

## An Efficient Time Sampling Mechanism for Detection, Separation and Identification of Unauthorized Persons from Surveillance Camera Footage based on Ensemble Machine Learning

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### Abstract:

In this paper, we are developing a tool that can automatically detect, separate and identify individuals from surveillance camera footage. The tool will use advanced computer vision and machine learning techniques to analyze the video and locate the faces of each person captured by the camera. Once identified, the tool will separate the faces from the background and create individual images for each person. Then, it will use facial recognition technology to match the individual images with a pre-existing database of known individuals

**Keywords:** Database Matching, Time-Stamping, Reduce Risk Of Human Error, Accurate Decision Making, Centralized location, Ethical Standards, Chabot for Visitors, Ease and efficiency.

### 1. INTRODUCTION

This project is all about developing a tool that can automatically detect, separate, and identify people from surveillance camera footage. We're using some pretty advanced computer technology to analyze the video and find the faces of everyone in the footage. Once we've found the faces, we create individual images for each person and use facial recognition technology to match them up with people we already know in the database. The idea behind this project is to make it easier and faster to identify people in surveillance footage. This could be really helpful in areas like law enforcement, security, and retail analytics. By making it easier and faster to identify people, we can improve safety and security for everyone. Plus, it can make things a lot more efficient, so businesses can save time and money. Overall, we're trying to make things simpler and safer with this project. By developing this tool, we aim to provide an effective solution that can simplify the identification process of individuals from surveillance camera footage. This can ultimately improve safety and security for individuals and businesses, while also improving the overall efficiency of operations.

### Literture survey

"A Survey on Face Recognition in Video Surveillance" by M. SaquibSarfranz et al. - This survey discusses the challenges and approaches for face recognition in video surveillance and provides an overview of various techniques and algorithms used for this purpose. The authors discuss the challenges and approaches for face recognition, including preprocessing techniques, different types of face recognition methods, and the importance of real-time processing. They review the state-of-the-art approaches, including deep learning-based methods, and discuss their advantages and limitations. The paper is a valuable resource for anyone interested in developing tools for facial detection and recognition in video surveillance.

"A Survey on Deep Learning for Person Re-identification in Video Surveillance" by M. Saquib Sarfraz et al. - This survey focuses on deep learning techniques for person re-identification in video surveillance and provides an overview of various approaches, including their advantages and limitations. The paper discusses the challenges associated with person re-identification, the advantages of deep learning-based approaches, and compares their performance against traditional methods. It covers various deep learning-based approaches such as siamese networks, triplet loss, and GANs, along with data augmentation techniques and the need for standardized evaluation protocols. Overall, the paper is a valuable resource for researchers and practitioners interested in developing person re-identification tools for video surveillance.

"Facial Recognition for Surveillance Purposes: A Comprehensive Survey" by R. Singh and D. Singh. The paper covers the different types of facial recognition systems, the challenges associated with facial recognition in surveillance, and the different types of facial features that can be used for recognition. The authors discuss the performance of different facial recognition algorithms, including traditional methods and more advanced techniques. Overall, the paper is a valuable resource for anyone working on developing tools for facial detection and recognition in surveillance footage

"A Review of Face Detection and Face Recognition Techniques in Surveillance Systems" by E. Mohd Azmi et al. is a review paper that provides an overview of current face detection and recognition techniques used in surveillance systems. The authors discuss the importance of these techniques, the challenges associated with them, and related topics such as face tracking and the use of multiple cameras. The paper covers various face detection and recognition techniques, including deep learning-based approaches, and provides a detailed analysis of their performance, advantages, and limitations. It also highlights the need for benchmark datasets and standardized evaluation protocols for comparing the performance of different techniques. Overall, the paper is a useful resource for researchers and practitioners interested in developing face detection and recognition tools for surveillance systems.

"Facial Recognition: A Literature Survey" by M. T. Khan et al. provides a comprehensive overview of various facial recognition techniques and algorithms, including their applications and limitations. The authors discuss the importance of facial recognition technology in various domains and highlight the challenges associated with it. The paper covers traditional methods and deep learning-based approaches and their performance analysis. This literature survey is a valuable resource for researchers and practitioners interested in developing facial recognition tools.

