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REAL-TIME NUMBER PLATE RECOGNITION SYSTEM

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ABSTRACT: Motion detection software system enables us to see the movement around an object or a visual area. Motion detection software is widely preferred as one of the most crucial security features in recent days. It enhances existing security devices such as motion sensor lighting on indoor and outdoor security cameras. Security cameras are one of the most common devices that use motion detection technology. Now, for better protection, motion detector cameras are preferred. The project suggested that Motion detection detects changes in object position concerning the environment and vice versa. This motion detection software helps us detect moving objects in front of the camera. A motion detection software is proposed, which allows us to see the movement in front of the camera. In addition, the detection of moving objects is a compelling research topic in computer vision and video processing. It constitutes a critical step for many complex processes such as video object classification and video tracking activity, thus recognising the actual shape of a moving object from a particular sequence of video frames.

1. Introduction:

Motion detection detects changes in object position concerning the environment and vice versa. This motion detection software helps us see moving objects in front of the camera. It can perform the following tasks using this software such as 1) Get a screenshot while working at home, 2) Monitor your child before screen time, 3) Get illegal access to your yard, 4) Find unwanted community/animal movement around your room/house/tunnel and many other things.

Motion detection software is proposed in this research work, which allows us to see the movement in front of the camera. Generally, there are many ways to do motion detection, tracking, and analysis in OpenCV and in that, some are very simple, and some are very complex. Earlier Bayesian features (opportunities) are adopted that work based on the background and foreground data. These methods are concerned with separating the background from the front (and provide ways to distinguish between actual movement and just a change of shade with a slight change in brightness).

Now, why is this so important? Furthermore, why do we care which pixels are lower and front and which pixels are the back part? With motion detection, we often make the following assumption: Our video streaming layer is very stable and does not change to consecutive video frames. So, if we can model the background, we monitor it to make a significant change. If there is a significant change, we can get it - this change is often similar to the movement of our video.

It is apparent in the real world that this belief can quickly fail. Our background can look very different from the various video frames because of the dignity, thinking, lighting conditions, and other possible environmental changes. Furthermore, if the background looks different, it can discard our algorithms. Effective retrieval / pre-discovery systems use horse-mounted cameras and controlled lighting conditions.

The proposed software program initially captures the first frame via webcam. This framework will be treated as the first framework. The movement will be obtained by calculating the phase difference between the first frame and the new frame. The new frames will be called Delta_frame, in which you will improve your delta frame using pixel power. The refined structure will be called the Threshold framework. Then, larger objects are captured using other complex image processing methods such as Shadow Removal, Dilation, Contouring, etc., in the threshold framework. Also, it could be possible to capture the timestamp when the object is framed and out of frame. Therefore, it is possible to get the screen in time. Finally, a graph will show us how long an object stays in front of the camera and how often the moving object is detected.

2. Related Works:

This section reviews a list of papers related to this research. The articles were found by searching for words such as motion detection, OpenCV android, computer vision;

A. Motion detection

Roquiero and Petrushin developed a system that could calculate the natural population with the help of a camera. They do this by analysing the images obtained and removing specific features with the help of motion detectors. This is done using a medium filter that takes several images at a time and calculated the average value of each pixel. After that, the middle image is subtracted pixels by pixel from the recent image; if the difference is higher than a certain threshold, is
marked as before. Front pixels are areas that have moved over time. Later they used a learning model of trained machines to count people in pictures on previous pixels. They reached 98.64% accuracy in detecting if more than one person was watching by following those steps. Using the closest neighbour algorithm, they achieved an 86.9% accuracy in calculating the exact number of people in a photograph. Processing and pre-extracting techniques used in this paper are used in our application.

The authors try to create a sound system for finding movement in sensitive areas like banks and business ventures. They use the same method as stated in. First, they take sample photos on webcam, record images and then store those images in a bar to calculate the difference between the sample images. Each time they saw the movement of the counter increasing, and when it was moving above a certain threshold, they sent a text message to the cell phone that the action was happening and the bus was opened. This paper outlines some image processing methods we have chosen to use in our solution.

Wei, Li, and Yue introduced a front-to-back algorithm used for motion detection to track objects moving from a video camera. The authors have achieved this by supporting their Gaussian Mixture Model (GMM) solution, which is a work in progress. The authors modified the traditional GMM algorithm by adjusting the Gaussian parameters and number of parts, and the authors did this to reduce computer time. The authors used their GMM algorithm for each pixel in each frame to perform pre-domain classification. Once the front and background have been defined, the authors make the frame binary, while the show is white (moving objects) and the back is black (no moving objects). The authors then take binary pictures with filters to remove sounds such as wind, light and shadows. The authors compare their GMM algorithm with the traditional GMM algorithm using a test in which a video camera tracks moving objects on traffic and compass. The result was that traditional GMM had 58% accuracy while their GMM algorithm had 77% accuracy in monitoring traffic. The solution used in this paper is considered to be the decision of how to obtain movement.

