are then analysed using the Haar wavelet transform technique. They also classified the text and non-text blocks using a neural network [29]. However, this research should focus on extracting regions in order to remove noisy regions and exclude text-like sections. Non-panoramic background modelling was suggested and modelled by Viswanath et al. [30]. They modelled the entire visual element with a single Spatio-temporal Gaussian using this method. The results of the simulations suggest that this technology is capable of detecting moving compounds with fewer false alarms. This solution, however, fails when the required characteristics are not available from the section. By combining Tensor features with a SIFT [31] technique to identifying the identified items using Deep Neural Network (DNN)[32], Najva and Bijoy suggested a model for object recognition and classification in films. The DNN, like the human brain, is capable of managing massive higher-dimensional data with billions of parameters. The proposed classifier model gives more accurate results than existing approaches, which use both SIFT and tensor features for feature extraction and DNN for classification, according to simulation findings.

3.1 Relationship between computer vision and AI

Computer vision is a topic of study that focuses on assisting computers in seeing, as demonstrated in figure 1. It is a multidisciplinary area that can be categorised as a subfield of artificial intelligence and machine learning, and it may employ specialised approaches as well as general learning algorithms.

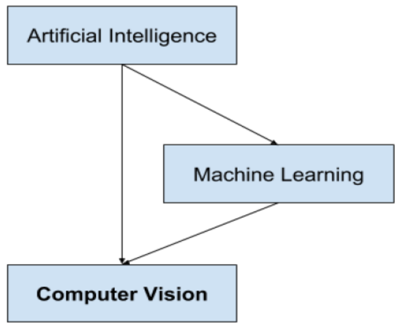


Figure 1 The Relationship between Computer Vision & AI

3. 2 Computer vision and image processing

Image processing is not the same as computer vision. The process of creating a new image from an old image [33], usually by simplifying or enhancing the content in some way, is known as image processing. It is a sort of digital signal processing that is unconcerned with image content interpretation. The image processing, such as pre-processing images, may be required for a certain computer vision system.
Normalizing the image's photometric attributes, such as brightness and colour. Cropping an image's limits, as in cantering an object in a photograph. Removing digital noise from an image, such as low-light digital artefacts.

3.3 Motion detection

When motion is detected, motion detection can be utilised to automatically execute a task. For example, motion detection can be used to light a room when people enter it or to detect criminal activities in security systems [34]. To detect motion, a variety of instruments are available, including hardware such as infrared sensors (IR sensors) and software such as image processing techniques. An infrared sensor detects the infrared radiation that human bodies emit when they generate heat. By comparing two photos [6] with each other, motion can be detected by image processing. This is accomplished by comparing pixels in the identical locations in the two photos. If the photos are identical, there is no difference between two pixels. However, if the photos are dissimilar, the pixel difference between some pixels will be more than zero. When comparing an image of an empty room to an image of the same room with people inside, discrepancies in the pixels where the individuals are in the image will appear.

3.4 Digital imaging

Pixels are minuscule bits that make up a computer image [35]. A pixel is made up of three smaller sub pixels, each of which represents a single colour (red, green, or blue) (RGB). Each sub pixel can change the brightness of its colour by changing its digital value between 0-255. This means that each pixel may produce a colour combination of 256 × 256 x 256, or more than 16.7 million distinct colours. A High Definition (HD) image has a horizontal resolution of 1920 pixels and a vertical resolution of 1080 pixels, totaling over 2 million pixels. Image processing can be used to alter the appearance of digital images by altering the image data, which means the pixel data. Image processing methods, for example, can be used to convert a coloured image [6] to a grey scaled image. In a grey scaled image, there are no RGB values in the sub pixels; instead, there is just one data value that defines the intensity of white light, with a range of 0-255, where 0 is black and 255 is white.