### **Existing System**

Currently, the surveillance systems in place use video recording and can be viewed on a computer or smart TV. However, they do not have the capability to alert you or raise an alarm if any unusual activity occurs. This means that someone would need to manually check the footage to detect any suspicious behavior.

However, it can be challenging to determine if someone is acting suspiciously just by observing them once. It is better to consider someone's behavior as suspicious if it occurs repeatedly or over a long period of time. For example, if someone is wandering around an area for an extended period, it may be cause for concern and further investigation. In such cases, it is important to monitor the situation closely and take necessary actions to ensure the safety of the people and property involved.

### **Proposed work**

Many offices and government organizations use biometric authentication systems, which rely on

physical and behavioral data to verify the identity of individuals. These systems process raw data such as fingerprints and iris scans to extract valuable features that describe the nature of the data. Based on these features, the system makes a decision about whether or not to grant access. Biometric authentication systems are considered more secure than traditional password-based systems, as biometric data is unique to each individual and difficult to replicate. Facial recognition technology has become increasingly important in the field of biometrics and has many applications in security and surveillance systems. As technology advances, the goal is to create a smart society where there is minimal need for human intervention. This has led to new developments in the field of security and surveillance. However, organizations face challenges in monitoring individuals who enter a specific area even after they have been authenticated. This can affect the performance of the system. Additionally real-time detection of unauthorized activity in the monitored area is also a major challenge.

## I. WORKFLOW

### Data Flow Diagram:



### MODULESDESCRIPTION

#### Video capturing:

When working with OpenCV, we can use the VideoCapture() method to create or capture an image or video. This method enables us to capture the video stream from the webcam. As you can see in the code, we need to provide an integer value as an argument to the VideoCapture() method.

This integer value indicates which camera is connected to the device. For example, if you have multiple cameras connected to your computer, you can specify which camera to use by providing the corresponding integer value. This allows you to choose the camera that you want to use for capturing the image or video.

So, in summary, the VideoCapture() method in OpenCV is used to capture the video stream from a webcam and the integer value passed as an argument represents the camera connected to the devices.

## **Take input frame:**

To start, you can use a computer program like Python and a library called OpenCV to extract individual frames from a video file. This will allow you to save each frame as a separate image file. You can think of these image files as snapshots of the video at specific points in time. Once you have the frames saved as images, you can do many different things with them. For example, you can resize the images to make them larger or smaller, or you can use machine learning models to detect objects in the images. You can also apply filters to the images to make them look different or to highlight certain features. One common operation that you can do with video frames is called optical flow. This involves analyzing how the pixels in each frame change over time to detect movement in the video. This can be helpful for tasks like stabilizing shaky footage or tracking moving objects.

There are many other operations that you can perform on video frames as well, depending on what you want to accomplish. The key is to extract the frames from the video file and then use them as inputs for different programs or algorithms that can perform various tasks with them.

## **Find recognize unknown or not:**

A "cascade file" is a machine learning algorithm that can be trained to detect specific objects or patterns in images, such as faces. This algorithm can be used to create a "classifier" that can recognize specific features of the object it was trained on.

A "database" is a collection of information that can be searched and queried to find specific pieces of data. In this case, the database would contain information about individuals that have been previously identified.

To use these tools to identify unknown individuals, you would first need to capture an image or video of the person you want to identify. Then, you would use the cascade file to detect if there are any faces in the image or video.

If a face is detected, you would use the classifier to extract specific features of the face, such as the distance between the eyes, the shape of the nose, etc. These features can then be compared to the features of known individuals in the database.

If a match is found, you would be able to identify the person in the image or video. If no match is found, the person would remain unidentified.

It's important to note that this process requires both a reliable cascade file and a comprehensive database of known individuals. Additionally, there are limitations to the accuracy of facial recognition technology, and it is important to use it ethically and responsibly to avoid privacy violations or other negative consequences.

## **Sent Email:**

If the facial recognition system is able to detect an unknown person, it can be programmed to automatically send an alert message to an authorized person via email.