B. Computer vision

In Tahkker and Kapadia used OpenCV on Android. Their goal was to give students an idea of what it takes to run OpenCV on Android. The authors demonstrated the effects of applying specific filters to an image, such as colour change, greyscale and dilation. The authors also tested the features on three devices to check the time it took for the algorithms to complete.

The authors developed a tutorial guide on the concept behind how to use OpenCV for image recognition purposes. The article covers image management and a variety of machine learning capabilities that contain OpenCV. The first part of the paper explained how to handle images in the form of filters, object recognition and image classification. The second part explained how different machine learning algorithms work as decision trees, k-mean combinations and neural networks. This document helped you understand how to use and use OpenCV to create an application that can detect human availability.

3. Proposed System:

A. Installing the python libraries and dependencies

To make this software, we need libraries of OpenCV, Bokeh, Pandas, and Datetime. OpenCV-Python is a library of Python bonds designed to solve computer vision problems. OpenCV-Python uses Numpy, a highly optimised library of pricing performance with the syntax of MATLAB style. All properties of the same OpenCV members are converted and removed from the same Numpy members. This also makes it easier to integrate with other Numpy libraries such as SciPy and Matplotlib. Bokeh is an interactive library for modern web browsers. It provides a beautiful, concise architecture for flexible graphics and high-performance connections to large databases or streams. Bokeh can help anyone who would like to quickly and easily create interactive sites, dashboards, and data applications. In a computer program, pandas are a software library written in Python programming language for cheating and analysing data. In particular, it provides data structure and functionality to manipulate numerical tables and time series. It is free software licensed under the three-term BSD license.

B. Working

a) Initializing the variables and capturing the video frames:

We will use these variables in the code to better understand them, first_frame, satus_list, times, and df for the dataframe. OpenCV has in-built functions to open the camera and capture video frames. "0" denotes the camera at the hardware port number 0 in the computer. We are capturing the video frames in a new variable, video.

b) *Converting the captured frame to greyscale:*

We change the colour frame to agreyy frame as an additional layer of colour is not required. Gaussian Blur is used to smooth the image and improve the accuracy of detection. These are set with higher-order calculation theorems so that you can use standard kernel values as (21,21) and standard deviations as 0.

c) *Capturing The Frames:*

The first frame will be treated as the first frame. Motivation will be obtained by calculating the phase difference between this basic framework and the new frames that contain something. Therefore, we use the absdiff function and call a different frame that emerges as a delta framework. As a measure, you can select 30 pixels as the limit value and define the colour of the limit value to be white. The Binary threshold function is a continuous function that works with two different values: 0 or 1. We view the current frame status as 0 when nothing is present in front of the camera or as 1 when an object is in front of the camera.

D) *Contouring and Threshold Dilation:*

Each part of the object casts shadows on the back or other legs. This may seem not very clear. To reduce these types of sounds, we need to filter the image. We can set the smoothness level in the Dilate function by setting the multiplication value. The more the repetitive value increases, the smoother it will be, and the more time it will be to process. Once the frame is filtered, we will have to get the look of our frame. A line turns when a function has a constant value at all points. We need a view of our current frame to identify the size and location of the object. We transfer a filtered frame copy to the FindCountors process to achieve this. We use a copy of the filtered frame to get the drawings, not the original ones, as we do not want to disturb the original filtered frame. This can be cuscustomiseding by the concept of a peer location. Here, we skip those objects with an area of fewer than 10,000 pixels. We set the state in the more extensive area lines = 1; the thing is available.

e) Capturing Time-stamp Of Object Entry and Exit Frame & Displaying All the Different Frames:

Status_list saves values 0: nothing found and 1: item found. The time when this state value changes from 0 to 1: at that moment, the object enters the frame. Similarly, when this state number varies frovaries0, the object disapthingfrom the frame. We, therefore, record the time stamp of these two conversion events from the last two values of the status list. Using the imshow method, you will be able to display each frame in separate windows and compare them. A waitKey function slows down the process until the key is pressed. Here, to get continuous live feeds from the camera, we use waitKey. If you want to stop video capture, press the "Q" key on the keyboard. We also have to take the last stamp when the "Q" is encouraged, as this will cause the system to finish capturing video from the camera and later create time data.

f) ***Plot of the graph marking the object entry and exit in the frame:***

With the help of bokeh. Plotting, we have several methods. It is a Plot section that facilitates the creation of a building with automatic axes, grids, tools, etc. Drawing objects have many glyph methods that can be used to draw vectorised graphic glyphs: x_axis_type, length, width, and title. Quad is also part of the figure, and both are part of the bokeh

