**Mini Project Report on**



**REAL TIME FACE DETECTION AND SMILE IMAGE CAPTURING APPLICATION**



**BACHELOR OF TECHNOLOGY**

**IN**

**COMPUTER SCIENCE & ENGINEERING**

**Submitted by:**

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**CANDIDATE’S DECLARATION**

I hereby certify that the work which is being presented in the project report entitled **“Real time Face Detection and Smile Image Capturing Application”** in partial fulfillment of the requirements for the award of the Degree of Bachelor of Technology in Computer Science and Engineeringof the Graphic Era Hill University), Dehradun shall be carried out by the under the mentorship of **MR. Rahul Chauhan**, Department of Computer Science and Engineering, Graphic Era Hill University, Dehradun.

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**Chapter 1**

**Introduction**

In the following sections, a brief introduction and the problem statement for the work has been included**.**

* 1. **Introduction**

### Introduction for Project Report: Real Time Face Detection and Smile Image Capturing.

Face detection and Smile Image Capturing are essential components in the field of computer vision and artificial intelligence. Real-time face detection is widely used in applications such as surveillance systems, security, human-computer interaction, and biometric authentication.

The Real-Time Face Detection and Smile Image Capturing Application is designed to utilize advanced computer vision techniques combined with machine learning algorithms to detect human faces in live video streams.

The core functionality of the application focuses on providing immediate feedback in the form of Smile Image Capturing when a face is detected. This project serves diverse purposes, including security monitoring, attendance tracking, and personal photo management.

OpenCV (Open Source Computer Vision Library) is an open source computer vision and machine learning software library. OpenCV was built to provide a common infrastructure for computer vision applications and to accelerate the use of machine perception in the commercial products. Being an Apache 2 licensed product, OpenCV makes it easy for businesses to utilize and modify the code.

The library has more than 2500 optimized algorithms, which includes a comprehensive set of both classic and state-of-the-art computer vision and machine learning algorithms. These algorithms can be used to detect and recognize faces, identify objects, classify human actions in videos, track camera movements, track moving objects, etc.

This mini-project demonstrates how to build a simple real-time face detection system using OpenCV, a powerful open-source computer vision library, and Python. The system also captures the image of the detected face.

* 1. **Problem Statement**

Develop a Python program using OpenCV to perform real-time face and smile detection from a live video feed. The program should capture video input from the primary camera, detect faces and smiles within each frame, draw bounding boxes around detected faces and smiles, and save images of frames where smiles are detected with a timestamp.

**Chapter 2**

**Objective of the Project**

The objective of this project is to develop a system that:

* **Real-Time Face Detection:**

Implement a reliable face detection algorithm to identify faces in various lighting and angle conditions.

* **Smile Image Capturing:**

Upon face detection, automatically capture and store images, enabling further analysis or archiving.

**Chapter 3**

**Technologies Used**

Tools and Technologies used to develop the project:

* **Programming Language:** Python
* **Libraries:**
  + OpenCV (for face detection and Smile Image Capturing).
  + Haar Cascade Classifier (for detecting faces).
* **Hardware:**
  + Webcam or external camera for real-time video input.

**Chapter 4**

**Methodology**

The methodology consists of the following steps:

1. **Setting up the Environment:**
   * Install Python and OpenCV library.
   * Install additional libraries like NumPy, if required.
2. **Haar Cascade Classifier for Face Detection:**
   * OpenCV provides a pre-trained Haar Cascade classifier for face detection, which is based on machine learning.
   * The classifier is loaded into the program, and it is used to detect faces in video frames captured from the webcam.
3. **Capturing Real-Time Video:**
   * OpenCV captures real-time video feed from the webcam.
   * Each frame from the video is processed to detect faces.
4. **Face Detection:**
   * Convert the frame to grayscale for better performance.
   * Apply the Haar Cascade face detector to locate faces in the frame.
   * Draw bounding boxes around the detected faces for visualization.
5. **Smile Image Capturing:**
   * When a face and smile is detected, an image of the face is captured and stored in a specified directory.
6. **Display:**
   * The video feed with face detection is displayed on the screen.
   * The user can press a specific key to stop the face detection.

**Chapter 5**

**Project Outcomes**

The Real-Time Face Detection and Smile Image Capturing Application successfully achieved its objectives within the outlined timeline.

**Key outcomes include:**

* The system successfully detects faces in real-time from the webcam feed.
* The bounding boxes are drawn around the detected faces.
* Images of the detected faces are saved when the face shows movement around you mouth area and smile.
* The system performs efficiently under varying lighting conditions and orientations of the face.

**Chapter 6**

**Conclusions and References**

1. **Conclusion**

The Real-Time Face Detection and Smile Image Capturing Application serves as a significant step forward in utilizing computer vision for practical everyday applications.

This mini-project on real-time face detection and Smile Image Capturing using OpenCV demonstrated the effectiveness of computer vision techniques in detecting human faces through a webcam feed. By utilizing Haar Cascade classifiers, we were able to build a simple yet powerful face detection system that can be expanded for more complex applications in security, biometrics, and human-computer interaction.

1. **References**

* OpenCV documentation: <https://docs.opencv.org>
* Python documentation: <https://python.org>