Google Summer of Code

GSoC 2021

SCoRe Lab organization

Project: Image Lab

Project Idea: Improve the Image Lab user experience

Pola Hano Shehat

Faculty of Engineering – Fayoum University

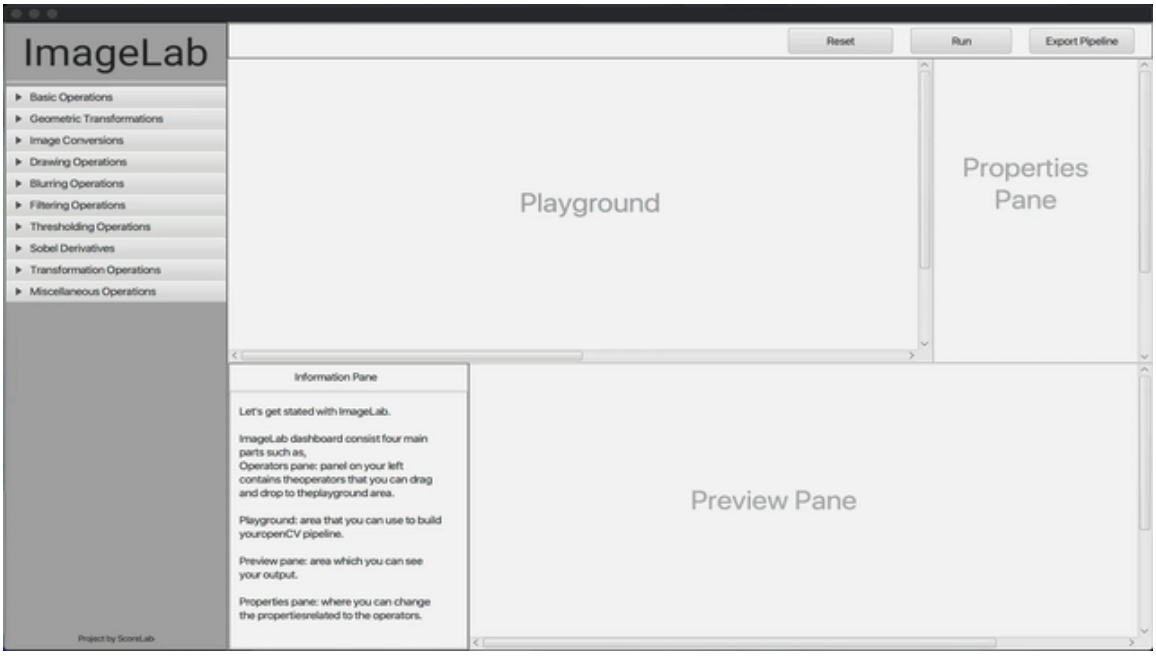
Fayoum, Egypt

Computer Engineering department

Table of Contents

1. About the project

ImageLab is an application that enables everyone to learn image processing principles and techniques in an easier, less logical manner. As a result, by interacting with ImageLab, this platform allows and motivates new users to learn how image processing concepts work. Furthermore, ImageLab provides a test environment for users who are already familiar with image processing activities before moving forward with actual implementation or creation.



Briefly, ImageLab is a project aims to facilitate learning image processing for those who don't have experience with image processing and improve the experience for people already have some experience. You can, by using the app, understand how complicated image filters form by small blocks of operations.

The idea of the project is great and beneficial but I faced some problems when I used it as a user like: the project needs many improvements in user interface to meet user's satisfaction and also it has few features so it would be better if it is supplied with more to ease usage.

So, in my GSoC period I am motivated to work on that useful project and enhance the user experience by designing a modern and interactive interface and will also make blocks of operators used in the processing of image be more attractive and interactive to be suitable for all ages. And I will illustrate all about my ideas on next pages.

2. Project Goals

In this section I will illustrate the ideas I see are so important for the project to apply during GSoC period and will illustrate each point in detail in implementation section:

- Designing a logo for ImageLab project
- Designing a splash screen (loading screen)
- Making a quick guide on the first use
- Improving the project User Interface
- Adding night mode
- Changing block shapes
- Adding zooming in the playground and also in preview pane.
- Add save or don't save pipeline option when closing the app.
- Enhance the view of the project documentation.
- Facilitate names of operator
- Improve error messages UI
- Replacing Information pane with button tooltips
- Adding help section
- Adding Info (About us) section
- Providing availability for all image sizes
- Adding history pane
- Drag and drop in basket to remove a specific filter
- Add (new pipeline) button
- Package the application into an installable exe file in windows
- Run with keyboard shortcut.

In case I have finished all above tasks, I could work on these:

⇒ Design infograph to illustrate all operators
⇒ Add playing music feature
⇒ Adding the ability to search for a block.
⇒ Adding undoing feature
⇒ Asking about personal name and photo at the first use
⇒ Add Arabic Translation
⇒ Adding feedback screen before closing application.
⇒ Adding drawing operations feature by adding ruler like MS word ruler in preview pane

3. Implementation

3.1. Designing a logo for ImageLab project

Here I've designed 2 logos for Image Lab project with different colors and styles and used the one who attracted me for dedicating the UI colors. But of course, we can change colors of UI depending on the choice of logo of SCoRe organization and my mentor.

