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# Student Information Extraction by using Face Recognition

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***Abstract*** — Obtaining and managing a student's details plays a vital role in academic database management and getting specific student details from the database becomes a very time-consuming process. Where the solution we bring to that problem is Face recognition-based Data Extraction. We will be implementing face recognition to detect the student's face and match the detected face in the database to get that student's details. To train the dataset we are using OpenCV (computer vision) a Python library. And we are training the dataset using classifiers. Once the face detection Is done and matched in the database it will display the output in a graphical user interface (GUI) we created using Tkinter.

***Keywords:*** *Face Detection; Face Recognition; Dataset Preparation; Dataset Training; ; Haar Cascade; Classification Model; CNN.*

## 1. Introduction

These days, Face Recognition technology is a hot topic in the section of biometric security. The algorithm that Face Recognition uses is deep learning, which is a subset of machine learning that involves training an artificial neural network to analyze and match the data in that dataset. This system is trained with a large amount of dataset as input to perform the most accurate recognition of the face. The Image from the created dataset was fed into a neural network. The machine learning algorithm aspect of creating an image recognition model. The training of an Image and Face Recognition algorithm makes it simple for the convolutional neural network (CNN) to identify specific Images and Faces in Dataset. Student details or information were gathered manually at the time of need, to make that process automatic and efficient, we are implementing our project, which uses student faces as input to gather data about that student from the database, which we have already created. Face recognition has become a most versatile biometric security. Because of the far too much interest in biometric security.

We will be using face recognition as our main prototype to get the details about the student and to recognize the student's facial features. We will be getting the student image as a dataset and training the database using the Haar cascade classifier storing the dataset and finally creating a GUI to detect the face and display the data about the student after a successful match.

## 2. Related Works

Numerous face recognition works are not particularly related to a single module or algorithm. Some of the work we explored are [1] Three novel approaches: 3D face reconstruction, sparse representation, and collaborative representation. Initially, a 3D model is reconstructed from single frontal face images using the Generic Elastic Model (GEM). [2] face expression detection and preprocessing techniques use the integral graph method and weak face feature classifiers. Furthermore, the construction of a dynamic facial expression feature extraction model and dynamic sequence facial expression recognition process are elaborated, employing displacement data and optical flow estimation.

[3] Partial face detection involves fine-tuning Alexnet on the (AFLW) dataset, enhancing positive sample selection, and employing a sliding window approach for detection due to its lower complexity. The method utilizes Multi Key-point Description (MKD) to recognize Scale Invariant Feature Transformation (SIFT) marks, suppressing fraudulent similarity and providing efficient representation. [4] Deep Convolution Neural Network (CNN) architecture is VGG16. VGG16 is a pre-trained architecture used on the ImageNet dataset which constitutes millions of images distributed among thousands of classes, the weights of the VGG16 are used and the architecture of VGG16 is customized to make a new architecture for performing classification in face recognition. [5] Two kinds of intra-person variances assume that the same person's non-ID photo should be like his/her ID photo and the same person should look like his/her other non-ID photo.

[6] Utilizing Haar-like features to efficiently encode intensity differences in image regions, with integral images aiding rapid feature calculation. The AdaBoost algorithm optimizes feature selection and thresholds. For feature extraction, Local Binary Pattern (LBP) is chosen due to its lighting invariance and computational efficiency. [7] A comprehensive review of face recognition methods, focusing on both. global and local feature extraction techniques. Global methods such as Principal Component Analysis (PCA), Linear Discriminant Analysis (LDA), and

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Life cycle assessment (ICA), as well as local methods like Life cycle assessment (LBP), Label Distribution Protocol (LDP) and Empirical Bayes Geometric Mean (EBGM) are discussed in detail. The challenges faced by face recognition systems, including illumination, pose variation, and facial expression, are highlighted. This paper presents a comparative analysis of recognition rates for various methods using different databases.

