

HIT137

Group Assignment 3 (30% Mark)

You are required to create a GitHub repository and add all your group mates to it (make sure to keep it public, not private). You should do this before you start the assignment.

All the answers and contributions should be recorded in GitHub till you submit the assignment.

Submission Guidelines:

- **Include your GitHub Repository link in a text file “github_link.txt”.**
- **Zip all the programming files, outputs, and “github_link.txt”. Upload them to Learline.**

Overview

You will develop a desktop application that demonstrates your understanding of Object-Oriented Programming principles, GUI development using Tkinter, and image processing using OpenCV.

Functional Requirements

1. Object-Oriented Programming

Your application must be structured using at least three classes, and demonstrate the following OOP concepts: Encapsulation, Constructor, Methods, Class Interaction.

2. Image Processing with OpenCV

Implement the following image processing features using the OpenCV:

- Grayscale Conversion – Convert image to black and white
- Blur Effect – Apply Gaussian blur with adjustable intensity
- Edge Detection – Use Canny edge detection algorithm
- Brightness Adjustment – Allow users to increase/decrease brightness
- Contrast Adjustment – Allow users to adjust image contrast
- Image Rotation – Rotate image by 90°, 180°, or 270°
- Image Flip – Flip image horizontally or vertically
- Resize/Scale – Allow users to resize the image

3. Tkinter GUI

You have the flexibility to design any user interface, provided it effectively supports all required functionality.

Required GUI Elements:

- Main Window – A properly sized window with an appropriate title
- Menu Bar – Include File menu (Open, Save, Save As, Exit) and Edit menu (Undo, Redo)
- Image Display Area – A canvas or label to display the current image
- Control Panel – Buttons or a sidebar for filter/effect options
- Status Bar – Display current image information (filename, dimensions, etc.)

Required Functionality:

- File dialogs for opening and saving images
- Support for common image formats (JPG, PNG, BMP)
- At least one slider for adjustable effects
- Message boxes for confirmations and errors