IV. OpenCV

OpenCV (Open Source Computer Vision Library) is a free software library for computer vision and machine learning. Artificial Intelligence relies on or is mostly based on computer vision. Self-driving cars, robotics, and picture editing apps all rely heavily on computer vision. OpenCV was an Android application subsystem for capturing, processing, and analysing pictures [36]. The OpenCV branch indicated the issues that needed to be resolved in order to capture a photo and determine whether or not movement had happened. OpenCV is a large open-source library for computer vision, machine learning, and image processing that currently plays a critical part in real-time operations, which are critical in today's systems It may be used to detect items, faces, and even human handwriting in photos and movies. Python can process the OpenCV array structure for analysis when it is combined with other libraries such as Numpuy. We employ vector space and execute mathematical operations on these features to recognise visual patterns and their various features. More than 2500 optimised algorithms are included in the library, which contains a comprehensive mix of both classic and cutting-edge computer vision and machine learning techniques. OpenCV was created with image processing in mind. The Image Processing coder was considered when designing each function and data structure. Matlab, on the other hand, is a very generic programming language. In the form of toolboxes, we can get nearly anything in the world. An algorithm analyses sequential video frames and outputs the movement of targets between the frames to conduct video tracking. There are many different algorithms, each with its own set of advantages and disadvantages. When choose the algorithm to utilise, it's crucial to keep the intended usage in mind.

V. Existing Problem

The main goal of this paper is to allow a simple camera connected to a general-purpose computer to detect items passing through it, as well as how long the object stayed in the area where the camera is located. As a result, this software can be used for monitoring. To begin, you'll use a camera to capture the first frame, as seen in figure 2. This frame will be used as the starting point. The phase difference between this baseline frame and the new frame with the object will be calculated to identify motion. Delta frames will be the name of the new frames. Then you'll use pixel intensity to fine-tune your delta frame. Threshold will be the name of the refined frame. Then you'll use advanced image processing techniques like Shadow Removal, Dilation, Contouring, and others to catch substantial items on the Threshold frame. Here's a visual representation of what you'll accomplish. You'll be able to record the timestamps of objects entering and exiting the frame. As a result, you'll be able to determine the screen-on time.

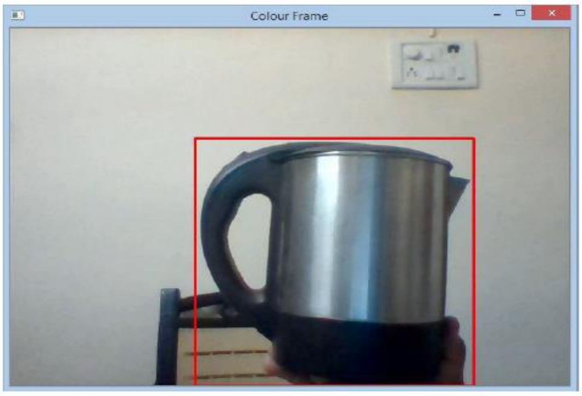


Figure 2 The Detected Object

VI. Proposed Methodology

In our project, we wanted to create a surveillance system that can not only detect motion but also notify the user of the intrusion, capture film from the moment the motion was detected, and send SMS to the user's mobile phone (see figure 3). The system architecture will work in the following manner.

6.1 Capturing phase

We must first acquire live photos of the area to be observed and kept under observation in order to detect motion. This is accomplished by utilising a webcam that continuously transmits a succession of photos at a specific frame rate (frames per second).

6.2 Comparing phase

To evaluate whether any motion is present in the live images, we compare the live images provided by the webcam to each other so that we may detect changes in these frames and so forecast the appearance of some motion.