3.2. Designing a splash screen (loading screen)

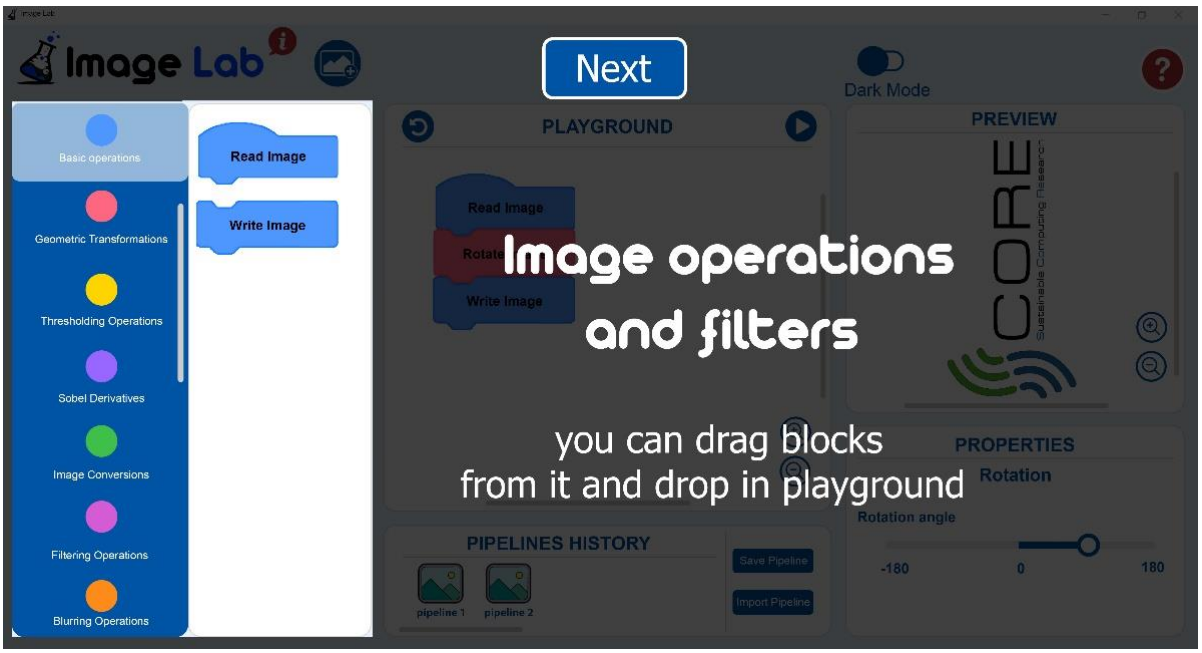
This is a design for the splash screen of the project that will load the bar on the bottom for about 3-4 seconds then the program will open.

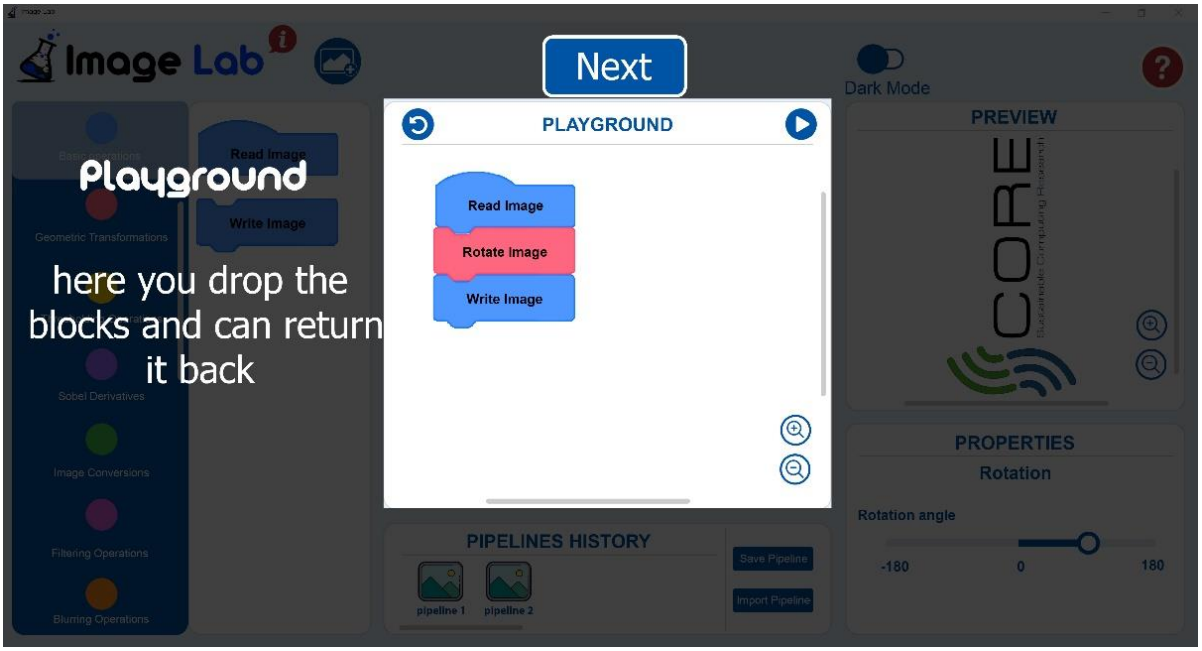
I think it will be attractive and give a good introduction of the app to the user.

