

Real-time Face Recognition System using LBPH

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Abstract

Face recognition is a biometric software application which recognizes a person by comparing and analyzing the geometric features of the face. We have developed a system for face recognition in real-time environment. Initially multiple inputs are taken from the web cam then the face is detected, extracted and then stored in a dataset. When a new face is input from the web-cam, the input face is extracted and compared with the images in the previously created dataset. We have used HAAR face classifier for face detection and LBPH for face recognition, Coding was done in python. Experimental results show that the proposed real-time face recognition method detects and recognizes faces accurately. In the world today with increasing number of security concerns, a real-time face recognition system will be helpful in building security systems such as criminal identification system, attendance system etc.

Keywords: Face-Recognition, Real-time, web-cam, HAAR face classifier, face detection, LBPH.

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1. Introduction

In the world today, face recognition systems are required in a plethora of fields. Video tagging on social media platforms, criminal identification, security systems having facial verification as password, identifying missing people based on CCTV footages etc. make use of real-time face recognition system. Facial Recognition is a task in which human abilities are absolutely brilliant but when it comes to developing a computational model of face recognition to differentiate one face from another the task gets considerably tougher because faces are complex and multidimensional. Faces in real-time environment can be identified from video frames, CCTV footage videos etc. In order to achieve this task, we have implemented a real-time face recognition system using python and OpenCV. To build a real-time face recognition system, we have used python and OpenCV.

OpenCV (Open Source Computer Vision Library) is a library that comprises of different calculations that can

assist us with preparing pictures and recordings to distinguish objects, faces, penmanship and so on.

OpenCV comes with 3 facial recognition libraries-

1. Eigenfaces - Uses Principle Component Analysis to reduce the dimensionality of the face. However, this neglects the class label into account and can represent variance from changes in illumination.
2. Fisherfaces - Solves this by using LDA (Linear Discriminant Analysis) that is a class-explicit projection, which implies it endeavors to limit difference inside a class, while expanding change between classes.
3. Local Binary Patterns Histograms - Uses local feature extraction while persevering spatial relationships. It divides faces into cells and then compares each cell to face being classified. It then produces a histogram showing the matching values of an area.

We have used LBPH in the proposed system.

The process of real-time face recognition has capturing the image through web cam as the first step.

Then if a face is present, it is detected. The detected face is then extracted and normalized and then recognized.

2. Literature Survey

Weidong Min et al. [3] proposed a framework for Real-time Face Recognition dependent on Pre-distinguishing proof and Multi-scale Classification. They built up a framework in which countenances can be powerfully distinguished in muddled situations, for example, heads moving every now and again or with huge points. To precisely perceive little scope faces, the Multi-scale and Multichannel Shallow Convolution arrange. (MMSCN) was proposed which consolidates a multi-scale instrument on the component map with a multichannel convolution arrange for continuous face acknowledgment.

Shreyak Sawhney et al. [4] proposed a structure for Real-Time Smart Attendance System utilizing Face Recognition Techniques. A framework was created for executing a mechanized participation the board framework for understudies of a class by utilizing face acknowledgment procedure, by utilizing Eigenface values, Principle Component Analysis (PCA) and Convolutional Neural Network (CNN). To mark the participation, the perceived appearances ought to be contrasted and the database containing understudy's countenances.

Ni Kadek, AyuWirdiani et al. [6] proposed a model for constant face acknowledgment with eigenface strategy. The proposed framework had two significant procedures, to be specific the preparation procedure and the recognizable proof procedure. The face enrolment process utilizes face recognition utilizing the OpenCV library. The component extraction procedure and prologue to the acknowledgment framework utilize the Eigenface strategy.

Weihua Sheng et al. [2] proposed a savvy security framework with face acknowledgment. A vigorous security dependent on face acknowledgment framework (SoF) was formed to give access into a home for confirmed users. By utilizing a profound learning structure - TensorFlow, it will be anything but difficult to reuse the system to receive with numerous gadgets and applications.

Krishna Kumar. N et al. [4] constructed a model for Modern Face Recognition with Deep Learning by coding in python to perceive faces in all conditions. Profound learning systems were utilized for face estimation. They built up a framework that could take in estimations structure another test picture and tell which individual was the nearest match to it.

3. Objectives

Given an image, the objective is to be able to compute the fundamental picture and recognize the nearness of human faces and contrast it and the countenances in the database and if present, let the user know about the identity of the

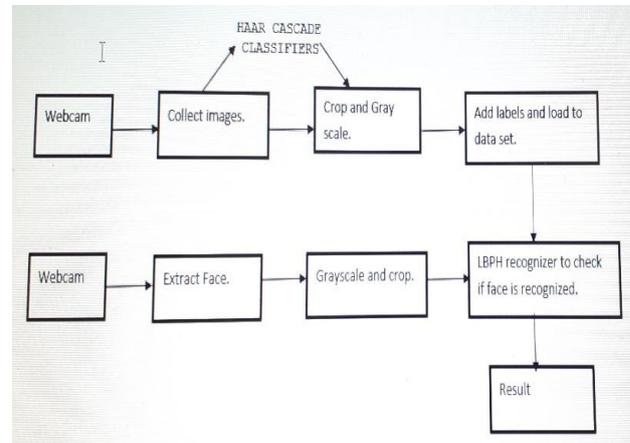
person. If not in the database, we can store the face in the database for future purposes.