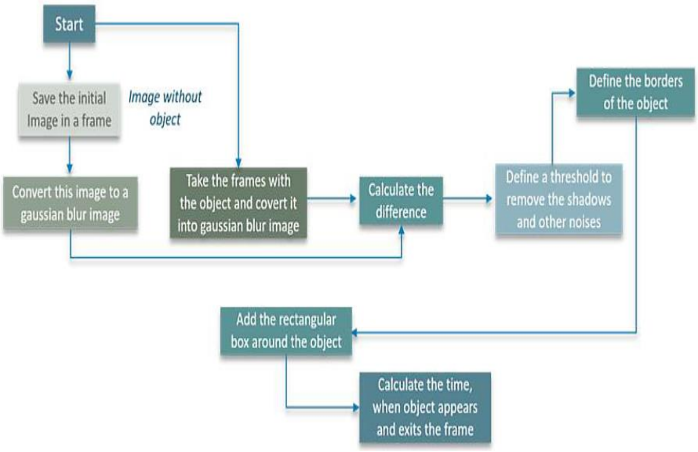


Figure 3 Flow Diagram

6.3 Storage phase

If motion is detected, we must store the frames in memory so that the user may see them soon. This also aids the user in presenting legal proof of certain inappropriate behaviour, as video coverage can be utilised as evidence in court.

6.4 System indicating phase

When motion is detected, the user may want to be notified through SMS right away that there has been an incursion identified by the software, which is why the software includes an alarm system. If any kind of motion is detected, this alarm system immediately generates a wav file format audible alert signal. This aids in the prevention of any form of security breach at the time. When motion is detected, a location with photographs of the intruder is given to the user, and an SMS is sent to the user's cell phone at the same time.

6.5 Image segmentation

Images are frequently just interested in certain sections of the research and use of images. Goals or foreground are terms used to describe these elements (as other parts of the background). To identify and analyse the target in the image, we must first isolate it from the rest of the image. The term "image segmentation" refers to the process of dividing an image into sections, each with its own set of properties, in order to extract the target of interest. Threshold segmentation [37] is the picture segmentation method employed in this paper. To put it another way, the grey scale image segmentation threshold is used to define a range in an image that is compared to the threshold and [35] then separated into two categories, foreground and background, based on the results. There are two fundamental processes in threshold segmentation. Determine the threshold first. In the second step above, the pixel value will be compared to the threshold value T to calculate the threshold value, which is the most important step in partition. There is an optimum threshold based on several picture segmentation goals [38] in the threshold selection. We can adjust the image for segmentation if we can identify an adequate threshold. Many alternative ways for detecting moving targets can be employed with an intelligent video surveillance system, including background subtraction and frame difference methods. These strategies have benefits and drawbacks, which will be discussed below.

6.6 Background subtraction method

The background subtraction method is a technique for detecting moving targets that uses the difference between the current image and the background image [39]. The first frame image is saved as a backdrop image, which is the basic concept. The current picture fk is then subtracted from the previously stored background image B, and if the pixel difference is more than the bound threshold, the pixel to pixel[35]on the moving target, or as the background pixel, is determined. To accomplish motion detection success, the threshold of the background subtraction must be carefully chosen. The accuracy of motion detection is critical. The threshold value is too low, resulting in a significant number of false change points; the threshold value is too high, limiting the range of movement changes. The proper threshold request responds to the impact that sceneries and cameras have on colour wavelengths and changes in lighting conditions, thus the dynamic threshold should be chosen. In the case of fixed cameras, background subtractions are used for motion detection [40]. It has the advantages of being simple to deploy, quick and successful detection, and the ability to deliver the target's complete feature data. The flaws are common in the moves of the occasions, making the background image tough to obtain. The immovable background difference is especially sensitive to changes in dynamic settings, such as slow shifts in indoor lighting.

VII. Implementation

To begin with, Python should be used to install Python 3 or above, pandas, and OpenCV. To open the camera and capture video frames, OpenCV includes built-in functions. The camera is connected to your computer's hardware port number 0 as "0". We can enter the port number if you have several cameras, external cameras, or a CCTV system installed. We change the colour frame to a grey frame because we don't need an extra layer of colour. Image smoothing is achieved by Gaussian Blur, which improves detection accuracy [41]. The width and height of the Gaussian Kernel are defined in the second parameter of the Gaussian Blur function, and the standard deviation value is provided in the third parameter. Because this is a series of higher-order differential calculus theorems, you can use standard kernel size values of (21,21) and standard-deviation values of 0. The first frame will be used as the starting point.

