A SMART CCTV CAMERA SYSTEM

Vaibhav sahu
Galgotia'sUniversity
Schoolof Computing Science
andEngineering
vaibhav_sahu.scsebtech@galgotiasuniversity.edu.in

AbhishekKumarSingh
Galgotia'sUniversity
Schoolof Computing Science
andEngineering
abhshekrazzo@gamil.com

Shilpy Gupta
Galgotia'sUniversity
Assistant Professor
School of Computing Science
andEngineering
shilpy.gupta@galgotiasuniversity.edu.in

ABSTRACT: Today's CCTV Require human interaction to work properly. It record only Whatever happen and it don't have any smart features. In this project we proposed a smart cctv model that work as a Security Guard which has strong sense of responsibility.Our model has abilities to detect What has been stolen, Do I know that person,Who entered, Detect Noises And ofcourse Record. Its work as:-Initially the frame is taken when nothing is stole, Continuosly detect for any motion happen or not If motion happen wait until motion ends When motion ends then capture another image And just apply structural similarity two both of the frames. Our model has also a unique feature that is Identify me,This feature allows to train the model on known circle of us.Next time just predict who entered .It Uses LBPH Face Identifaction method.

KEYWOEDS:-smart cctv camera,Machine Learning,Python

I.INTRODUCTION

We have progressed from wired video surveillance and passcodes to portable cameras. In fact, it could be argued that the our face has evolved into digital identification that verifies the individual in the era of wearable technology and multi-factor authentication. Technology for facial recognition has been around for a while. It began in the 1960s. However as of late, it has become an enticing answer to a variety of modern identifying and identification issues. It combines the potential of other fingerprint systems, which goal to link identity to personally physical characteristics, and the more recognisable qualities of smart CCTV systems. law enforcement officials.

II.PROBLEM WITH EXITING SYSTEM

Currently, the existing system is great and have negligible or no limitations. The major problem faced by existing system is that cost of maintenance is very high and also cost of resourcesthey use for their betterment is high.

III.SYSTEM REQUIREMENT ANALYSIS

CCTV-based surveillance has evolved from simple systems that consisted of a camera directly attached to a viewing screen watching for any activity or looking for targeted individuals to complicated multi camera systems with multiple computers.Using wireless technologies, the CCTV camera project security system was created. There is no requirement for more than one camera to cover a broad area for object detection. In this project, a single camera is utilised for cost effectiveness as the cost grows as the number of cameras increases.

System Feasibility:- system feasibility can be divided into the following sections:

Software Requirements

Since this is a software hence it will have to run on some hardware and operating system obvously, so the prerequisites to run this software listed below:

- Windows/Linux/Mac OS any version.
- Python.
- Python packages-
  - ↘ openCV
  - ↘ skimage
  - ↘ numpy
  - ↘ tkinter

Hardware Requirements:-

- A PC or Laptop
- Webcam with drivers installed.

Technology used to make this project :

- as mentioned earlier **Python** language is used.
- Sublime Text Editor is used to write the code.
- Linux Mint os is used to run and create this minor project.
- HP-ay503tx laptop is used.
  - ↘ Core i5 dual core
  - ↘ 240GB ssd
  - ↘ 8GB RAM
  - ↘ In-built webcam hp-truevision
- Terminal to run the code/

IV.PROPOSED SYSTEM

The proposed system brings out all the features ofa modern fully-fledged smart cctv system.

1. Monitor
2. Identify the family member
3. Detect for Noises
4. Visitors in room detection

1:-Monitor Feature : It continuously watches the frames and determines which item or item has been removed from the frame by the burglar.

The differences between the two frames are discovered using structural similarity. The first frame was taken before any noise occurred, while the second one was taken after noise stopped appearing in the frame.

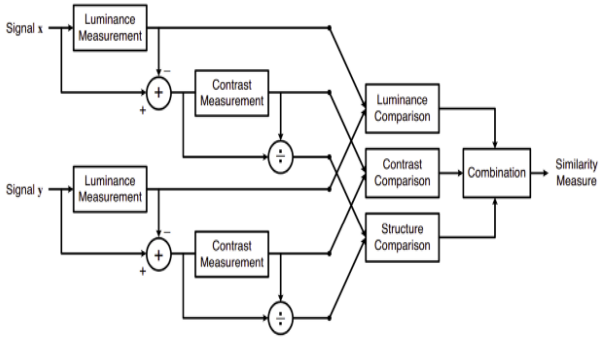
Three crucial features are extracted from an image using the Structural Similarity Index (SSIM) metric:

- **Luminance**
- **Contrast**
- **Structure**

These three properties are used as the basis for the comparison of the two photos.

The Structural Similarity Index, which ranges in value from -1 to +1, is calculated using this system between two provided images. A number of +1 denotes that the two photographs are identical or extremely similar, whereas a value of -1 denotes that the two pictures are highly not similar. These numbers are frequently changed to fall between [0, 1], where the extremes have the same meaning.