[8] A robust and efficient face recognition system for monitoring unauthorized access to equipment in a room using a surveillance camera. The system integrates person detection, tracking, and face recognition algorithms, addressing challenges in real-time operation with non-controlled image sources. A novel confidence estimation strategy for face recognition is introduced to enhance identification rates and minimize false alarms. [9] The challenge of resource-constrained embedded devices in face recognition by introducing DGFaceNet, a lightweight model based on Dynamic Ghost Bottleneck. The proposed Dynamic Ghost module optimizes the generation of similar features in early and late network stages, significantly improving efficiency. The study also introduces a novel class-margin-linear SoftMax loss function (CML-SoftMax) tailored for lightweight networks, addressing convergence and stability issues. [10] This system utilizes Deep Learning, specifically Convolutional Neural Networks (CNNs), for automatic face recognition to streamline attendance management. The system employs high-definition video streams captured through surveillance cameras for precise face biometric recognition. It addresses the limitations of manual attendance systems by automating the process using advanced technology.

## 3. Methodology

First, it's important to collect the student image dataset, to gather the image of the students we are using OpenCV (computer vision) a Python library, OpenCV is a great tool that helps in image capturing, processing, and performing computer vision tasks then store it as a dataset. And after the dataset is collected the next step is to train the dataset. We are using classifiers and an OpenCV module that helps in image filtering, geometrical image transformations, and color space conversion... we are specifically using a haar cascade classifier, and once all the gathered dataset is trained it will be stored in yet another markup language (yaml) format. We need Pillow and NumPy, these two are Python's libraries to classify the image and work on large amounts of data. Pillow (Python Imaging Library) is used for image processing within it to show the image Dataset. Pillow has some built-in image modules that help in functions such as loading images, creating images, and processing images. NumPy is used here to perform various operations mathematically on the array (Dataset).

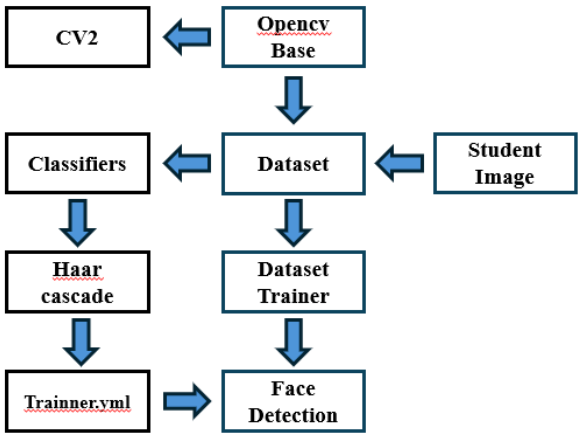


**Fig.1: Dataset Creation and Training Process**

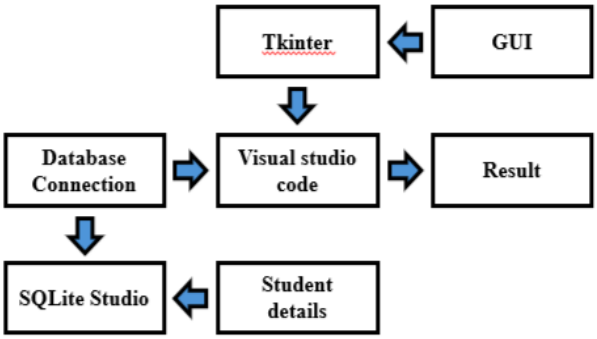


**Fig.2: Database and Face Recognition GUI**

Figure 2 is implemented to display the student's details after a Detection and perfect match in the database. We are using Visual Studio Code as our code editor due to the rich interface and useful features The GUI(Graphical User Interface) we needed was created using Tkinter a Python library the GUI and for the database, we are using SQLite Studio to store the student details. Once the database is created, we can connect that database to the GUI we created to display the information about the student.

## 4. Conclusion

To sum up, all the work done in this paper is to make the retrieval of a specific student detail easy and efficient. To make the process simple and time-saving we are implementing a system based on Face Recognition. This paper can make good use of the sudden need of an individual student but doesn't have a reasonable amount of time to gather the information about that student. This paper is not solely based on student data alone, we can alter the system and will be able to use it for staff and personal use too.


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