The phase difference between this baseline frame and the additional frames containing some item will be calculated to detect motion. There should be no movement in front of the camera when shooting the first frame. You don't want to process the first frame any further once you've obtained it. Use the continue statement if you want to skip the next stages. We must now determine the difference between the first and current frames [42]. As a result, we use the abs diff function to create an alternative frame, which we refer to as a delta frame. In our use case, simply discovering a difference will not suffice, thus we must establish a pixel threshold value that can be deemed a real object. As a rule of thumb, the threshold value should be 30 pixels, and the colour of the threshold value should be white (color code: 255). The Thresh binary function returns a tuple value, with the resulting threshold frame contained solely in the second item ([0] is the first item and [1] is the second item). The binary threshold function is a non-continuous function that only accepts two discrete values: 0 or 1. We regard the current frame's status to be 0 if there is no object in front of the camera and 1 if there is an object in front of the camera.

Each component of an object casts shadows on the background or on other components of the item. This could be perplexing. For example, the nose casts a shadow on your lips, any larger stationary object casts shadows on smaller things placed nearby, fluttering light sources, various light sources with varying luminous intensities, curtains in your room, light source direction and viewing angle, and so on. These are some of the anomalies that have been discovered in real-time captured frames. As a result, we must filter the image to reduce these forms of disturbances. We can control the degree of smoothness in the Dilate function by adjusting the number of iterations. The greater the number of iterations, the smoother the result, and the longer the processing time. As a result, it is recommended that it be kept at 3. The structural element is denoted by the "None" option in the dilate function, which is not required in our scenario. We need to discover contours in our frame once it has been filtered. A curve along which a function has a constant value at all points is called a contour. In order to determine the size and placement of the object, we need contours in our current frame. To accomplish this, we use the locate counters method to pass a copy of the filtered frame. We identify contours using a replica of the filtered frame rather than the original since we don't want to mess with the original filtered frame. It becomes a little hard here since the contours must be stored in a tuple, and you only want the first element of the tuple.

The syntax for declaring a tuple in Python 3 may be found here (name,). We now need to find only the external contours of objects on our filtered layer, as any contours other than the extreme external ones are worthless in our use case. To optimise the process of retrieving the contours, we must apply some approximation approaches. Any curve approximation or curve interpolation method can be used, but the Simple Chain Approximation rule compresses horizontal, vertical, and diagonal segments and only leaves their end points. As a result, we can quickly obtain the best-fit contour. We don't want to catch small stuff like insects, but rather significant objects like humans and animals. The notion of contour area can be used to personalise this. Those items with an area of less than 10,000 pixels are skipped in this case. We set the status=1 for contours with an area greater than this, indicating that the object has been detected. Using the bounding Rect function, we can now capture the contour's coordinates. Then, we use these coordinates to draw a rectangle of the desired color and thickness on the colored frame. This rectangle depicts the actual detected object. The status_list stores the values 0 no object detected and 1 object detected.

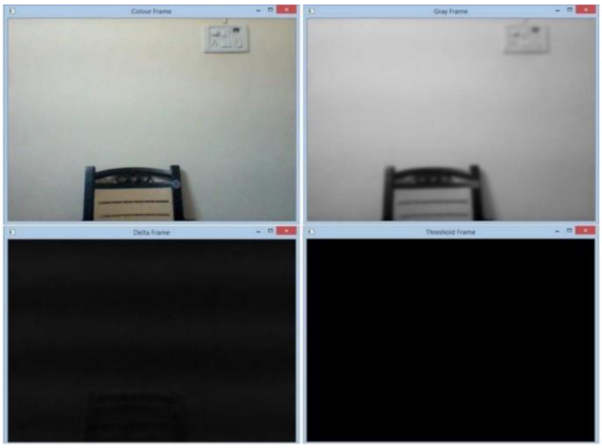


Figure 4 The Baseline Frames

The point at which this status value changes from 0 to 1 indicates that the object has entered the frame. Similarly, when this status value goes from 1 to 0, the object is no longer visible in the frame. As a result, we take the time-stamp of these two toggle events from the status list's last two values.

