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ADVANCED INTEGRATED CCTV

¹Yashwant Bade, ²Abhishek Hande, ³Vishwajeet Modiwale, ⁴Sunil Pandhonde, ⁵Dnyandeo Khemnar

¹Leader, ²Member, ³Member, ⁴Member, ⁵Guide

Department of Information Technology

G.H.Raisoni College of Engineering and Management Wagholi Pune

Abstract : Over the last few decades, remarkable infrastructure growths have been noticed in security-related issues throughout the world. So, with increased demand for Security. An Intelligent Video Surveillance system basically censored the performance, happenings, or changing information usually in terms of human beings, vehicles or any other objects from a distance by means of Digital Camera. The scopes like prevention, detection, and intervention which have led to the development of real and consistent video surveillance systems are capable of intelligent video processing competencies.

In broad terms, advanced video-based surveillance could be described as an intelligent video processing technique designed to assist security personnel's by providing reliable real-time alerts and to support efficient video analysis for surveillance.

This project deals with the various requirements for designing a robust and reliable video surveillance system.

IndexTerms - Machine learning, Cyber security, Random forest, Antivirus

1.INTRODUCTION

Advanced Integrated CCTV is a python GUI Application which can run on any operating system, uses webcam and has number of features which are not in a normal CCTV, it's like a Security Guard which has sense to respond.

This Project will be using latest Programming Language and highly evolving Computer Science field which is "Computer Vision".

In this project we will be using an algorithm named LBPH to smartly Analyze the frames of the video captured by the CCTV to watch out for any Suspicious activity.

Which means this project will allow computer to watch or in other words it Gives vision capability to computers via the Digital Camera.

1.1 Overview

Our vision is to create a software that would work as an extension to modern day CCTV's. Our software would use OpenCV Library to detect if there is any Malicious Activity by capturing multiple images using CCTV and passing those images through multiple Parameters.

The proposed system aims to design a smart integrated CCTV which would be having a sense to respond.

1.2 Need

Based On the technology improvements such being having the capability of small size but high processing power this project can be broadly used. Below are some future workout on this project.

- Creating Portable CCTV.
- Adding in-built night vision capability.
- Adding deep learning if having high power device.

More feature such as

- Deadly weapon detection
- Face mask detection
- Thief detection
- Person identification
- Attendance prediction
- Accident detection

- Fire Detection
- much more..
- Making a stand alone application with no requirements such as python, etc.
- Making standalone device.

Adding DL support would create broad scope in this project such as with DL we would be able to add up much more functionality.

1.3 Literature survey

1. Designing of Face Recognition System.

Published By, Vijay Kumar Sharma School of Electronics & Communication Engineering, Shri Mata Vaishno Devi University, Katra, India, 182320..

Human face can be used as an identity for numbers of applications because of its uniqueness. Human faces are different for different persons basis of various parameters. The uniqueness and measurement of the different parameters help us to recognize the persons. Uniqueness of the face and differen parameters separates the humans from the machines. The face recognition is independent of user's physical interaction. It has very precise measurement and permits for high deployment and authentication. It is so easy that can use available resources to simplify the problems. In the 1960s, the first semi-automatic systems to recognize the face features like location and dimension of eye, nose, ear etc. were carried out. In 1970, Goldstein and Hartmann used 21 specific subjective markers such as hair color, lip thickness to automate the recognition. In 1990s more advance face recognition algorithms were developed, to extract the image information such as Eigenfaces (1991) which is a principal component analysis (PCA) method that uses significant features to represent the difference between facial images. Fisherfaces (1997) which is a linear discriminant analysis (LDA) method for dimensionality reduction. It works better than PCA, where Eigenfaces and Fisherfaces have a similar approach.

2. LBPH Based Improved Face Recognition At Low Resolution

Published By, Aftab Ahmed, Jiandong Guo, Fayaz Ali, Farha Deeba, Awais Ahmed.

Currently, the Face recognition becomes the more important topic in computer vision and having much importance in many applications such as for security, surveillance, banking and so on. But it becomes more challengeable because of accuracy and efficiency. Over the years, many scholars have developed variety kinds of face recognition algorithms, including Sparse Coding (SC) algorithm, Local Binary Pattern (LBP) algorithm, Histograms of Oriented Gradients (HOG) algorithm, Linear Discriminant Analysis (LDA) algorithm, and Gabor feature algorithm. These all algorithms provide accuracy rate between 50% - 76%. Compared with the above algorithms the LBPH algorithm can not only recognize the front face, but also recognize the side face, with 90% accuracy rate.

3. Face Recognition System Based on LBPH Algorithm

Published By, Abhishek Pratap Singh, Sunil Kumar S Manvi, Pratik Nimbal, Gopal Krishna Shyam.