4. System Testing:

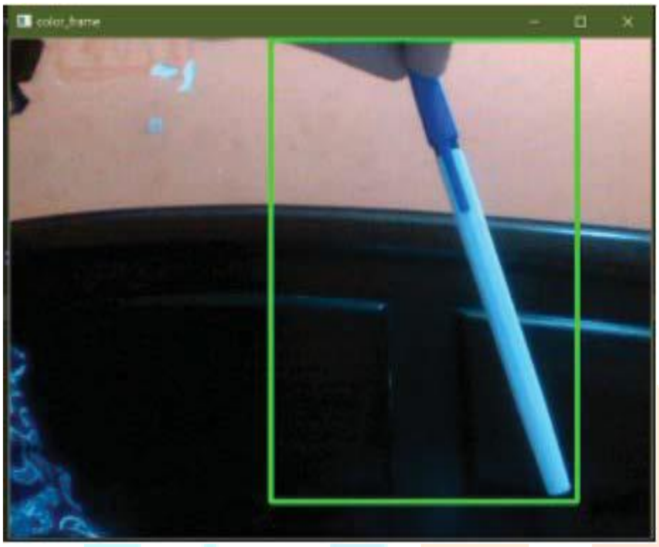


Fig. 1. This is the colour frame that captures the object which is entering it.