3.3. Introducing a quick guide on the first use

When the user first uses the app, he will need a quick tour in the application to tell him about each component and its role and choose path to save exported pipelines.

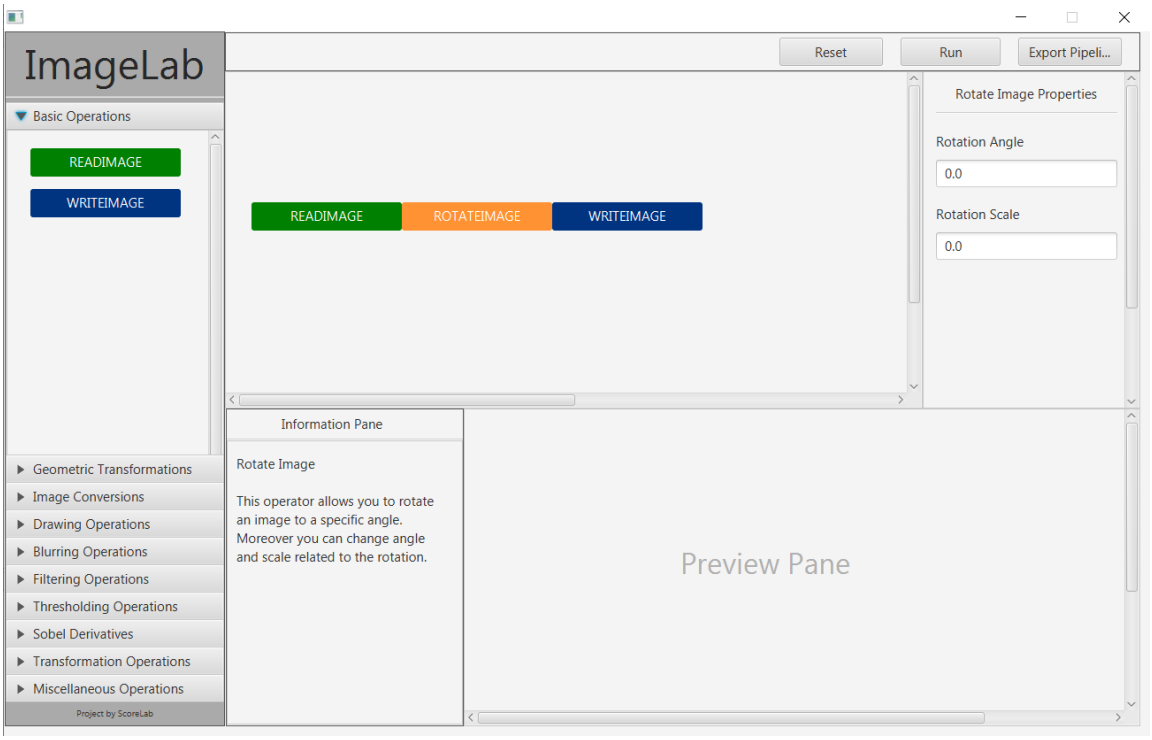
Note: This is a demo of the idea of this guide not showing the exact sentences will be written:



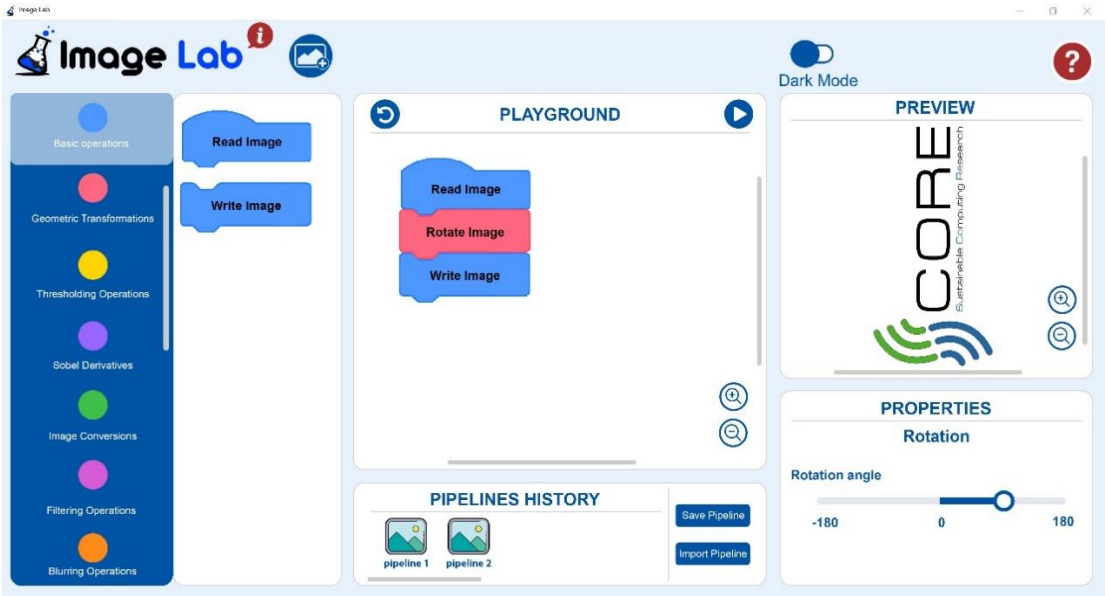


3.4. Improving the project User Interface

I have designed an initial new design for UI of the project. Here you can see the old design:



