**CSD 4523 – 2023W**

**Python II**

**Project Part 1**

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## Project Description

The goal of this project is to develop a GUI based Python image editor program with database connectivity using different advanced python library. Users will be able to crop, resize, add filters, rotate, flip, modify resolution, add blur effects, and add filter effects to photographs as well as store and retrieve those edited images from a database using the application. The program will be accessible to all users and feature a user-friendly interface. The application will also be put through testing and debugging as part of the project to make sure it functions as intended. The program is anticipated to be able to support several image types, including JPG, PNG, and GIF. To allow users to store and retrieve their altered photographs, the project will also use a database, such as SQLite.

## Introduction To Team

Table

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We will work on various project modules and present them at the final presentation.

## Project Scope

We have planned various features and functionalities for our system to be implemented using different Python’s libraries and advanced python concept. Some of the features that we have intended to include in our project are listed below:

* The tkinter module for Python will be used to create a main container window that will contain all other widgets.
* The user will have the option of browsing the images and selecting the one they want, which will then be presented on the screen along with more information about it.
* After the image gets selected, user will be able to perform different image editing activities such as:
  + Adding filter effects
  + Image Blur
  + Cropping image
  + Grayscale the image
  + Resizing the image.
  + Rotating and flipping the image
  + Reducing image resolution etc.
* To implement the above functionalities, many widgets from the Tkinter GUI toolkit, including buttons, labels, sliders, checkboxes, radio buttons, images, frames, and message boxes, will be used.
* The "Reset" button will be available for usage if the user decides at any time throughout the editing process that they would like to remove the modified effects and return to the original image.
* After the user has finished modifying an image, he or she will have the choice of downloading the altered version or uploading it to a database for future use.
* There will be a button that displays a list of every image that was submitted and stored in the database.
* Users will be able to access the specific details of the uploaded images, including the image name, the date and time of the upload, and the processed version of the image itself.
* Users can download the image that was preserved in the database from the list of the uploaded images.
* Finally, the user will have the option to close the application, re-open it if desired, and begin the same steps for choosing, altering, uploading, and downloading the image.

## Technology/Library Used

We will be going to use different Python’s concepts including various libraries to complete the project. For the database integration part, SQLite will be used. Some of the technologies and libraries that we will be going to use in the project are listed below:

* **Tkinter**:

To construct the GUI part for our program, we will be using the most commonly used Python GUI’ library named Tkinter. It will allow us to create the container and the number of widgets which will be added inside the container.

* **Object-oriented Programming (OOPs) concept:**

We will be using the concept of OOPs while doing coding for our program. It will allow us to use objects, classes and inheritance while doing the programming. Due to this our written code will be much cleaner, shorter, reusable, and readable.

* **Pillow:**

Since most of our project is about image processing, we need to add the image processing capabilities to the Python interpreter. To add such capabilities, we will be using the “Pillow” which is one of the most popular Python Imaging Library. With the aid of this library, we will be able to apply filters to an image, such as blur, grayscale, resize, flip, crop, etc. This library offers these features, and we'll investigate more options to improve the features of our program.

* **SQLite**:

We will be using the SQLite database for holding the image details after the user’s clicked the “Upload” button in our program. For integrating the SQLite in our program, we will be using Python’s sqlite3 module. It allows us to connect to the database and perform CRUD operation in the database.

* **Git for version control:**

This will be used to share the codebase among the team members and keep track of the changes made by all and then merge them for the final application.

## Wireframe

As we are just discussing and planning our project within our group, there should be a tangible way to demonstrate and comprehend what our program will look like once we have finished putting our suggested design and functionality into practice. Wireframes for the features of our program that we will later integrate have been built to make this process easier.

1. GUI after selecting image:

Text

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Figure Wireframe image of program after selecting image.

1. GUI after clicking “Get Started” button:

Diagram

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Figure Wireframe image after the user clicked "Get started" button.

1. GUI after user clicked “View History” button:

Diagram

Description automatically generated

Figure Wireframe image after user clicked "View History" button.

## Project Milestones and Work Distribution

To make it easier to understand and compare our work with the specified timeline, we have split our entire project into several sections. This will enable us to monitor our development going ahead and assign work on that component or capability to the proper team member. Also, it will be easier for each group member to understand their role in each stage of the project development.

**Preparatory Phase:**

Proposed Deadline: End of Week 10

We have planned to work on designing part, schema design and other required preparation which will be required during the implementation phase in this preparatory phase:

* Design a database schema for all the relevant tables such as image, edits of image, image history etc. **[Basanta]**
* Design wireframe for the project which will include main section, image edit section, image history section etc. **[Basanta]**
* Design the first window which will open as soon as the user starts the program that may have different buttons, labels, check boxes etc. **[Sagar]**
* Make a list of required Python’s libraries investigate it and create a simple demo app containing database connection so that it will be easier for us in implementation phase. **[Keyur]**

**Phase 1 Implementation:**

Proposed Deadline: End of Week 11

* Create an actual database making all the necessary tables and fields on it taking reference of the designed schema and make a connection with the project file. **[Basanta]**
* Create a class for doing all database related functions. Also make the methods for insert operation and fetching the records to display to the user. **[Keyur]**
* Make method to delete the record that the user wants. **[Basanta]**
* Design the main window which will open after the user click “Get Started” button from the first window. All the image editing stuff will be carried out in this window. **[Sagar]**

**Phase 2 Implementation:**

Proposed Deadline: End of Week 13

* Implementing rotating and flipping the image. **[Basanta]**
* Function for uploading the image to database and converting it to supported file format for the database **[Sagar]**
* Function for downloading the image in file format after the user clicks the “Download” button. **[Keyur]**
* Features for reducing image resolution and cropping the image. **[Sagar]**
* Features for adding filters, blur effect, grayscale and resizing the image. **[Keyur]**
* Design the third window which will open after the user click “View History” button from the main window. **[Sagar]**
* List all the uploaded records in the tabular form with features for deleting the record. **[Basanta]**
* Add the feature of “Reset” button. **[Keyur]**

**Testing Phase:**

Proposed Deadline: End of Week 14

* Test the features of image editing sections such as blur, crop, flip etc. by making proper test cases. **[Basanta]**
* Test the queries to the database for fetching and inserting the data by applying test cases that are likely to occur by the user. **[Keyur]**
* Test the proper working of the graphical user interface widgets such as buttons, check boxes, sliders and overall layout of the application when resizing the window. **[Sagar]**
* Design presentation slides and work on dividing each part for explaining. **[Sagar, Keyur & Basanta]**

We created a Gantt chart, which is displayed below, to help you better understand the project timeframes and milestones:

Figure Gantt chart for the project timeline