This means that if someone enters a restricted area or a place where they are not authorized to be, the system can quickly notify the appropriate personnel so that they can take appropriate action.

For example, if a person is trying to enter a building and the system detects that they are not authorized, an alert message can be sent to the security team or other personnel in charge. This will enable them to take necessary steps to ensure the safety of the people in the building.

Automated alerts through email can also be useful in other scenarios, such as in monitoring traffic or tracking people in public spaces. By alerting the authorized personnel in real-time, they can take appropriate action to ensure the safety and security of the public.

It is important to note that any system involving facial recognition technology must be implemented with privacy considerations and ethical practices in mind, to avoid any negative consequences or misuse of personal information.

## **MODULES USED**

### **tkinter – Python**

Tkinter is a Python module/library used for creating graphical user interfaces (GUIs) in Python. It

provides a set of tools and widgets for building desktop applications that can run on Windows, Linux, and macOS operating systems.

With Tkinter, you can create windows, buttons, text boxes, labels, menus, and other GUI components that allow users to interact with your program. You can also add event handlers to these components to respond to user input, such as button clicks or menu selections.

Tkinter is built on top of the Tcl/Tk GUI toolkit, which provides the underlying functionality for drawing windows and widgets on the screen. It is included with most Python installations, so there's no need to install any additional software to use it.

Overall, Tkinter makes it relatively easy for Python developers to create GUI applications with a relatively small amount of code, making it a popular choice for many desktop software developers.

## **IDLELIB**

IDLElib is an Integrated Development Environment (IDE) for Python that is included with the standard Python distribution. It stands for "Integrated Development and Learning Environment" and is often referred to simply as "IDLE".

IDLElib provides a graphical user interface (GUI) that allows developers to write, edit, and run Python code in a convenient and user-friendly way. It includes features like syntax highlighting, code completion, and debugging tools to make the coding process smoother and more efficient.

One of the most prominent features of IDLElib is its Python shell, which allows developers to run Python code interactively in a console-like environment. This feature is particularly useful for testing code and exploring Python's functionality.

In addition to its development features, IDLElib also provides a range of learning resources for Python beginners. It includes a built-in tutorial, as well as links to online resources like the Python documentation and various Python-related websites.

Overall, IDLElib is a versatile and powerful tool that can be used for both learning and development purposes. It is especially well-suited for Python beginners who are just getting started with the language and need a user-friendly environment to work in.

## **tkinter.constants**

Symbolic constants that can be used in place of strings when passing various parameters to Tkinter calls. Automatically imported by the main tkinter module.

## **tkinter.dnd**

tkinter.dnd is a Python module that provides support for Drag and Drop (DND) functionality in Tkinter GUI applications.

DND allows users to click and drag items within a GUI, and then drop them onto specific targets or drop zones. This can be a useful feature in many types of applications, such as file managers or image editors.

The tkinter.dnd module provides a set of classes and methods that can be used to implement DND functionality in a Tkinter application. For example, it includes a DragSource class that allows you to define which items can be dragged, as well as a DropTarget class that defines which items can be dropped onto specific areas of the GUI.

By using tkinter.dnd, you can create more interactive and user-friendly GUI applications that allow users to easily manipulate items within the interface. However, implementing DND functionality can be more complex than other aspects of Tkinter programming, so it may be more appropriate for more advanced users or for applications with specific requirements.

## **tkinter.tix**

tkinter.tix is a Python module that provides additional GUI widgets and features to the Tkinter library. Tix stands for "Tk Interface Extension" and was originally a separate package that has since been integrated into Tkinter.

The tkinter.tix module includes a set of additional widgets, such as ComboBox, FileSelectBox, and NoteBook, that are not available in the standard Tkinter library. These widgets can be used to create

more complex and feature-rich GUI applications.

In addition to the new widgets, tkinter.tix also provides a set of functions and classes for managing windows, dialogs, and other GUI elements. For example, it includes a Balloon class that can display helpful tooltips when the mouse cursor hovers over specific elements in the GUI.

Overall, tkinter.tix is a useful addition to the Tkinter library that provides more advanced widgets and features for creating GUI applications. However, it is not always necessary for basic GUI development and may require more experience and knowledge to use effectively.