And here is the new design:

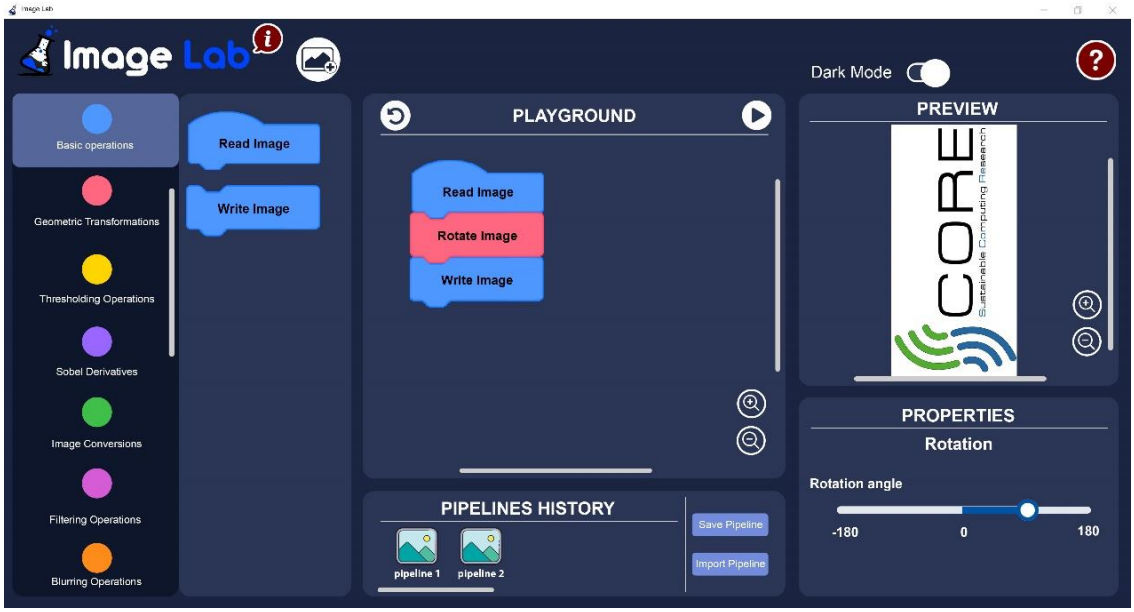


The step after that will be implementing that design using Javafx and Scene Builder so we will have a new **dashboard.xml** file, **DashboardController.java** file and a new **style.css** file then I will introduce code of the old design to the new one in order to be able to work properly on it taking in mind the new sizes, colors, styles etc.

I may use some Javafx libraries with modern components like : MigLayout, Jfoenix, BootstrapFX, FontAwesomeFX.

3.5. Adding night mode

I've also designed a prototype of the dark mode for the project



Here, I will create a new file **style-dark-mode.css** and add the new colors of the components in order to change on turning dark mode on.

And this is pseudo code of how **style-dark-mode.css** could be like:

```
.root {
    -fx-base: #000000;
    -fx-accent: #000000 ;
    -fx-focused-text-base-color : ladder(
            -fx-selection-bar,
            -fx-light-text-color 45%,
            -fx-dark-text-color 46%,
            -fx-mid-text-color 60%
        );
}
```

And we will add a listener to the toggle button and here is pseudo code of it:

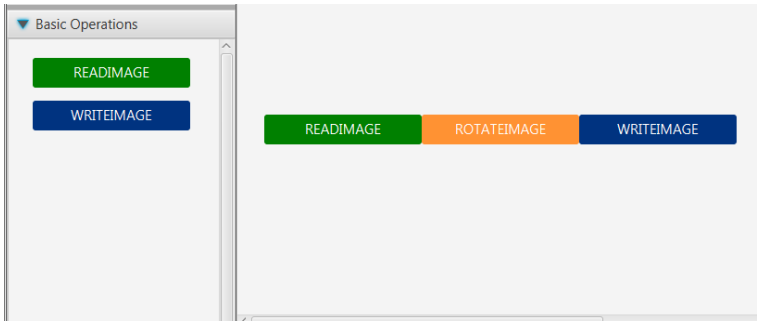
```
checkToggleButton.addListener(parameters) -> {
    if (isSelected)
        show("dark-theme.css")
     else
        hide("dark-theme.css")
}
```

3.6. Changing block shapes

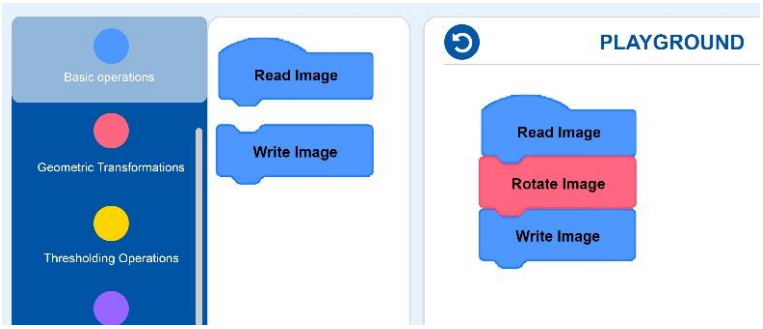
Here, I will Introduce block shapes depending on the operation types which can be merged with each other at the workspace area (playground) by changing shapes of rectangular blocks to be like Scratch blocks to inform user nicely about operators that can be merged with each other at the workspace area without using error messages.

