

Design Document
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Image Processing & Editing

Data

Image Data - 2D array of int (imageHeight x imageWidth)

- The size will depend on the image's dimensions.

Filename - String (char array)

- Stores the path of the file possessing the image.

Loaded Image - bool

- Keep track of if an image is loaded or not.

Menu Choice - int

- Receives & calls user input.

File Pointer - 'FILE *'

- Deals with file input & output.

Brightness - char array {' ', '.', 'o', 'O', '0'}

- Associates brightness values to specific characters.

Image Width & Height - int variables (dimensions)

- Stores the width and height of a loaded image.

User-Specified Dimensions - int inputs {'x', 'y', 'width', 'height'}

- Receives custom dimensions from the user for cropping.

Loading An Image

The program presents a menu to the user. If a user selects the option to load a new image, they will then be prompted to provide a file name.

The program will then attempt to read the image data from the provided file. The data from that image will be loaded into a 2D array that keeps the image in memory.

Viewing Current Image

Once an image is loaded, the user can choose to view/display the loaded image. The program will represent the image through displaying characters that act as pixels, with their quantity representing the image dimensions and the type of character representing the brightness value.

Editing The Image

Once an image is loaded, the user can also choose to edit the image. The program will provide a submenu offering various options: cropping, dimming, brightening, and rotating.

Cropping: The program will prompt the user to enter the coordinates and dimensions of the crop, to which the program will ensure that the given inputs are within the specs of the image. The program will then process a new 2D array with dimensions equal to the user inputs, and the pixel data from the original image will be copied to the specified area. The original image and dimensions in memory will then be updated with the cropped version.

Dimming: The program will decrease the brightness values of each pixel by one, with the minimum brightness being 0. The program will then update the original image data with the dimmed version.

Brightening: The program will increase the brightness values of each pixel by one, with the maximum brightness being 4. The program will then update the original image data with the brightened version.

Rotating: The program will process a new 2D array with swapped dimensions (width becomes height, vice versa). The program will map

each pixel to a new position from the old one. The original image and dimensions in memory will be updated with the rotated version.

Post-Edit (Saving)

Once the user is finished with an edit, the user can save the image. They'll be prompted to enter a file name, to which the program will write the pixel values from the 2D array to the designated file, saving the image. Once this process is complete, the user will be returned to the main menu.

Exiting

When the user chooses to exit the program, unsaved changes to an image are discarded and the program ends.

Functions

Main Menu Functions:

displayMainMenu()

Input Parameters: none

Functionality: Displays main menu options to the user.

loadImage(char filename)

Input Parameters: filename

Functionality: Loads an image from a specified filename into the image data array.

displayImage()

Input Parameters: none

Functionality: Renders the current data within the 2D array to the screen using characters representing pixels.

editImage()

Input Parameters: none

Functionality: Displays the submenu for editing options and calls editing functions based on user input.

exitProgram()

Input Parameters: none

Functionality: Ends the program and discards unsaved image data.

Editing Submenu Functions:

cropImage(int startX, int startY, int cropWidth, int cropHeight)

Input Parameters: 'startX', 'startY': Where the crop begins (top left corner of crop area), 'cropWidth', 'cropHeight': Crop dimensions

Functionality: Validates coordinates and dimensions, then crops the image as specified, then updates 2D array with cropped measurements.

dimImage()

Input Parameters: none

Functionality: Decreases brightness of each pixel in the 2D array by one level (minimum is 0).

brightenImage()

Input Parameters: none

Functionality: Increases brightness of each pixel in the 2D array by one level (maximum is 4).

rotateImage()

Input Parameters: none

Functionality: Rotates the image 90 degrees by inverting width and height values of the image and relocating pixels accordingly.

Saving & Updating Functions:

saveImage(char filename)

Input Parameters: filename

Functionality: Saves the current 2D array to a file with the input file name.

updateDisplay()

Input Parameters: none

Functionality: Updates the terminal displayed image with the current 2D array image data.