## Turtle

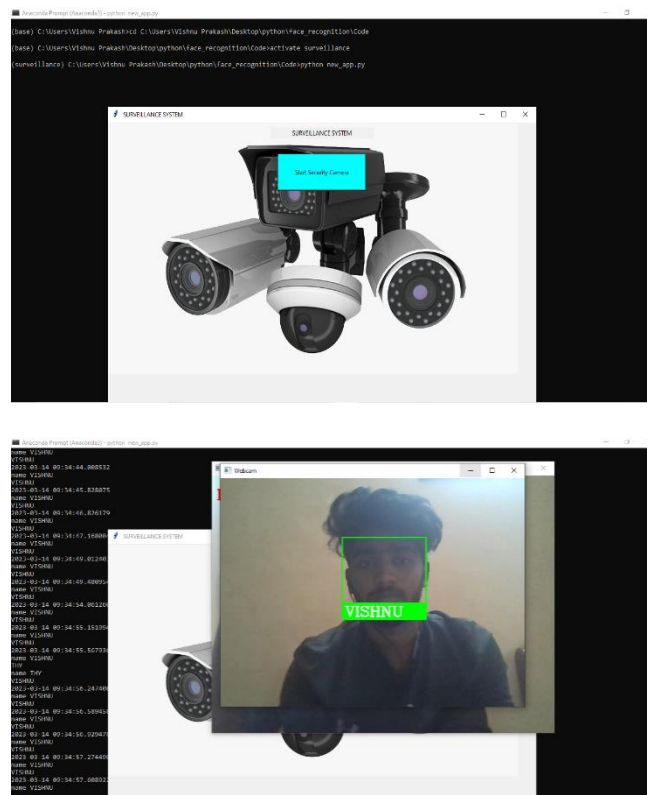
Turtle is a Python module that allows developers to create simple graphics and animations using a turtle-like object. The turtle object moves around the screen and draws lines as it moves, allowing developers to create simple shapes and patterns.

The turtle module is based on the Logo programming language, which was designed to teach children programming concepts in a fun and interactive way. Similarly, the turtle module is often used to introduce beginners to programming concepts like loops, conditionals, and functions.

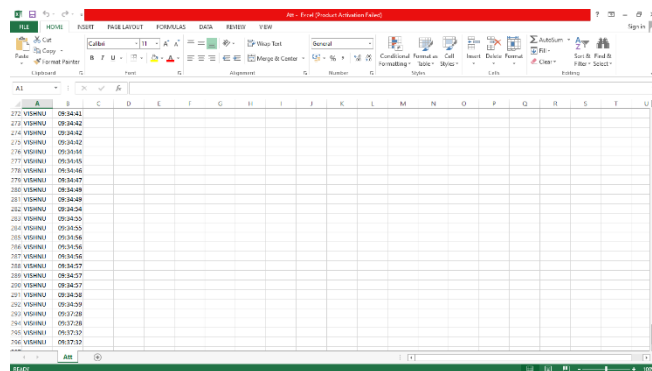
To use the turtle module, developers simply import the module and create a turtle object. They can then use a set of commands, such as forward(), backward(), left(), and right(), to control the turtle's movement and draw lines on the screen. Developers can also change the turtle's color, shape, and other properties to create more interesting graphics.

In addition to simple graphics and animations, the turtle module can also be used to create more complex projects, such as games and simulations. However, it is generally not well-suited for creating high-performance or professional-grade graphics, as it is a relatively simple module designed for educational and fun purposes.

## SNAPSHOTS







## 2. CONCLUSION

This paper is a tool that uses computer vision techniques to recognize individuals. The application utilizes a cascade file and database information to identify unknown individuals. If an unknown person is detected, the application sends an alert message via email to an authorized person. The application uses a webcam to capture images and then applies computer vision algorithms to detect and recognize faces.

Overall, the project is successful in achieving its goal of detecting and recognizing faces. It provides a useful tool for security and surveillance purposes, allowing authorized personnel to quickly respond to potential threats or unauthorized individuals.

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