For example, in the new design below we can't put Write Image before Read Image because they can't be composed together.

For more illustration, that is the style of blocks now:



And will be changed to be:



And this change will make interacting with blocks more easily, smoother and looks more beautiful and comfortable to eyes.

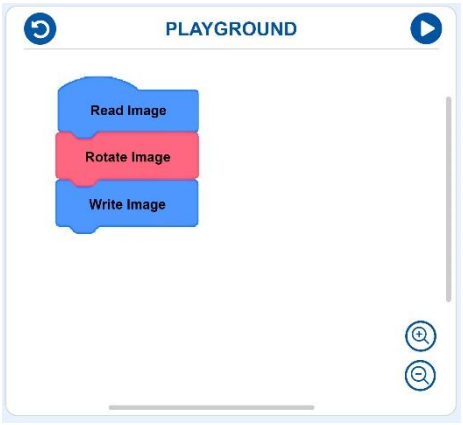
To do that step we will need to see all operations and for every operation what other operations can be merged with it in order to make block designs than can match each other. And for those operations that don't match each other will need to be different in shape in order not to make them merge together and in the same time without showing error message as it exists in old design.

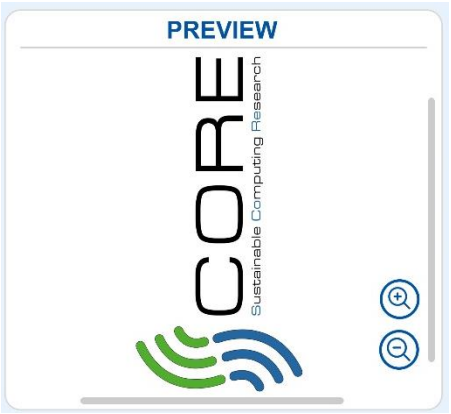
So, we will make a table like the following and then analyze operations that match together and that don't match:

operation	Other operations that are allowed to be merged with it
ReadImage	All operators
ApplyBorder	ReadImage – RotateImage – WriteImage – ColoredImageToBinary – ConvertToGrayscale – ApplyBlurEffect – ApplyGaussianBlurEffect – ApplyMedianBlurEffect – ApplyBoxFilter – ApplySimpleThreshold - ApplyBorder
RotateImage	ReadImage.class - RotateImage.class - WriteImage.class - ConvertToGrayscale.class
And so on for all operators …	

For doing such a task I will use the help of Scratch blocks generator to get very high-quality blocks and may also use editing apps like photoshop to make some modifications on it.

3.7. Adding zooming in the playground and also in preview pane





For the ease of usage of playground and preview pane we will add zooming to them with 2 ways:

1) By using mouse wheel

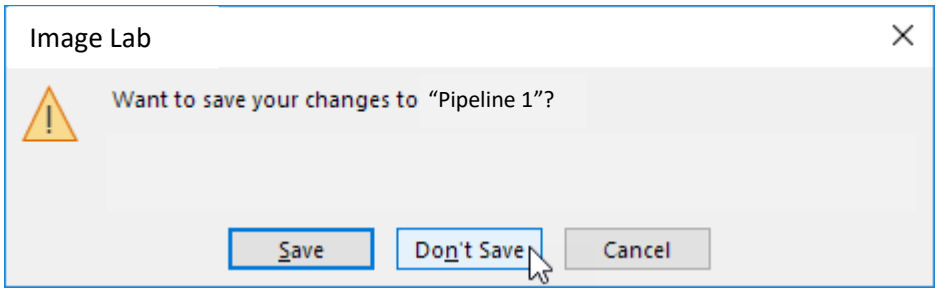
JavaFX provides option to listen for mouse scroll event. We will make use of that. ScrollEvent.SCROLL allows to track the scrolling.

We will do next steps for adding zooming feature:

a. Attach a scroll listener
b. Get how much scroll was done in Y axis.
c. Add it to the Z-axis location.

