Project Description: Digital Line Art Generator

Project Overview

Welcome, digital artists! In this exciting project, you're on a mission to transform ordinary images into captivating line art. Imagine being commissioned to unleash your creativity and generate stunning visual effects using Python.

The goal is to develop a Python program that accepts an image file path, background color (RGB), foreground color (RGB), and an edge detection kernel as input. The program will then extract lines from the image using either the Prewitt or Sobel operator, based on user input, and recolor the resulting edge image according to the specified foreground and background colors.

Your Task

Stage 1: Accept user input

- Write a Python function that accepts:
  - □ File path to an image
  - □ Foreground and background color in RGB format
    - H*int:* you may want to make a function that accepts RGB and reuse it for both
  - □ Edge detection kernel choice (Prewitt or Sobel)
- □ Load the input image from the file path.
- □ Display the original image to the user with the title `"Original"`

Stage 2: Edge detection

□ Create a function called `normalize_to_255` that normalizes an array so values are in the range 0-255.

□ Create a function called `detect_edges` that given an image, x derivative kernel, and y derivative kernels, find the edges in an image using symmetric/reflective padding and returns the result.

- *Hint:* Make sure to account for noisy images and normalize your result!

□ Apply your edge detection using the Prewitt or Sobel operator, depending on user input.

Stage 3: Recoloring

□ Create a function called `alpha_blend` that accepts three parameters: a foreground RGB (list of three ints), background RGB, and the intensity of the foreground color. Adapt the alpha-blending formula for your function to make sure edge intensity corresponds to foreground color vibrancy.

□ Recolor your edge images so pixels that aren't edges are only the foreground color and pixels that are edges have a foreground color vibrancy that corresponds to the edge strength. You should use your `alpha_blend` function for this.

□ Display the final line art image to the user with the title `"Result"`.

Project Notes:

- You are encouraged to work in pairs but each student must submit their own project on Google Classroom
- Refer to class slides, homework, and code alongs for relevant concepts and techniques.