Computer Vision
Task 4
Inter IIT Preparation

This task will be divided into two parts:

Part 1:

Objective:

To build a strong foundational understanding of OpenCV and apply it to practical computer vision tasks. This document outlines the learning resources and task milestones to help you master key concepts and develop implementation skills.

Learning goals:

- Color space conversion
- Blurring and smoothing
- Edge detection
- Thresholding and contour detection
- Drawing saped and text on image
- Face detection
- Object tracking
- Masking techniques
  and you are free to explore the library as much as you can.

Part 2: The project

Overview:

Manual attendance systems are time-consuming, error-prone, and not scalable for large classrooms. In an effort to automate and optimize this process, your task is to design and implement a **Smart Attendance System** that can automatically mark student attendance using **images** captured by teacher using the app.

Note: This project is given by one of our seniors who have graduated from IIT BBS in past years.

Background of the problem:

Currently the attendance system in schools and institutions is very inefficient. Teachers manually take attendance of students by calling out names and marking the attendance. The project aims to reduce time and use technology to make the process more efficient. The idea is that the teacher will go to each column and click one or multiple picture(s) of all the students sitting in that column. The images will be taken on a app that is being developed by the seniors. The attendance of all the students in the images should be marked and updated.

Objective:

To develop a computer vision-based attendance system that:

- Take images(frames) of students sitting in a column and mark the attendance..
- Detects and identifies all students present in the column.
- Marks attendance by matching detected faces with a pre-registered student database.

Core Requirements:

1. **Face Detection:** Accurately detect all visible faces in the images. The images should be preprocessed to ensure that all the faces are visible clearly specially students with dark complexion as not marking the attendance will lead to real world bullying.
2. **Face Recognition:** Match detected faces with the pre-registered student faces.
3. **Handling edge cases:** The model should be able to detect faces with different colors, angles and lighting patterns.
4. **Attendance Logic:** Mark a student as "present" if they are recognized in at least one frame.
5. **Output Format:** Generate an attendance report (e.g., CSV or Excel) with student names and attendance status.
6. **Demo Video:** Make a video of the model performance and practical working showing that the model works perfectly.

Deadline: 25 July 2025.