2) By using zoom in & zoom out buttons

3.1. Add save or don’t save pipeline alert when closing the app.



This part would be implemented by overriding the close button function by adding event handler on pressing the exit button and form the new window style and buttons and follow that logic of pseudo code:

If (save pressed)

save pipeline then application closes

Else if (Don’t save pressed)

Close application immediately without saving pipeline

Else if (close or X sign pressed)

Close save window and continue working on application

3.2. Enhance the view of the project documentation.

By designing a new design for that page and fix errors in links exists in that documentation and add more description for the application about setup guidelines, application GUI, operators …

3.3. Facilitate names of operator

We can change blocks names to be easier to user for example:

Read Image => Open Image

Write Image => Save Image

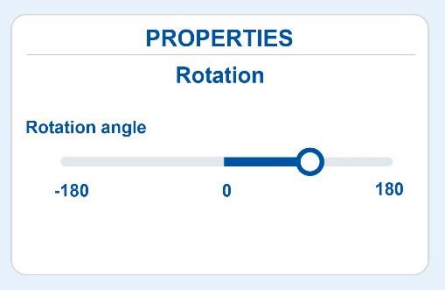
And like this for most of blocks to facilitate understating what they do.

3.4. Improve error messages UI

By designing a new UI for error messages to improve user experience.

3.5. Replacing text input fields with Scroll bars

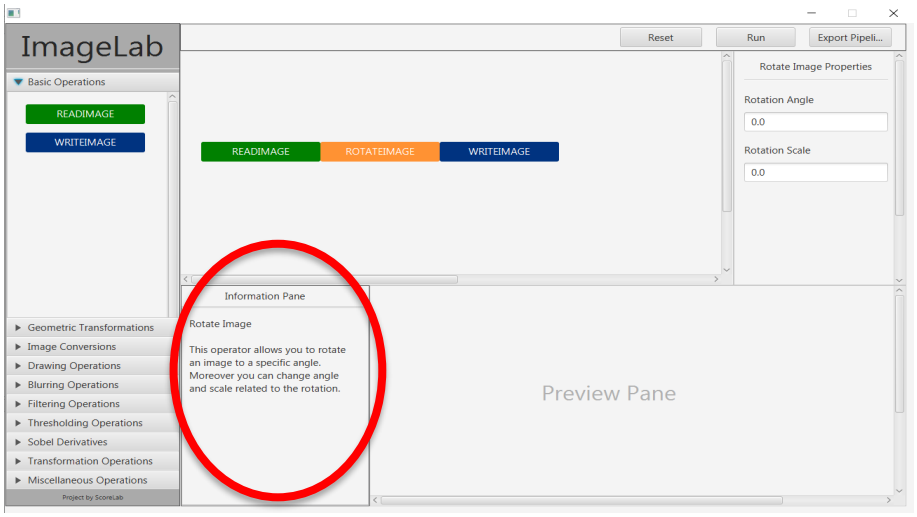
In some operators it asks the user to write a value and if he entered a wrong format it gives us **NumberFormatException** so, to avoid that exception we can replace text input components with scroll bars. It will provide smoother interacting and better user experience.



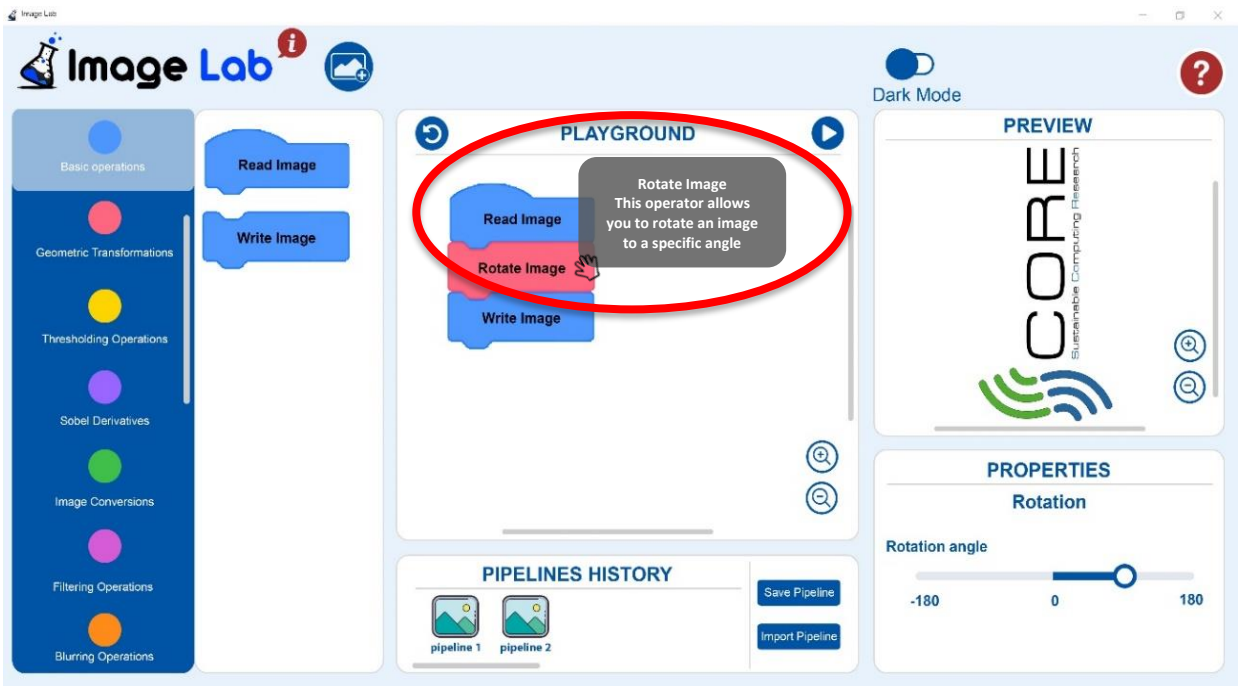
3.6. Replacing Information pane with button tooltips

It is a small change to improve user experience. That change is that we will replace the information pane in our old design with tooltips that gives a brief about the operator you select and if the user wants to know more, he can navigate help section. And by that change we will use the area of information pane to increase size of playground and add a new section that shows saved pipelines before.