Luminance: By averaging over all of the pixel values, luminance is determined. Its symbol is



(Mu), and the formula is shown below.

$$\sigma_x = \left(\frac{1}{N-1} \sum_{i=1}^{N} (x_i - \mu_x)^2 \right)^{\frac{1}{2}}. \qquad (4)$$

The contrast comparison $c(\mathbf{x}, \mathbf{y})$ is then the comparison of σ_x and σ_y.

Structure: So, in essence, we divide the input signal by its standard deviation to get a result with a unit standard deviation, allowing for a more trustworthy comparison. The condensed formula is used to execute the structural comparison (more on that later).

$$(\mathbf{x} - \mu_x)/\sigma_x$$

We simply need to pass it two previously taken photos or frames, and then it will output the masked image along with a score.

2:-Identify the Family Member feature:-:
1– In the frames, look for the faces.
2– To forecast the person from a trained model, use the LBPH face recognizer algorithm.

So lets divide this in following categories,

Detecting faces in the frames:- This is execute using the built-in Python openCV module's Haarcascade classifiers.Several hundred sample photographs of the thing we wish to detect and other images without that object are used to train cascade classifiers.

We can recognise a few common characteristics on the majority of human faces:

- a darker area around the eyes than the upper-cheeks
- a bright nose bridge region compared to the eyes
- some specific location of eyes, mouth, nose.

The traits are known as Haar Characteristics. This is how the feature extraction procedure will appear:

Convolution kernels used to detect the presence of that feature in the provided image are comparable to Haar features..

We utilised the built-in cascadeclassifier function of the Python language's openCV module to do all of these tasks in order to identify faces in the frame.

3:–Detect for Noises in the frame:- The majority of cctvs have this feature, which is used to detect noise in the frames; however, in this module, we'll examine its operation.

In a nutshell, every frame is continuously studied and noise-checked. The subsequent frames check for noise. Simply put, we calculate the absolute difference between two frames. This allows us to assess how two photographs differ from one another and specify the movement boundaries; if there are none, there is no motion; if there are any, there is motion.

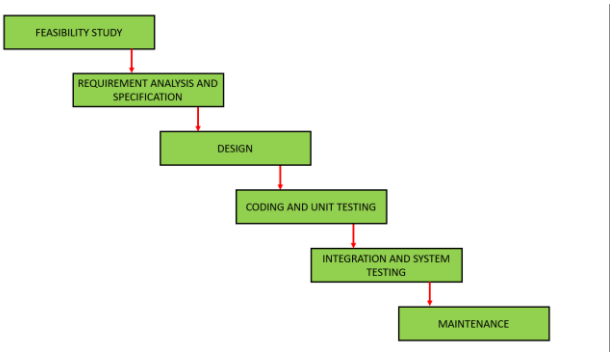
As you are aware, all images are simply integer or float values for the pixels, and each pixel has a corresponding brightness value.As a result, we only calculate the absolute difference as the negative makes no sense at all..

4:–Visitors in room detection:- This feature is capable of detecting when someone enters or leaves a room.So, the process is as follows:

1–It begins by looking for noise in the frame.
2–Then, if anything happens, it determines which side—left or right—that comes from.
3 – The final check will detect motion from left to right and capture the frame if it occurs.

So in essence, we first detect motion, then we make a rectangle over the noise, and last, we check the coordinates to establish which side the motion originated from. The motion is classified as left motion if those locations are on the left.

VI.SYSTEM ARCHITECTURE



Design:- This project was created utilising the most recent programming language and the rapidly developing subject of computer science known as "Computer Vision." So, this project allows a computer to watch, or to put it another way, it provides computers the ability to see.

FIG4.1ArchitecturalContextDiagram

For this model we have used waterfall model, since it was not huge project at all. Reasons behind choosing waterfall model - 1. Good for minor projects. 2. Easy to follow. 3. Well tracking for small projects. 4. Well time managed

Every button is backed with a icon, and the Interface is pleasant. Monitor - Detect what has been taken from the frame. Locate - Locates the

family members (it has to be trained first) Finds the motions in the frame using noise Finding who entered and left a room is known as "In Out."

VII.RESULTS

Based on technological advancements, such as the capacity to combine tiny size and high processing power, this project has a wide range of applications. The project's future exercises are listed below.

- Creating Portable cctv.
- Adding in-built night vision capability.
- Adding deep learning if having high power device.
- More feature such as
    - Deadly weapon detection
    - Accindent detection
    - Fire Detection.

Adding DL support would give our project a wider scope because we could add a lot more capabilities.

VIII.CONCLUSION

Using wireless technologies, the Project Smart CCTV camera Surveillance system was created. This initiative is primarily intended to protect people while also conserving the resources needed for CCTV and video storage, specifically electricity and memory.

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