You can compare frames by using the imshow function, which allows you to display each frame in its own window.

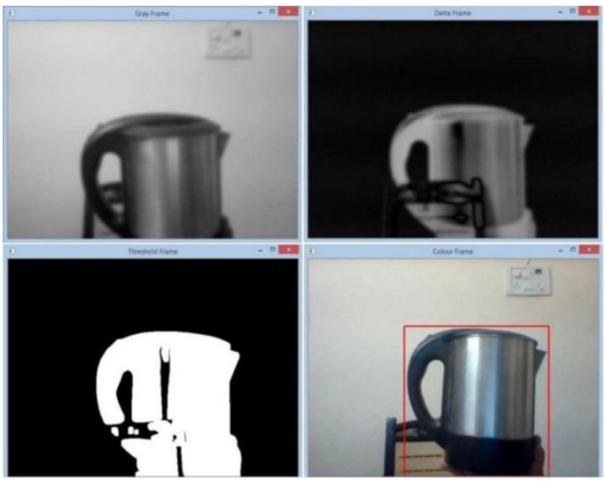
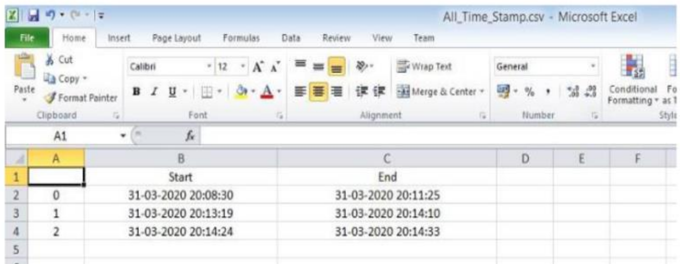


Figure 5 The Frame with Detected Object

To delay the action until a key is pressed, we utilise the waitKey method. We use waitKey to acquire a continuous live feed from the camera in this case (1). Simply hit the "Q" key on the keyboard to stop the video from being captured. We also need to record the last time "Q" was pushed, as this will force the application to stop taking video from the camera and generate time data afterwards. The real image output created by the application is shown below. The first image depicts the four types of frames found in the baseline frame depicted in Figure 2, whereas the second image depicts the four types of frames found in the frame with objects depicted in figure 5.All timestamps have been stored in the panda's data-frame until now. We will export our data-frame to a CSV file on our local drive, as illustrated in figure 6, to gain insights from the data created. Please remember to release the video variable, as it has been taking up a lot of memory. Also destroy all windows to avoid getting any errors. This is how the generated CSV looks like. We can see, there that object has been detected 3 times till the program has ended. We can see the start and end time and calculate the time when the object was in front of the camera.



	Start	End
0	31-03-2020 20:08:30	31-03-2020 20:11:25
1	31-03-2020 20:13:19	31-03-2020 20:14:10
2	31-03-2020 20:14:24	31-03-2020 20:14:33

Figure 6 The Output Format

VIII. Results and Discussion

The "Smart webcam motion detection surveillance system" is a home/office security system that can be very useful in situations when security is a concern. The methods used by thieves and robbers to steal have improved dramatically as a result of technological advancements in the modern world. As a result, surveillance systems must evolve to keep pace with the changing world. Video surveillance and monitoring are the most recent technologies utilised in the fight against theft and destruction. It is possible to monitor and collect every inch and second of the region of interest utilising technology. In digital video surveillance systems, motion detection is the most crucial function. It allows the camera to capture only when necessary rather than all of the time, resulting in a significant decrease in storage capacity. When unexpected motion is detected, an alarm can be activated. Personnel are no longer required to monitor at all times as a result of this. The motion detector fills the requirement for a low-cost, tiny security system in everyday life. Computerized home-based security can develop a lot with the coming future. Future is promising and easier with innovative technologies.