It's a real-time face recognition system which can be implemented in many verticals.

4. Proposed System

We first need to detect the face because face detection is the first key process in any face related application like face alignment, face swap etc. Face identification is the way toward recognizing a face in an advanced picture. In this system, we have accomplished the task of face detection using the HAAR Cascade classifiers.

We then load the image and convert it from RGB to grayscale. In the wake of changing over the picture to grayscale, we find the highlights in our face and draw a square shape around the face in particular and disregard the properties that produce commotion, similar to hair, foundation and so on. This process of eliminating the noise and retaining just the facial features is called face normalization. The part of the photo that is highlighted is then extracted, cropped and labelled and stored in the dataset. Multiple photos are captured and stored in the dataset. For face recognition, first a photo is captured. If a face is detected, photo is normalized and cropped. It is then compared with the images in the dataset. The photo is recognized if it is present in the dataset else it remains unidentified. There are many ways for face recognition.



5. Methodology

General overview of facial recognition systems steps are:

The principal most advance is to instate the web-cam and Record numerous pictures of the client. HAAR Cascade Classifiers are an article identification strategy that inputs HAAR highlights into a progression of classifiers course to distinguish protests in a picture. They are prepared to recognize one kind of article. Notwithstanding, we can utilize a few of them in equal. Once the camera is initialized, we collect multiple images of the user. The images that are collected contain noise in form of background, hair, etc. We should get rid of the

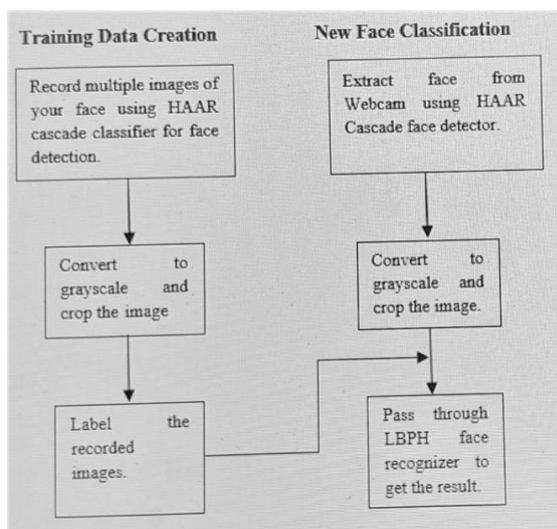
noise and make the image suitable for storing in the dataset.

To do so, we should normalize the image by cropping, converting to gray scale and sizing to 200 x 200 pixels.

Multiple such photos are collected, labelled and stored in the dataset. Once the data set is created we use it to recognize a person.

To recognize a face (whether it is present in the dataset or not), we first extract the face from the web cam using HAAR cascade face detector. It is then converted to grayscale and resized to 200x200 pixels.

We then pass it to the LBPH recognizer and obtain the result - face recognized or not recognized.



6. Result

A vigorous continuous face acknowledgment framework was fabricated utilizing python and OpenCV. The exactness of face acknowledgment can be improved by expanding the quantity of pictures during preparing. The consequence of individual recognizable proof utilizing LBPH method displays exact outcomes. A confidence value is also displayed in the end.

Create dataset: Images are captured, and corresponding labels are given for each image.

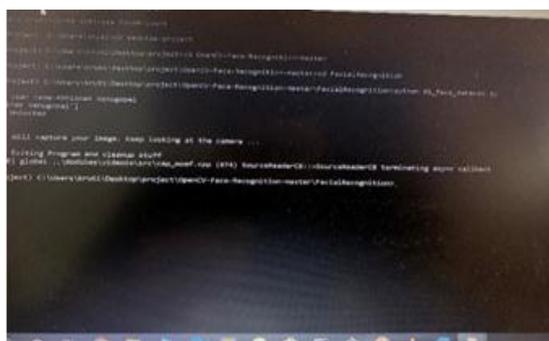


Figure 1: Create Image

Train dataset: all the labels are stored and trained in dataset

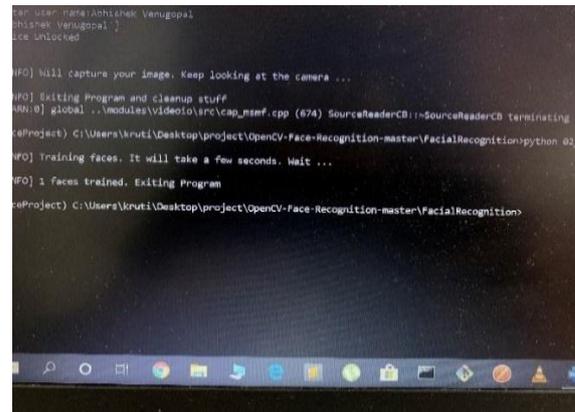


Figure 2: Train Dataset

Recognize the Face: when webcam is tested for face recognition, the name of the person is displayed with a confidence value.