The old design Information pane:



The new buttons tooltips:



3.7. Adding help section

I have more an idea about the help section:

- Making button file navigate user to a PDF file online that includes all details about the project (how to use the GUI? - how each operator acts? – info about the project idea – how to contribute – how to setup in windows/Linux/macOS …)
- Opening another window above the app window offline that has all information about project like the PDF but it will be written in a scrollable pane and will be divided into tabs and sections like help of most of programs.
- Improving the page of Image Lab documentation by adding not only the setup guidelines but also all other information about the project and organize the page into sections.
- Providing links on some small tutorials about how to use the program.

These are some ideas but I will discuss my mentor about that and choose which is more suitable and preferable.

3.8. Adding Info (About us) section

That is a small window that appears when you click info button. It provides project github link, chatting groups, information about SCoRe Lab organization and could contain a link (for example: SurveyMonkey) that allows user to provide his feedback about the application if he faces any issues, has a question or provides an idea to enhance the app.

3.9. Providing availability for all image sizes

In the project there is a problem of not allowing all image sizes to be imported. In other words, when importing a large image size, it shows only a small part of it in the preview pane and will solve this problem by fitting imported image in the preview pane by using `fitWidthProperty()` method in `ImageView` class.

3.10. Adding history pane

It shows the previous saved or exported pipelines by the user. When user save a pipeline, it will be saved in the output folder path the user chooses.

We will implement a method that take the path of pipelines saved and its name, the name will appear in pipeline history section and the path will be used to get the blocks used to build it and can redraw them in playground when the user presses any of them.

And here is how the exported pipeline looks like:

```
                    ImageLab v1 | Operation Pipeline
                      Sun Apr 11 01:22:35 EET 2021


READ_IMAGE
|
?
ROTATE_IMAGE
|
?
WRITE_IMAGE
|
?
```

So, we can return these lines into blocks by extracting blocks names from these lines and we will do that by implementing a new algorithm.

3.11. Removing a specific operator

It can be done by two ways:

1- By dragging a specific block from the playground and dropping it back into the operations pane.

2- By dragging a specific block from the playground and dropping it into a bin that appears when dragging a block or bin image can be fixed like a button in the playground and the user drop into it.

3.12. Add (new pipeline) button

When the user presses that button, a message appears asks him if he wants the new pipeline in a new window or in the same window.

3.13. Package the application into an installable exe file in windows

First, we will convert our application to a .jar file by using `maven-assembly-plugin` or `maven-shade-plugin` dependencies because maven uses convention over configuration, so you only need to tell Maven the things that are different from the defaults.

Then we can use one of the famous softwares like **Launch4J** that could convert (.jar) files to executable files (.exe).

3.14. Run with keyboard shortcut.

We can use for example (ctrl+R) shortcut to run the pipeline and we will implement that by using `keyCodeCombination` class and pass the shortcuts to it and by adding an event on pressing the keyboard (ctrl+R).
Implementation will go through these steps:

```
[1] Adding event filter to our button
[2] Initializing Key Combination.
[3] Handling that key event
```

4. Timeline

Phase	Estimated Start/End time	Estimated duration	Tasks
Pre-Coding Phase	**14 April – 16 May**	**30 days**	I will invest this period in self-study and get ready start coding when being accepted without any latency. I will be giving at least 12-15 hours/week during this period to accomplish these missions: • Familiarize myself more about technologies used in the project like: Javafx, Ruby, Jekyll. • Practice more on Javafx and build several UIs to be totally ready when coding period begins. • ▪Try to solve the rest of opened issues.
Community Bonding	**17 May – 6 June**	**21 days**	• Know more about SCoRe Lab Organization and be more active with the community. • Take a deeper look in the code of the Image Lab project and know more about coding style and the architecture of the project to be more familiar with it. • Discussing with the mentor all the details needed before beginning writing code. • Establishing regular communication with mentor. • Discuss the timeline and process with the mentor for any suggested modification.
	7 June – 12 June	**6 days**	• Choosing a logo for Image Lab project with my mentor and the organization. • Designing and adding a splash screen (loading screen) on opening the application • Designing and implementing a quick guide on the first use. • Testing these additions.
	13 June – 24 June	**12 days**	• Implementing the new UI design recommended using Javafx. • Changing the project User Interface to the new designed one and implement new scenes and components added. • Adding night mode.