IX. Conclusion

To sum up, our application demonstrates what tasks can be accomplished with the help of computer vision, such as creating surveillance-based simple applications and more advanced AI integrated applications that can use machine learning to implement tasks such as facial recognition, emotion detection, object detection, and so on. Video surveillance and monitoring are the most recent technologies utilized in the fight against theft and destruction. It is possible to monitor and collect every inch and second of the region of interest utilizing technology. In digital video surveillance systems, motion detection is the most crucial function. It allows the camera to capture only when necessary rather than all of the time, resulting in a significant decrease in storage capacity. When unexpected motion is detected, an alarm can be activated. This relieves personnel from constant monitoring. The motion detector fills the requirement for a low-cost, modest security system in everyday life. Computerized home-based security has a lot of potential in the future. With breakthrough technologies, the future seems bright and easier.

X. Future Work

This programme can be used for surveillance to safeguard any area or important object from unauthorized access, as well as to determine the length of time that an unauthorized human or object attempts to breach the perimeter or gain access to the protected object. It can also be used to determine how long it takes for an entity to transition from its original condition to its final state, as in biology and chemical studies. From here on out, there are a plethora of topics that can be investigated further. For instance, the methodologies presented could be improved to suit various problem-specific or domain-specific applications. Also, more helpful methods and algorithms, such as those involving tracking the item that causes the motion events, such as those using optical flows or also known as picture flows, could be implemented to improve the procedures. Human motions are detected in this area. Future works may, however, desire to recognize the human body stance or gesture registered by the algorithm used in the prototype system.

XI. REFERENCES

[1]. P. S. Von and U. Lichtenthaler, "The role of innovation intermediaries in the markets for technology", Int. J. Technol. Intell. Plan., vol. 7, no. 2, pp. 128, Jan. 2011

[2]. Yusuf Perwej, “An Experiential Study of the Big Data”, International Transaction of Electrical and Computer Engineers System (ITECES), USA, Science and Education Publishing, Volume 4, No. 1, Pages 14-25, 2017 DOI: 10.12691/iteces-4-1-3

[3]. Weiming Hu, Tieniu Tan, Liang Wang and Steve Maybank, "A Survey on Visual Surveillance of Object Motion and Behaviors", IEEE Trans. on Systems Man and Cybernetics-Part C: Applications and Reviews, vol. 34, no. 3, pp. 334-352, August 2004

[4]. Yusuf Perwej, Prof. Syed Qamar Abbas, Jai Pratap Dixit, Nikhat Akhtar, Anurag Kumar Jaiswal, “A Systematic Literature Review on the Cyber Security”, International Journal of Scientific Research and Management (IJSRM), Volume 9, Issue 12, Pages 669 - 710, 2021 DOI: 10.18535/ijsrm/v9i12.ec04

[5]. Xia Dong, Kedian Wang and Guohua Jia, "Moving Object and Shadow Detection Based on RGB Color Space and Edge Ratio", IEEE 2nd International Conference on Image and Signal Processing, pp. 1-5, Oct. 2009

[6]. Yusuf Perwej, Asif Perwej, Firoj Parwej, “An Adaptive Watermarking Technique for the copyright of digital images and Digital Image Protection”, International journal of Multimedia & Its Applications (IJMA), USA , Volume 4, No.2, Pages 21- 38, 2012, DOI: 10.5121/ijma.2012.4202

[7]. Y. A. Wang and E. H. Adelson, "Representing moving images with layers", IEEE Transactions on Image Processing, vol. 3, no. 11, pp. 625-638, Sept. 1994

[8]. Y. You, S. Gong, C. Liu, "Adaptive moving object detection algorithm based on back ground subtraction and motion estimation", Int. J. Advancements in Computing Technology, vol. 5, no. 6, pp. 357-363, 2013

[9]. 9M. Murshed, A. Ramirez, O. Chae, “Statistical Background Modeling: An Edge Segment Based Moving Object Detection Approach”, Proc. of IEEE International Conf. on Advanced Video and Signal Based Surveillance, pp. 300-305, 2010

[10]. Geethapriya. S, N. Duraimurugan, S.P. Chokkalingam, “Real-Time Object Detection with Yolo”, International Journal of Engineering and Advanced Technology (IJEAT) ISSN: 2249 – 8958, Volume-8, Issue-3S, February 2019.

