

WARSAW UNIVERSITY OF TECHNOLOGY

Programming 3 Project

Image Merging Application by Ștefan-Paul Georgescu

First Use of Application

Upon the first run of the application, you will be presented with an interface which has the following subdivisions: two directory select regions, recognised by the choose button and the Directory 1 and Directory 2 label, further called “directory select panel”; one viewing area with white background, currently empty, with a clear and a refresh button, further called “image view area”; to the right of the two afore mentioned functional areas we find multiple selectors, regarding naming, merge method, output format of images, fitting variant and a merge button. While those will be explained in the chapter “Choosing Merge Options”, we will further refer to this section “operations panel”.

Selecting Directories

The first step in using the application is choosing two directories which you wish to merge. To do so, you will have to select one at a time two directories from your disk, which contain images in one of the formats accepted by the application (these formats will be described in the chapter “Choosing Merge Options”). The directories selected do not have to contain only files of those types, since the application will filter out files that do not contain images. If you choose a directory that contains no images, a warning label will appear informing you so. If you choose a directory with images, the program will pause to parse all the data, and after successfully doing so will display all images in the image view area (more details on this in the next chapter). The path will also change next to the directory you selected to inform you what folder you are currently viewing. You can choose which directory to view in the image view area by double-clicking the mentioned path.

Viewing Images

Viewing images is extremely simple. Once a selected directory has images and those have been parsed, the label Viewing: will change to indicate which directory we currently have in the image view area, which can be intuitively scrolled to view all images available. To display an image at its full size, double click on desired image and a new window with just the image will open. Again, you can switch to viewing the other directory by clicking its path in the directory select panel.

Choosing Merge Options

The operations panel presents you with all the settings required to do the merge between the two directories. Take note that both directories have to be selected and contain images, otherwise you will be presented with an error.

Merge Method

What you choose from the dropdown next to this label will determine how the application will merge the images. You can choose one of the following methods:

- **Normal Merge:** this method will do a simple overlay of the two images;
- **Hard Mix Merge:** this method will apply an algorithm which will set each pixel with either minimum or maximum value on each colour channel. Experiment for interesting result;
- **Or Merge:** this method will apply the “or” operation on each two pixels;

- **And Merge:** this method will apply the “and” operation on each two pixels;
- **XOR Merge:** this method will apply the “XOR” operation on each two pixels.

Output Format

Choosing the output format will determine with what format the images will be exported to disk. It can be one of the following: **JPG, JPEG, TIF, TIFF, BMP, PNG.**

Fitting Method

The fitting method describes how the application will behave when dealing with images of different sizes (probably most cases). You can choose one of the two following options:

- **Preserve Ratio:** this will scale down one of the images in such a way that its aspect ratio will be preserved, and it will fit the other image in width;
- **Discard Ratio:** this will rescale one of the images in such a way that it will fit the other one in both height and width. Take note that by this, its aspect will change.

Naming Convention

Choosing this will decide how the application will name the newly created images. Take note that upon making a decision, the layout of the operations panel will change in order to give you all the options required to complete the decision. You can choose one of the following:

- **Keep names:** upon selecting this, you will be presented with two buttons to choose which directory's names will be kept;
- **Generate new names:** upon selecting this, you will be presented with a few field to describe how the new names will be created: main name, number of digits in counter, counter start and counter step.

Obtaining, Viewing and Manipulating Merge Results

In order to generate merged images, you first need to properly select all options presented in the previous chapter. Upon pressing the merge button, the application will generate the images and display them in the image view area, changing the Viewing label to reflect this. Also, the operations panel layout will change to allow the user to save or discard the results. Take note that the image viewing area works the same, as in you can still double-click images to view them.

In order to save those images, you must press the save button now available, which will open a directory select frame (identical to when selecting directories earlier), in which you must decide the destination of the images. After selecting, the images will be automatically saved.

Multiple actions will allow you to discard these images: either pressing the discard button, or choosing to view one of the selected directories.

User Preferences

The application implements a way of preserving selected directories. When exiting the app, those selections will be preserved, and when running the application again, it will load these selected directories automatically.

Technical Description of the Flow of the Application

Selecting Directories

When selecting a directory, a repository with all the images in that repository is created. Using the FileNavigator class we get a list of images fitting the format from the selected directory, which get passed one by one to the FileSystemUtilites class, which will convert the File to an object of the Image class. Therefore, by the end of selecting two directories, we will have two repositories, each containing the images stored as mentioned for easy access.

Viewing Images

The images will be painted on the canvas that is longer than the container housing it, which will make it scrollable. Quick change between the directories is possible due to simply hiding and displaying the correct canvas.