Automatic face identification is an essential theme of computer vision and pattern recognition analysis. It will distinguish the personalities and different data as indicated by the optical highlights of face picture, having an exceptionally wide possibility for advancement. It is typically utilized in validation, criminal examination, police investigation, automaton intelligence, and healthful science, etc. There are various techniques utilized in the face recognition system. Each distinctive features underneath varied conditions like illumination, expression and posture amendment. Among them, for our motivation that is confront discovery in the video stream, we tend to focus on three noteworthy methods and that we looked their execution underneath modified improvement condition to find an honest coordinating and low process expenses. As the time passed, almost several researchers have developed a range of face detection and recognition algorithms, as well as Deep Convolution Network algorithm, Histograms of Oriented Gradients (HOG) algorithm, Sparse Coding (SC) algorithm, Gabor feature algorithm, Local Binary Pattern (LBP) algorithm, Linear Discriminate Analysis (LDA) algorithm, however additionally within the unceasing development. There are three different face identification techniques in the OpenCV library: Fisherfaces, Eigenfaces and Local Binary Pattern Histogram (LBPH). The contributions of this work tend to develop a real-time face recognition system that will acknowledge face in poor illumination condition and fetch information about that image from database.

4. Face Detection and Recognition Using OpenCV.

Published By, Maliha Khan, Sudeshna Chakraborty, Rani Astya, Shaveta Khepra.

A face recognition program is a software application for verifying a person and identifying him or her with a video or picture from a source. For psychology at least the 1950s and the 1960's, the earlier work on facial recognition can be traced back to engineering literature. Some of the earliest findings include experiments on Darwin's feelings for face expression. With the open source platform Intel called OpenCV, (Media, 2008)[1] (Media, 2008) facial recognition can be done quickly and reliably. One way from a face and an image database are the preferred facial features. It is generally compared to biometrics like fingerprints and eye reconnaissance systems, and is used in security systems, thumb recognition systems. The key element analysis using Fisher face algorithms, the Markov model, multilinear subspace learning using tensor representations and the nervously driven dynamic reference matching, etc, were also common recognition algorithms. The Computer-View library for Intel's open-source makes programming easy to use. This provides advanced capabilities such as facial detection, face tracking, facial recognition and a range of ready-to-use methods for artificial intelligence (AI). It has the advantages of being a multi-platform framework; this supports Windows and Macos, as well as Mac OS X recently.

1.4 Existing System

1. Webcam
2. CMD
3. AVIRA
4. McAfee

2. PROPOSED SYSTEM

2.1 Objective

We will use various OpenCV library which includes more than 2500 machine learning algorithms and of which in one we will going to use LBPH algorithm.