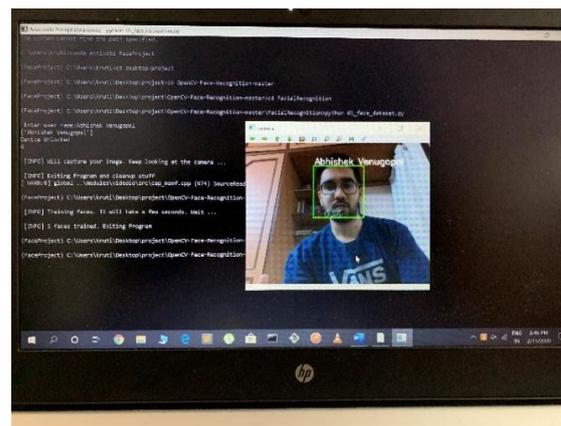


Figure 3: Recognize the Face

7. Conclusion

A strong continuous face acknowledgment framework was assembled utilizing python and OpenCV. The exactness of face acknowledgment can be improved by expanding the quantity of pictures during preparing. The consequence of individual ID utilizing LBPH method shows exact outcomes. A certainty esteem is likewise shown at last. In future, a similar acknowledgment framework can be used to manufacture a security framework in lofts, research centers and so on to guarantee that lone the individuals enrolled in the database can enter. The same recognition system can also be in future to build a system to identify lost people. Such a system will be of help to the police force and ease their work. Another future use of this recognition system can be Criminal recognition to identify run-aways from prison and people belonging to the "Wanted" category.

References

- [1] Ni Kadek Ayu Wirdiani, Tita Lattifia, I Kadek Supadma, Boy Jehezkiel Kemanang Mahar, Dewa Ayu Nadia Taradhita, Adi Fahmi, " Real-Time Face Recognition with Eigenface Method", International Journal of Image, Graphics and Signal Processing(IJIGSP), Vol.11, No.11, pp. 1-9, 2019.DOI: 10.5815/ijigsp.2019.11.01
- [2] ShreyakSawhney, Karan Kacker,Samyak Jain, Shailendra Narayan Singh, Rakesh Garg Amity University, "Constant Smart Attendance System utilizing Face Recognition Techniques" 978-1-5386-5933-5/19/\$31.00c 2019 IEEE.
- [3] Trung Nguyen, Barth Lakshmanan and Weihua Sheng, "A Smart Security System with Face Recognition" arXiv:1812.09127v1 [cs.MM] 3 Dec 2018
- [4] Suma S L1, Sarika Raga2,"Real Time Face Recognition of Human Faces by utilizing LBPH and Viola Jones Algorithm" International Journal of Scientific Research in Computer Science and Engineering Vol.6, Issue.5, pp.06-10, October (2018) E-ISSN:2320-7639
- [5] Springer Nature Singapore Pte Ltd. 2019 P. K. Sa et al. (eds.), "Ongoing Findings in Intelligent Computing Techniques, Advances in Intelligent Systems and Computing 707"
- [6] Weidong Min , Mengdan Fan , Jing Li , Qing Han, School of Information Engineering, Nanchang University, Nanchang, China "Constant Face Recognition dependent on Pre-recognizable proof and Multi-scale Classification" 2018/10/24 18:22:16 IET Computer Vision
- [7] Jothi Thilaga.P Arshath Khan .B, Jones .A.A, Krishna Kumar .N, "Current Face Recognition with Deep Learning" Proceedings of the second International Conference on Inventive Communication and Computational Technologies (ICICCT 2018) IEEE Xplore Compliant - Part Number: CFP18BAC-ART; ISBN:978-1-5386-1974-2978-1-5386-1974-2.
- [8] Waldemar Wójcik, Konrad Gromaszek and Muhtar Junisbekov (July sixth 2016). Face Recognition: Issues, Methods and AlternativeApplications, Face Recognition - Semisupervised Classification, Subspace Projection and Evaluation Methods, S. Ramakrishnan, IntechOpen, DOI: 10.5772/62950.
- [9] Abhishek Pratap Singh, SunilKumar S Manvi, Pratik Nimbale, Gopal Krishna Shyam, "Face Recognition System Based on LBPH Algorithm",International Journal of Engineering and Advanced Technology (IJEAT) ISSN: 2249 – 8958, Volume-8, Issue-5S, May, 2019
- [10] Aftab Ahmed, Jiandong Guo, Fayaz Ali, Farha Deeba, Awais Ahmed, School of Information and Software Engineering, University of Electronic Science and Technology of China Chengdu, China "LBPH Based Improved Face Recognition At Low Resolution",2018 International Conference on Artificial Intelligence and Big Data.