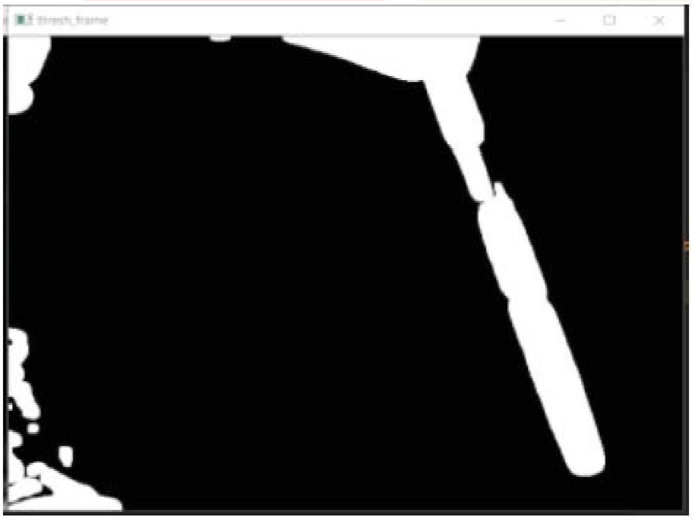


Fig. 2. Thresh frame with the object with noise cancellation

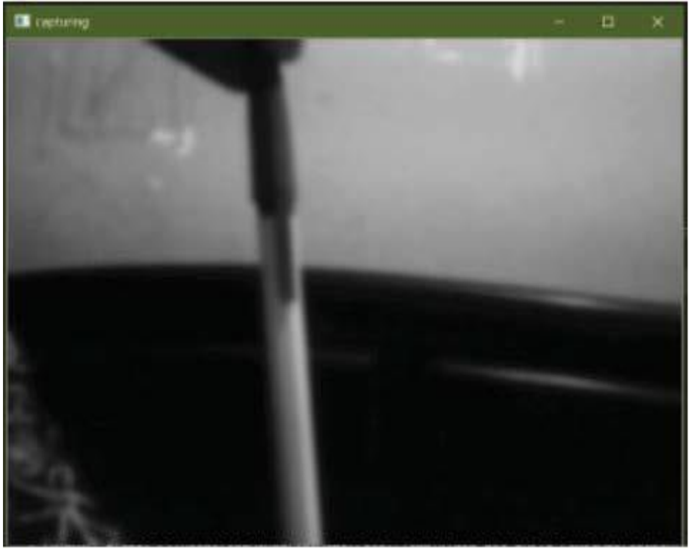


Fig. 3. This frame converts the captured object picture to a grey version

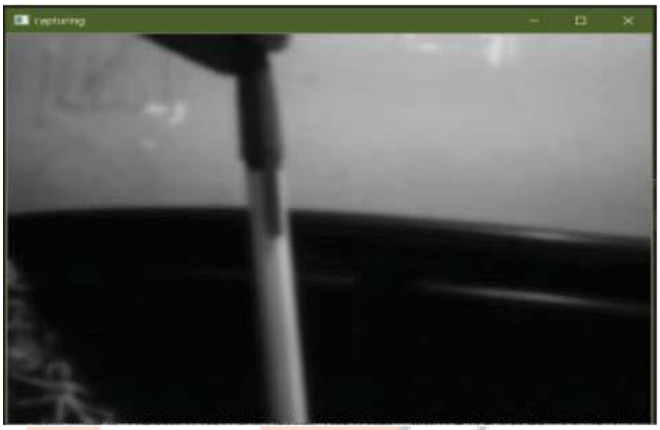
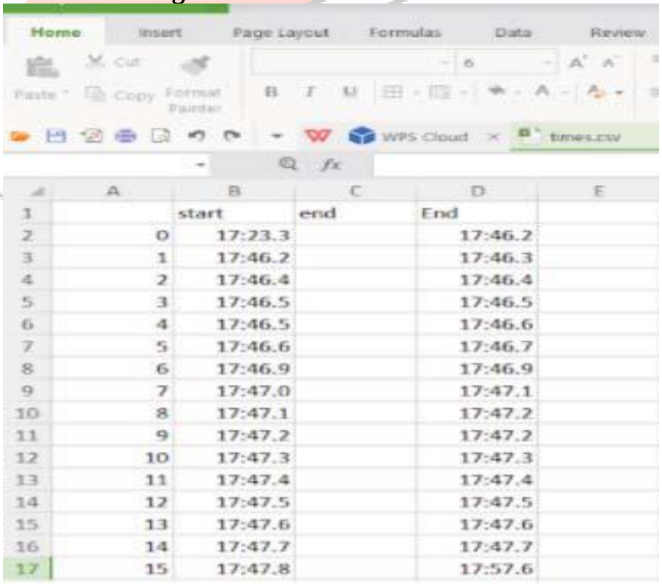


Fig. 4. Delta frame calculates the motion through phase difference using the absdiff function



	A	B	C	D	E
1		start	end	End	
2	0	17:23.3		17:46.2	
3	1	17:46.2		17:46.3	
4	2	17:46.4		17:46.4	
5	3	17:46.5		17:46.5	
6	4	17:46.5		17:46.6	
7	5	17:46.6		17:46.7	
8	6	17:46.9		17:46.9	
9	7	17:47.0		17:47.1	
10	8	17:47.1		17:47.2	
11	9	17:47.2		17:47.2	
12	10	17:47.3		17:47.3	
13	11	17:47.4		17:47.4	
14	12	17:47.5		17:47.5	
15	13	17:47.6		17:47.6	
16	14	17:47.7		17:47.7	
17	15	17:47.8		17:57.6	

Fig. 5. The times.csv is created using the pandas' library, and it stores all the t timestamps that were held in the pandas dataframe.

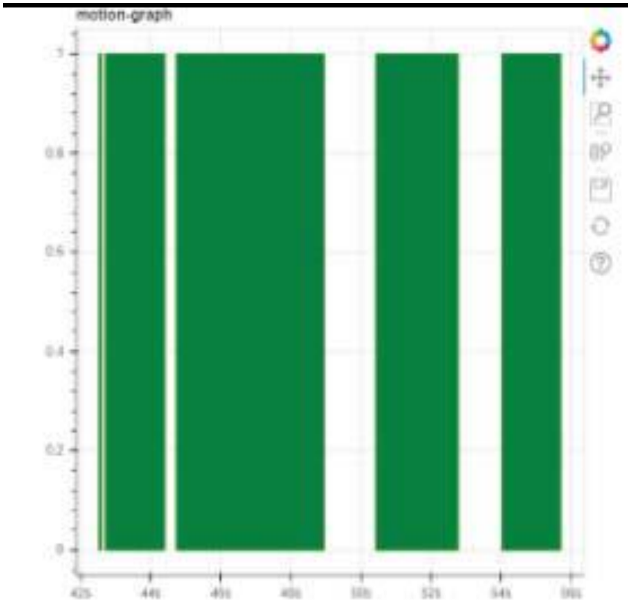


Fig. 6. This plot is based on the t imes.csv file; it shows the total time for which the object remained in front of the camera (marked by the green bars), and the white region shows the absence of activity in front of the camera. The x-axis ranges between 0-1, and the y-axis shows the time.

5. APPLICATION OF MOTION DETECTION SYSTEMS

Movement machines have a wide range of uses and can be used in everyday life to detect any unusual Movements at home. These days, most smart devices come with built-in motion sensors that have been proven to be important in modern times. Some of the Motion sensor applications are listed below:

- Incoming alarms
- Automatic ticket gates
- Entrance light
- Security lighting
- Automatic sinks/toilet flusher
- Authors and Meetings

6. CONCLUSION

A simple and efficient motion detection system is proposed in this research work. This project supported the user's interaction with the machine and enabled us to access and extract information from the internet and our PC. The proposed model is helpful due to its practical and user-friendly nature. It is technically free to use and very helpful in today's technology-dependent generation ensuring their security. Also, in a world full of technological advancements that provide comfort, a webcam motion detector is adding itself to this race. It could be extended further and improvised as per the user's requirements.

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