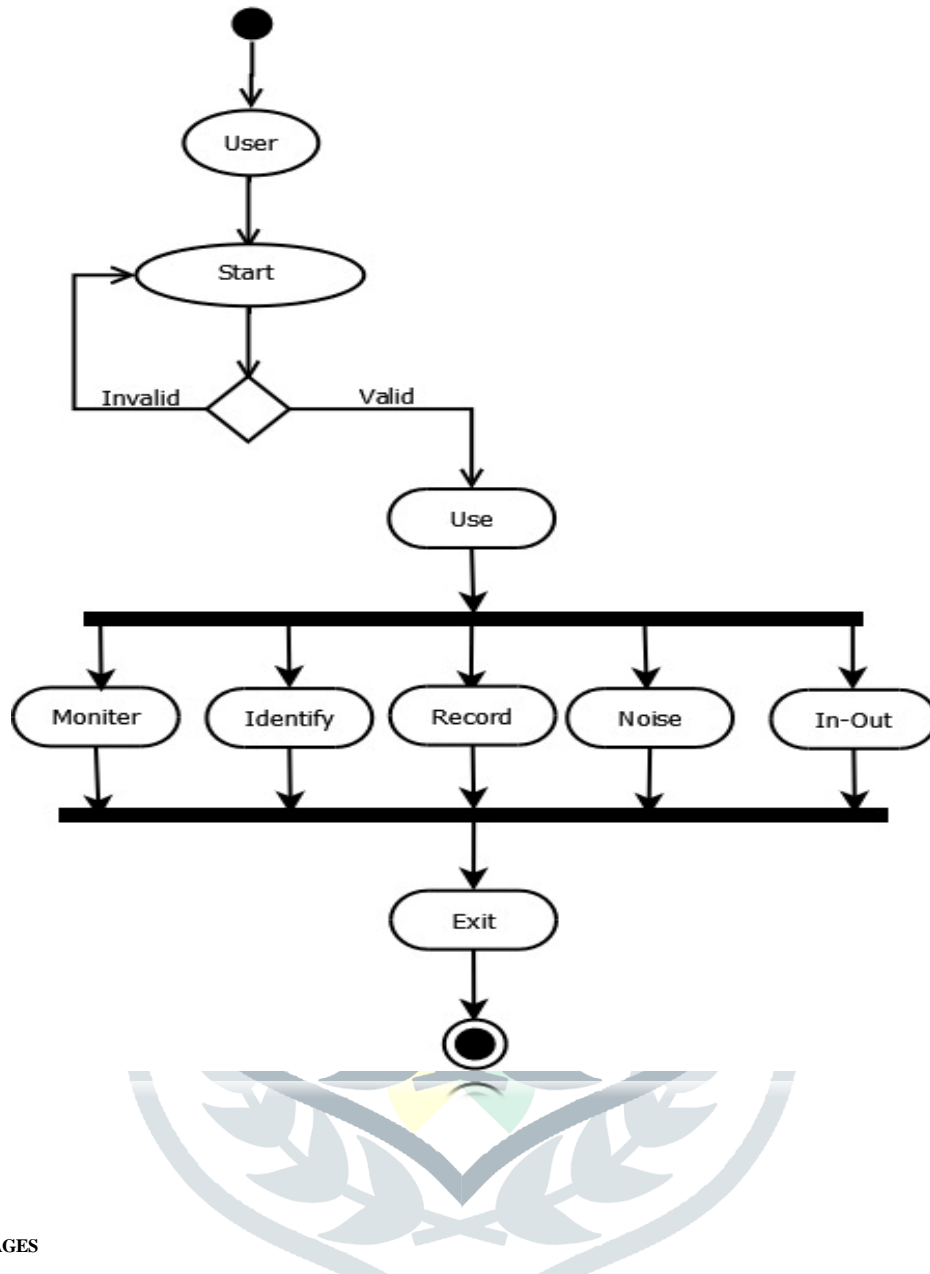
LBPH (Local Binary Pattern Histogram) is a Face-Recognition algorithm it is used to recognize the face of a person. It is known for its performance and how it is able to recognize the face of a person from both front face and side face. Work environment would comprise frameworks like Jupyter notebook, Spyder, Kali Linux Terminal.

we would be working with advanced technologies such as Artificial Intelligence, Machine Learning, Cyber security.

2.1 Algorithms

- "LBPH": LBPH (Local Binary Pattern Histogram)
- "FRS": Facial recognition system
- "DecisionTree": `tree.DecisionTreeClassifier()`,
- "KNN": k-nearest neighbor algorithm
- "NBC": Naive Bayes classifier
- "SVM": Support vector machine
- "DNN": Deep neural networks

3. SYSTEM DESIGN



4. ADVANTAGES

- Cost Effective :- As only normal CCTV will be modified with the AI system created by us
- Security:- Security would be provided against multiple types of threats
- Highly Efficient :- During the testing we would train it as much images as possible .
- Immediate noise prediction.
- Doesn't use various sensors except webcam.
- Confidentiality
- Scalable

5. LIMITATIONS

- Inconsistent results during night:- Incapable to predict results during night because quality of photographs .
- false positives :- A false positive is an error in classification in which a test result incorrectly indicates the presence of a condition
- false negatives :- a false negative is the opposite error, where the test result incorrectly indicates the absence of a condition when it is actually present.

6. HOW SYSTEM WORKS

The system would be working in the following manner

- First we have to start our desktop application using CMD.
- The algorithm with highest accuracy would be chosen and saved with pickle library
- with the help of the modules an interface would be created
- lastly a file would be passed through the interface
- With the help Tkinter it will features using Graphical User Interface(GUI).
- Then we get GUI interface named as multiple features.

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Conclusion

We have proposed a system which can potentially detect and report the threats and malicious activity posed to the organization. By analyzing the photos and videos captured by Advanced integrated CCTV.

References

- [1] Chen, S.K; Chang, Y.H (2014). 2014 International Conference on Artificial Intelligence and Software Engineering (AISE2014). DEStech Publications.
- [2] LBPH algorithm
- [3] GitHub
- [4] OpenCV
- [5] Structural Similarity from medium
- [6] timesofindia.indiatimes.com/blogs/voices/technology-to-bolster-opportunities-for-industry-4-0/
- [7] OWASP top 10
- [8] Also we used Official python documentations to know basics about python.
- [9] For making this project we will use so many websites and papers and youtube tutorials all are below specified. Also we have used so many other youtube channels and google and stack overflow to solve our errors.

AUTHOR BIOGRAPHY

Yaswhant Bade student of Information Technology from G.H.Raisoni College of Engineering and Management pune Interested in Research and Development in Machine Learning, Data Science and OpenCV.