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Face Recognition using Video and Live Stream a Machine Learning Approach

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Abstract: *One of the top computer vision technologies at the moment is facial recognition. In computer vision, recognising faces is always an extremely challenging process due to lighting, stance, and facial expression. Target objects are tracked by face recognition in live streaming or through video. It is a system application that, in simplest terms, automatically recognises a person from a live capture through camera or video frame. We suggested an automatic face recognition system in this project. When the person in front of the camera recognises him, this application, which is based on face detection, feature extraction, and recognition algorithms, automatically detects the human face. Although the camera is continuously identifying the face in every frame, we employed the Haar cascade classifier to detect human faces. We have utilised the CNN method to train the system using the dataset that is currently accessible, and using real-time face capture, we will store the face data in a database. It was trained using the LBPH recognizer. Face recognition has done through Harr cascade algorithm.*

Keywords: Computer Vision, live streaming, CNN, LBPH Recognizer, Harr cascade

I. INTRODUCTION

The process of identifying a person's face using a visual system is called face recognition. It has been a crucial tool for human-computer interaction because of its application in security systems, video surveillance, commercial spaces, and social networks like Facebook. Face recognition has gained attention in the wake of artificial intelligence's rapid progress because of its intrusive character and because, in contrast to other biometric techniques, it is the primary way for identifying humans. Without the subject's awareness and in an uncontrolled setting, face recognition can be simply checked. The system's key goals are to develop a facial recognition system that can be imitated and eventually surpass this human ability. The frontal faces of people are the system's primary focus. There have been several facial recognition algorithms developed, and each has its own power. If we are previously familiar with a face, we can usually instantly recognise it when we see it. If at all feasible, this innate talent can be explained and put to practical use. There are numerous face detection methods at the moment. The first one is a local face recognition system, which associates a face with a person by analysing its facial traits. The second method, called global face recognition, uses the user's full face to identify them. The two processes mentioned above have been implemented in many ways using various algorithms. The neural network and its practical research applications. the complications that develop in face features throughout time. Unbothered by those changes, a person can be quickly identified. The idea behind copying this skill is that people can be very rewarding.

1.1 Motivation

A. Greater Safety

Businesses can identify thieves, trespassers, and other criminals with the aid of a biometric facial recognition solution. It can be used by businesses as a security tool to reduce identity theft.

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B. Accelerated Processing

A facial recognition system can identify a face in one second or less. Businesses use this type of quick technology to maintain the security of their systems in the age of cyber threats and hacking.

C. Unbroken Integration

The majority of facial recognition solutions are compatible with the current software, so businesses won't have to pay extra for integration. This is the reason why we get moticated to work on face recognition algorithm.

1.2 Problem Definition

While recognising faces in still images is simpler, doing so in streaming videos and during real-time capture is more challenging due to problems with low resolution, occlusion, non-rigid deformations, large motion, complex backgrounds, and other uncontrolled conditions that taint the accuracy of face detection and recognition. Due to the extreme variety in how faces appear on camera and in videos, this problem is difficult to solve accurately.

1.3 Scope of Project

Because face recognition technology allows for simple identification without physical contact, it can be applied in a variety of ways. In an effort to discover these people, surveillance cameras with face recognition capabilities can be helpful. Alternatively, these same surveillance systems can also assist in locating missing people, although this relies on reliable facial recognition software and a well-developed database of faces. Last but not least, facial recognition technology has appeared in social media applications on websites like Facebook that encourage users to tag friends who have been recognised in images. It is obvious that there are numerous uses for facial recognition technology.

II. RELATED WORK

Dr. S Govinda Rao, G Anil Kumar, Y Manoj Kumar et.al. The goal of this project is to identify faces in the camera source, and after training the photographs, the faces are saved in a folder with the user's chosen name. When a face from the source folder is presented on the camera source, the photographs are compared when the identify button is pressed, and the matched name is shown on the screen.

Shervin Emami, Valentin Petrut, Suciu et.al. Research will shed light on how our brains function in terms of computer picture processing and understanding, and vice versa. The author has offered to develop an application that would grant user access to a certain machine based on an in-depth analysis of a person's facial features out of general curiosity and interest in the subject. The.NET framework from Microsoft and the OpenCV open source computer vision project from Intel will be used to create this application.

Ramadan TH. Hasan, Amira Bibo Sallow et.al. The primary OpenCV modules, features, and OpenCV based on Python are presented in this document. The paper also discusses popular OpenCV applications and classifiers that are employed in these applications, including object detection, face detection, and image processing. Finally, we explore various literary analyses of OpenCV applications in computer vision, including face detection and recognition, the identification of emotions on the face, such as grief, rage, or happiness, and the identification of a person's gender and age.

Primoz Podrzaj, Boris Kuste et.al. The first topic covered in this essay is computer vision libraries. Then, the face detection and identification capabilities of the libraries that are currently accessible are examined. The fundamental outline of the algorithm employed in the libraries is provided. An example of the resulting image is provided for each significant step. Despite the fact that the paper only includes two sample images, many images were used to analyse the algorithm. The analysis proved that Python is in fact the best programme for tasks requiring face recognition and detection.

Lahiru Dinalankara et.al. This report details the face detection and recognition mini-project carried out for the Plymouth University visual perception and autonomy curriculum. It outlines the technologies offered by the Open-Computer-Vision (OpenCV) package as well as the process for putting them into practise with Python. Haar-Cascades

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were utilised for face detection, and Eigenfaces, Fisherfaces, and local binary pattern histograms were used for face recognition. The technique is explained, along with flowcharts for each system level. The results are then presented, along with plots and screenshots, and then a discussion of the difficulties encountered follows. The authors offer their thoughts on the project and potential applications as a conclusion to the report.