[11]. Thakker and Kapadia, Image processing on embedded platform Android, Computer, Communication and Control (IC4), 2015 International Conference on, Indore, pp. 1-6, 2015

[12]. Marengoni and Stringhini. High Level Computer Vision using OpenCV. 2011. Universidade Presbiteriana Mackenzie.

[13]. Yusuf Perwej, “An Evaluation of Deep Learning Miniature Concerning in Soft Computing”, International Journal of Advanced Research in Computer and Communication Engineering (IJARCCE), Volume 4, Issue 2, Pages 10 - 16, 2015, DOI: 10.17148/IJARCCE.2015.4203

[14]. Thomas, Ashraf, Lal, Mathew,Jayashree, Security enhancement using motion detection, Signal Processing, Communication, Computing and Networking Technologies (ICSCCN), 2011 International Conference on, Thuckafay, pp. 552-557, 2011

[15]. Wei, Li, Yue. A Foreground-background Segmentation Algorithm for Video Sequences. Jiangnan Univ. China. 2015

[16]. M. Murshed, A. Ramirez, O. Chae, “Statistical Background Modeling: An Edge Segment Based Moving Object Detection Approach”, Proc. of IEEE International Conf. on Advanced Video and Signal Based Surveillance, (2010), pp. 300-305.

[17]. Yusuf Perwej, “An Optimal Approach to Edge Detection Using Fuzzy Rule and Sobel Method”, International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering, Volume 4, Issue 11, Pages 9161-9179, 2015, DOI: 10.15662/IJAREEIE.2015.0411054

[18]. Md. Z. Islam, C.M. Oh and C. W. Lee, “Video Based Moving Object Tracking by Particle Filter”, International Journal of Signal Processing, Image Processing and Pattern, vol. 2, no. 1, pp. 119–132., 2009

[19]. P. Dunne and B. J. Matuszewski, “Histogram Based Detection of Moving Objects for Tracker Initialization in Surveillance Video”, International Journal of Grid and Distributed Computing, vol. 4, no. 3, pp. 71-78, 2011

[20]. N. R. Shin and K. Hong, “A Study on the Development of Multiple Objects Extraction Method Using Difference Image Edge Information”, International Journal of Energy, Information and Comm., vol. 2, no. 2, pp. 108–120, 2011

[21]. Yusuf Perwej, Firoj Parwej, Asif Perwej, “ Copyright Protection of Digital Images Using

