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# Redundant Frame Removal from Video Stream

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## **Abstract –**

*A major problem faced during the processes of video synthesizing and video processing is that the video stream might consists of numerous redundant frames. The existing methods to remove the redundancy of frames in the video streams were algorithms like RRFC for redundant video frame based on the classic k-means clustering algorithm but keeping the frame order by means of calculating the dissimilarity between frames was proposed. The proposed way of removing redundancy in a video stream as discussed in this paper is through the application of a PIR sensor. PIR-based motion detector is used to sense movement of people, animals, or other objects which emits infrared waves.*

**KEYWORDS** - Frame Redundancy; PIR motion sensor; User Generated Videos

## **I. INTRODUCTION**

In modern era, there has been tremendous growth in the multimedia videos that are generated on daily basis. Different video sharing websites like YouTube, daily motion, official channels etc. contribute to petabytes of data daily. The length of every video varies from few seconds to hours or even days. As the amount of user-generated videos (UGVs) grows rapidly on the internet, techniques for efficiently removing the redundancy in the video stream. By dividing the video into frames, viewers will then be able to differentiate between the unique and redundant frames. For example, when you are in a bank ATM and there is no activity in an ATM which means that there is no one present inside an ATM for performing the transaction, so the camera continuously records the same video which results in redundant frames.

A major problem faced during the processes of video synthesizing and video processing is that the video stream might consists of numerous redundant frames. The existing methods to remove the redundancy of frames in the video streams were algorithms like RRFC for redundant video frame based on the classic *k*-means clustering algorithm but keeping the frame order by means of calculating the dissimilarity between frames was proposed. The proposed way of removing redundancy in a video stream as discussed in this paper is through the application of a PIR sensor. PIR-based motion detector is used to sense movement of people, animals, or other objects which emits infrared waves.

## **II. PROBLEM DEFINITION**

Recording the video with duplicate frames results in an inefficient memory usage, increased power

supply, reduced feasibility while accessing the video, etc.

### Problems:

1. The video should contain no duplicate frames and the camera should record videos only when sensor detects a human body or an animal which results in usage of low power supply and less memory.

### Objective:

Removing redundancy in a video stream through the application of a PIR sensor. PIR-based motion detector is used to sense movement of people, animals, or other objects which emits infrared waves.

### III. LITERATURE SURVEY

As there is huge amount of multimedia data that is generated every day by users, we need some efficient method other than that of the image processing through algorithms for removing redundant frames from the video. The main aim of video redundancy removal tool is to create a short version of the video containing unique information from original video with much more accuracy.

A major problem faced during the processes of video synthesizing and video processing is that the video stream might consist of numerous redundant frames.

### Related Work

Many algorithms have been proposed for removing redundancy in video contents. One of the methods is RRFC for redundant video frame based on the classic  $k$ -means clustering algorithm but keeping the frame order by means of calculating the dissimilarity between frames was proposed. They do not actually summarize the video but they rather present them in pictorial form. In this key frame is extracted from every shot which helps to form a summary. Some cameras use more than one frame per shot to visualize camera or object motion [3].

This summarization is usually done by Delaunay Clustering Technique. The basic idea in Delaunay Clustering Technique is to represent individual frames as data points in generating a Delaunay Triangulation (DT). Using DT, the inter-frame similarity relationship is mapped to the spatial proximity relationship among data points.

The other method of removing redundancy in a video stream is through the application of the PIR sensor. The PIR sensor helps to detect the motion of infrared emitting bodies and further facilitates in the recording of the motion through the camera. Thus, the recording will be done only if the body present in front of the camera (i.e., a human being or any other living organism) is in the state of motion. Due to which each time when the recording is happening, it will be only when there is a motion or in other words, it will happen only when there is a new activity or a new event. Thus, there will be no similar frames in the video stream.

The heat waves which are sensed by the PIR sensor are directed to the connected computer system with the help of the serial-to-usb converter. Then internally, the algorithm makes the camera ready for recording only if the PIR sensor senses some kind of motion otherwise it is pause. This saves a lot of time for the person who wants to see the exact event being happened in the video.

Thus recording done with the help of a PIR sensor helps a lot in saving the time and energy of the overall setup. This in turn helps in removing redundant frames from the video stream which we have recorded. The PIR sensor is one of the best applications for removing redundancy in the video. It has been designed in such a way that it helps to record the video only in case of a motion being happened in front of it. PIR sensor senses the infrared waves being transmitted out by humans and other living organisms and the accuracy of the PIR sensor is far much better than any other sensor.

A PIR sensor can be used for the purpose of detecting not only in daylight but can also be used in darkness also. The PIR sensor will detect the motion in the darkness and will help in the recording of the motion. The accuracy of a PIR sensor can be judged by the fact that it does not produce false alarms to the recording software and hence provides accurate video without any redundancy.