Dr. V Suresh, Srinivasa Chakravarthi Dumpa, Chiranjeevi Deepak Vankayala, Haneesha Aduri, Jayasree Rapa et.al. Face databases will be established for this project in order to feed data into the recognizer algorithm. Then, during the period for recording attendance, faces will be checked against the database to try to identify anyone. When a person is recognised, the attendance will be recorded automatically, recording the essential data into an excel sheet. The excel document with all students' attendance data is mailed to the appropriate faculty at the end of the day.

III. SYSTEM ARCHITECTURE:

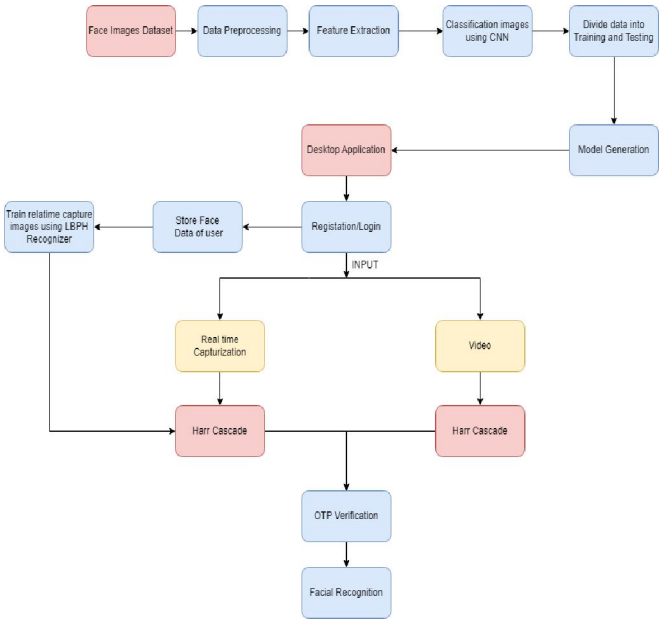

Figure 1: System Architecture

We are creating a desktop application in which user needs to register before using the application at the time of registration ,we are going to capture a face which we are going to store on a database. Then we will train that images using LBPG Recognizer. Then user need to select the option either live streaming or he wants to give input as video. If he selects live streaming then camera will open and start capturing its video then if persons face is available in database then face get recognized and information displays on screen , And, If user selects video input option then it will recognise the face in the video.

IV. ALGORITHM

4.1 Convolutional Neural Network

Convolutional Neural Networks are designed specifically for use in image and video recognition applications. CNN is primarily utilised for image analysis applications such segmentation, object detection, and picture recognition.

Convolutional Neural Networks have four different kinds of layers:

1. Convolutional Layer: The next hidden layer in a traditional neural network is connected to each input neuron. In CNN, the hidden layer of neurons is coupled to a relatively small number of the input layer neurons.
2. Pooling Layer: The pooling layer is used to make the feature map less dimensional. Inside the CNN's hidden layer, there will be numerous activation and pooling layers.

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3. Flatten: Data must be converted into a 1-dimensional array before being fed into the layer below. The output of the convolutional layer is flattened to create a single, extensive feature vector.
4. Fully Connected Layer: Fully Connected Tiers make up the network's final few layers. The output from the last pooling or convolutional layer is passed into the fully connected layer, where it is flattened before being applied.

4.2 Harr Cascade Algorithm

Here, based on our calculations, the first feature seems to emphasise the fact that the area around the eyes is frequently darker than the area around the nose and cheeks. Based on the eye's darker qualities than the nasal bridge, the second feature was selected. You do not, however, require the same window that is applicable to your cheeks and other areas. face recognition system that extracts, stores, and matches face feature information from a picture. However, it is challenging to install transmission lines in areas with poor topography. The authors suggested a system based on real-time facial recognition that is dependable, safe, and quick but needs work in various lighting scenarios.

V. PROPOSED METHODOLOGY

Describe a dataset. For a machine that doesn't see data the same way that people do, the data collected should be made standard and intelligible.

1. Pre-processing - Real-world data typically includes noise, missing values, and may be in an undesirable format, making it impossible to build machine learning models on it directly. Data pre-processing is necessary to clean the data and prepare it for a machine learning model, which also improves the model's accuracy and effectiveness.
2. Feature Extraction tries to decrease the amount of features in a dataset by generating new features from the ones that already exist (and then discarding the original features). The majority of the information in the original collection of features should then be summarised by this new, smaller set of features.
3. Classification - The Classification algorithm, which uses supervised learning to categorise new observations in light of training data, is used to recognise new observations. In classification, a programme makes use of the dataset or observations that are provided to learn how to categorise fresh observations into various classes or groups.

VI. CONCLUSION AND FUTURE WORK

Several test photographs were used together with a variety of situations and factors to thoroughly examine the face recognition and detection methods. Real-time data were used in all of the aforementioned projects. The success rate is influenced by a number of external variables, including light and camera angle. 95 percent of attempts are successful when carried out under perfect circumstances. Face recognition is a technology that is only now becoming mature enough to see a sharp increase in the number of practical applications. A robust and reliable automated attendance system that makes counting and identifying students much easier and more convenient can be created using face recognition technology. Additional Face Recognition applications include anti-theft smart automobile security, in which a single alarm signal might be sent to sound an alarm or silently "call" the police and the host with the assistance of other system prototype modules. Shoplifters in a crowd can be detected automatically using face recognition technology. Although there are currently verification mechanisms for physical and electronic access security, passive customisation and automated surveillance systems powered by face recognition are what the future promises.

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