Obtaining, Viewing and and Manipulating Merge Results

If the user selected all the options correctly and no error was delivered, we wrap all preferences in a data transfer object and give it to the ImageMerger singleton, which will create a new image repository containing results of the merge. The merge is done either image by image, if both directories have at least two or more images, or one image from one directory with all the others from the second one, otherwise. ImageMerger will analyse the data transfer object it received, and it will do the merge according to what the user selected.

Merging two images together is done pixel by pixel following an algorithm decided upon in correspondence with the selection made by the user.

Saving the images is the task of the ImageExporter singleton, which will export each image to the directory selected by the user, whilst taking care of the output format and the name which the image should get.

User Preferences

User preferences are simply saved to a text file, and loaded from that file, if it is available, at startup.

Detailed Description of Class Interaction

In the following two pages, you will find UML diagrams representing in detail the interaction between available classes.

Graphical User Interface Diagram

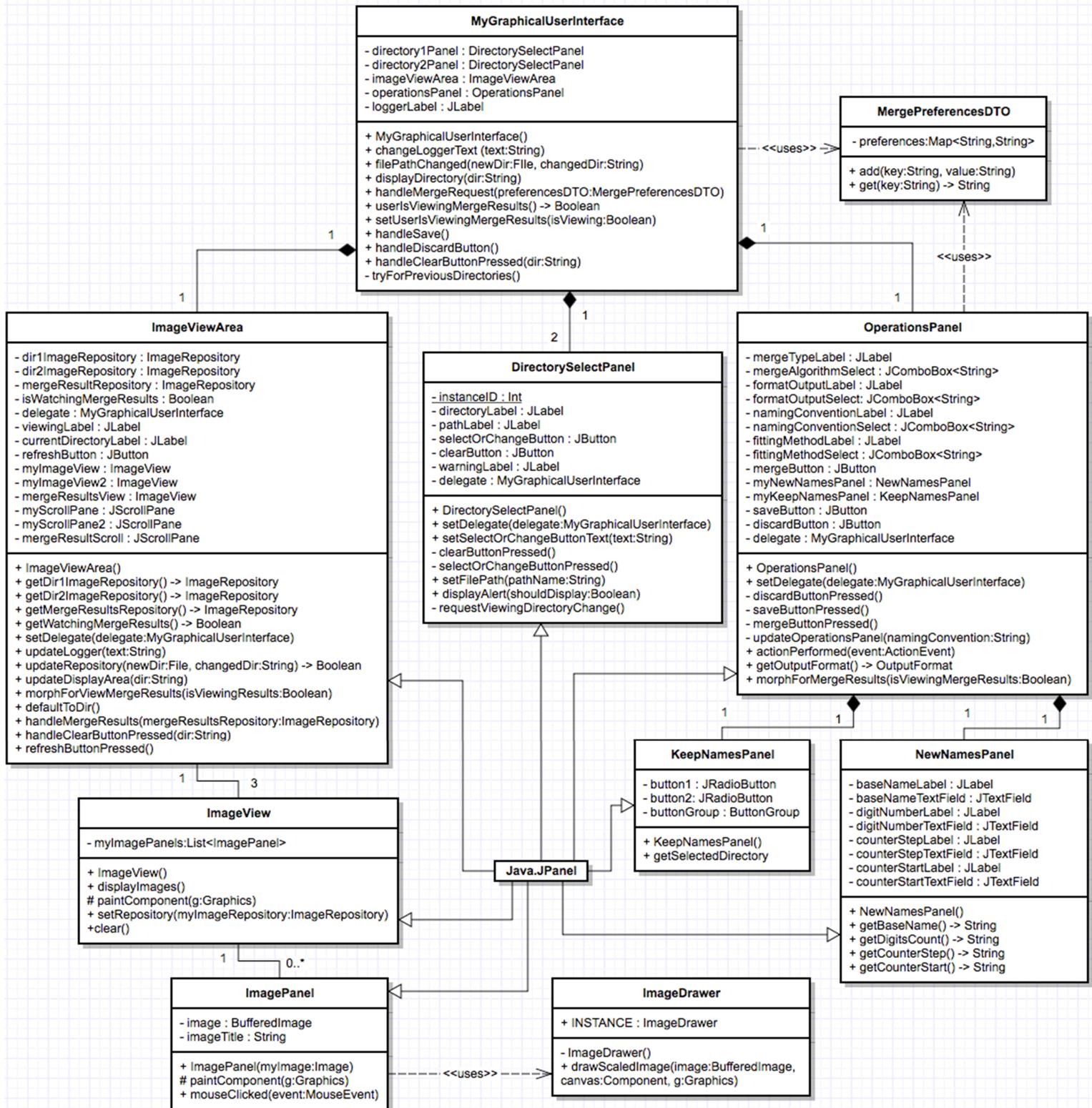


Image Merging Process Diagram