Robust Watermarking Based on Joint DLT and DWT ", International Journal of Scientific & Engineering Research (IJSER), France, Volume 3, Issue 6, Pages 1- 9, 2012
[22]. Papert, The summer vision project, Massachusetts Institute of technology, 1996
[23]. Efstration Graves, A brief history of computer vision [Internet]. 2016 [updated 05/05-2016, cited 05/05-2016].
[24]. Roqueiro, Petrushin, Counting people using video cameras, Department of Computer Science, University of Illinois at Chicago, Chicago, IL 60607, USA, 2006
[25]. Havaei1, Jodoin1, Efficient interactive brain tumor segmentation as within-brain kNN classification. University Sherbrooke, Canada. 2014
[26]. Mobileye, Mobileye - Our Vision. 2016 [updated 04/25-2016, cited 25/04-2016]
[27]. Guo, L., Liao, Y., Luo, D. Generic Object Detection Using Improved Gentle boost Classifier. Phys. Procedia 25, 1528–1535, 2012, doi:10.1016/j.phpro.2012.03.272
[28]. Ben Ayed, A., Ben Halima, M., & Alimi, A.M., 2015. MapReduce-based text detection in big data natural scene videos. Procedia Comput. Sci. 53, 216–223. doi:10.1016/j.procs.2015.07.297
[29]. Yusuf Perwej, "Recurrent Neural Network Method in Arabic Words Recognition System", International Journal of Computer Science and Telecommunications (IJCST), UK, London Volume 3, Issue 11, Pages 43-48, 2012
[30]. Viswanath, A., Kumari, R. & Senthamilarasu, V., 2015. Background Modelling from a Moving Camera. Procedia - Procedia Comput. Sci. 58, 289–296. doi:10.1016/j.procs.2015.08.023
[31]. Najva, N. & Bijoy, K.E., 2016. SIFT and Tensor-Based Object Detection and Classification in Videos Using Deep Neural Networks. Procedia Comput. Sci. 93, 351–358. doi:10.1016/j.procs.2016.07.220
[32]. Yusuf Perwej, "An Evaluation of Deep Learning Miniature Concerning in Soft Computing", International Journal of Advanced Research in Computer and Communication Engineering (IJARCCE), Volume 4, Issue 2, Pages 10 - 16, 2015, DOI: 10.17148/IJARCCE.2015.4203
[33]. Ankit Kumar, Neha kulshrestha, Yusuf Perwej, Ashish Kumar Srivastava, Chandan Mani Tripathi, "The Assay of Potholes and Road Damage Detection", International Journal of Scientific Research in Computer Science, Engineering and Information Technology, Vol. 8, Issue 1, Pages 202-211, January-February-2022, DOI: 10.32628/CSEIT228135
[34]. L. Li, W. Huang, I. Y.H. Gu, Q. Tian, "Statistical modeling of complex backgrounds for foreground object detection," in IEEE Transactions on Image Processing, vol. 13, no. 11, pp:1459-1472, 2004
[35]. Dictionary. Pixel: Define pixel [Internet]. 2016 [updated 12/05-2016, cited 12/05-2016].
[36]. G. Bradski, A. Kaehler, O' Reilly, Learning OpenCV, 2008
[37]. Yusuf Perwej, Shaikh Abdul Hannan, Nikhat Akhtar, "The State-of-the-Art Handwritten Recognition of Arabic Script Using Simplified Fuzzy ARTMAP and Hidden Markov Models", International Journal of Computer Science and Telecommunications, Volume, Issue 8, Pages 26 - 32, 2014
[38]. D Lin, J Dai, J Jia et al., "Scribblesup: Scribble-supervised convolutional networks for semantic segmentation", II Proceedings of the IEEE Conf. on Computer Vision and Pattern Recognition, pp. 3159-3167, 2016
[39]. G. Yao, T. Lei, J. Zhong, P. Jiang and W. Jia, "Comparative Evaluation of Background Subtraction Algorithms in Remote Scene Videos Captured by MWIR Sensors", Sensors, vol. 17, no. 9, pp. 1945, Aug. 2017
[40]. M. Piccardi, "Background subtraction techniques: a review", Systems Man and

Cybernetics2004 IEEE International Conference, vol. 4, pp. 30997-3104, 2004

[41]. Yusuf Perwej, Nikhat Akhtar, Firoj Parwej, “The Kingdom of Saudi Arabia Vehicle License Plate Recognition using Learning Vector Quantization Artificial Neural Network”, International Journal of Computer Applications (IJCA), USA, Volume 98, No.11, Pages 32 – 38, 2014, DOI: 10.5120/17230-7556

[42]. M. Piccardi, "Background subtraction techniques: a review", IEEE International Conference on Systems Man and Cybernetics, pp. 3099-3104, 2004

Cite this article as :

Shubham Mishra, Mrs. Versha Verma, Dr. Nikhat Akhtar, Shivam Chaturvedi, Dr. Yusuf Perwej, "An Intelligent Motion Detection Using OpenCV", International Journal of Scientific Research in Science, Engineering and Technology (IJSRSET), Online ISSN : 2394-4099, Print ISSN : 2395-1990, Volume 9 Issue 2, pp. 51-63, March-April 2022. Available at doi : https://doi.org/10.32628/IJSRSET22925

Journal URL : https://ijsrset.com/IJSRSET22925