In case of movement of any mechanical or non-living object in front of the PIR sensor, the sensor does not detect any such motion and does not cause any recording.

**Benefits of using a PIR sensor can be categorized as:-**

\*) A PIR sensor is easily configurable. It can be easily programmed to be used for the purpose of recording motion in front of it.

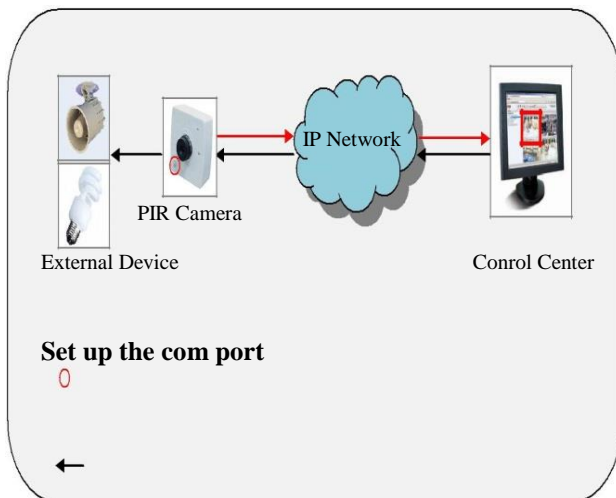
\*) There are no worries about the power supply being provided to the PIR sensor. In case of a built-in PIR sensor  
 The power is supplied with the help of the IP camera attached to the computer.

\*) In case of an built-in PIR camera, the viewing directions of the PIR sensor as well as the camera are the same.

**IV. PROPOSED METHODOLOGY**

The Passive Infrared Sensor (PIR) detects human movement by sensing temperature changes over the scene, and works even in the total darkness. Human body heat moving across the scene will trigger PIR sensor. The alarm signal will be sent to the control center over the IP network instantly. The Com port helps in converting the infrared waves into the electronic signals which are transferred to the computer through the serial to port converter. The com port is programmed such that whenever there will be a motion in front of the PIR sensor, the com port will send a message 'A' to the camera which in turn will start the recording instantly and sends a message 'B' when the recording is "off". The dialog box which signifies the status of the com port, i.e., whether its "open" or "close", is displayed with red colour when the recording is "on" and with yellow colour when the recording is "off". As a result, the intruder who entered the guarded area in total darkness will instantly be exposed for high quality video shooting.

**Block Diagram of proposed methodology**



Firstly, the com port or the serial port is programmed to get the input in the form of character. The com port will sent a message 'A' to the camera which in turn will start the recording instantly and sends a message 'B' when the recording is "off". The com port is programmed in visual basic. The programming is done in visual basic which gives as a result a dialog box that consists of two buttons programmed to "open" and "close" the port. There is also a provision for getting to know about the settings of the com port containing the port number, which in our case is "26". The dialog box will be named as 'A' when the recording is "on" and named as 'B' when the recording is "off".

### Image capturing through Arduino

The programmed code for image capturing is written in the open source platform Arduino. This code helps to automate the webcam of the connected device, for example - laptop, to start recording the motion occurring in front of it. The code provides you with the flexibility to variate the delay time (The amount of time for which the camera will continue to record an image after the motion is stopped in front of the sensor). The arduino is programmed such that whenever the recording is "on" an "orange" light is switched "on" else its "off".

### Recording an image

The image is captured with the help of a software (Debut Video Capture Software) which initiates the webcam of the connected device. The software also allows recording the video with a time stamp that shows the time of recording or the time when a particular image is being captured.

### Ignore Moving Objects behind the Glass Window or Door

PIR sensor can help you keep the room guarded and avoid false alarms even if there is motion outside the window, such as tree leaves waiving in the wind, people walk by etc.

### Detection of Mechanical and Non-living objects

The PIR sensor is programmed such that it does not detect the the presence of any mechanical or non-living objects. The functionality is such that it does not detect their presence as these objects does not emit any infrared waves.

### HARDWARE & SOFTWARE REQUIREMENTS

#### Hardware

- A. Desktop computer with atleast 4 GB RAM 20 GB Hard Disk
- B. An arduino circuit board.
- C. An PIR sensor
- D. Male-Female Connector
- E. USB-Serial Connector
- F. Resistance

#### Software

- A. Visaul Basic
- B. Arduino (Open source Platform)
- C. Windows OS
- D. Debut Video Capture Software

### V. CONCLUSIONS

We introduced a method that can remove redundancy from the video stream with the help of a PIR sensor. Instead of applying an algorithm we used the sensor which tracks the motion of a living object by sensing the infrared waves. The major advantages of using this method are reduction in te usage of power supply, reduced memory usage, reduced cost, improved efficiency, etc. Thus at the time of viewing a particular video we only get to see the unique frames. This reduces the complexity of scrolling through the entire video length to watch wherever a new activity has occurred.

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