			• Testing these additions
	25 June – 6 July	**12 days**	• Dedicating blocks that matches each other and design the blocks each individually. • Implement an algorithm for the new added operators. • Implement new code that matches the new design of vertical new blocks. • Testing these additions.
	7 July – 11 July	**5 days**	• Adding zooming in the playground and also in preview pane. • Add save or don't save pipeline option when closing the app. • Testing these additions.
Phase 1 Evaluation	**12 July – 16 July**	**5 days**	• Discussing drawbacks of Phase 1 with the mentor. • Asking if there are any improvements of phase 1 or considerations for phase 2. • Gain any missing information needed in Phase 2
	17 July – 30 July	**14 days**	• Facilitating names of operators • Adding help section • Adding pipelines history pane • Adding Info (About us) section
	31 July – 9 August	**10 days**	• Providing availability for all image sizes • Drag and drop in basket to remove a specific filter • Replacing Information pane with button tooltips
	10 August – 13 August	**4 days**	• Add (new pipeline) button • Run with keyboard shortcut. • Improve error messages UI
	14 August – 23 August	**10 days**	• Package the application into an installable exe file in windows • Enhance the formatting of the project documentation. • Add new documentation of added functionalities and of using the new GUI. • Testing overall performance and all added functionalities and views. • Additional few days for any unpredictable delay. • Finalize the documentation, fix issues and merge the code into main repo. • Submission of project report.

			• I will love to discuss my work with the community members and get the feedback. • Work on a blog post about the tasks achieved during the coding period.
	24 August – …		• Continue contributing to the project by: ⇒ Solving more issues. ⇒ Adding more features to the project.

5. Commitment

** Final exams dates vary from year to year and also due to covid-19 pandemic, the second semester was postponed 3 weeks and these delayed weeks will postpone final exams about 3 weeks, too. So, I expect it will be held between (15 June – 6 July).

Start/End date	Rate of hours/week
14 April – 6 June	12-15 hours/week
7 June – 14 June	25-35 hours/week
15 June – 6 July	10-14 hours/week
7 July – 23 August	25-35 hours/week

6. SCoRe Contributions

6.1. Pull requests:

#56 Update README.me file

#59 Solving checkstyle errors while building by adding pluginManagement

#60 Designed new logo for the project and added it to the UI

#61 Adding SCoRe Lab Logo to the interface

6.2. Issues will be solved:

#46 User Interface: More Space for Preview Pane to Improve User Experience

#47 User Interface: Drawback of Fixed Size Processed Image

#48 User Interface: Adding Button for removing a specific filter

#52 Adding Dark Mode

#62 Run operation using keyboard shortcut

7. Personal Information

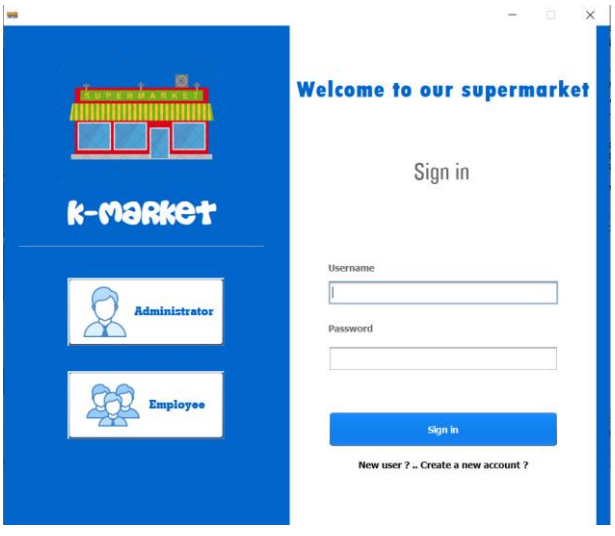
Name	Pola Hano Shehat
University	Fayoum University
Faculty	Engineering
Department	Computer Engineering
Country	Egypt
E-mail	pola.hano@gmail.com
Github	https://github.com/polahano
LinkedIn	https://www.linkedin.com/in/pola-hano/
Phone	+201282652072

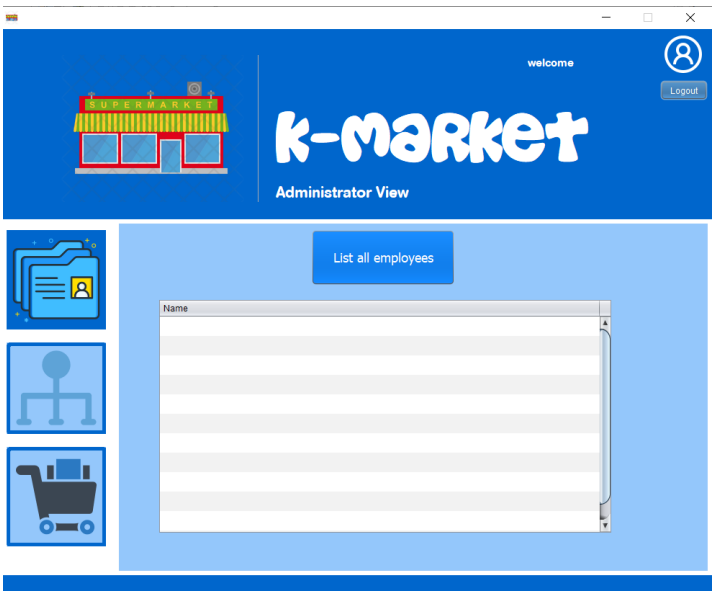
8. About me

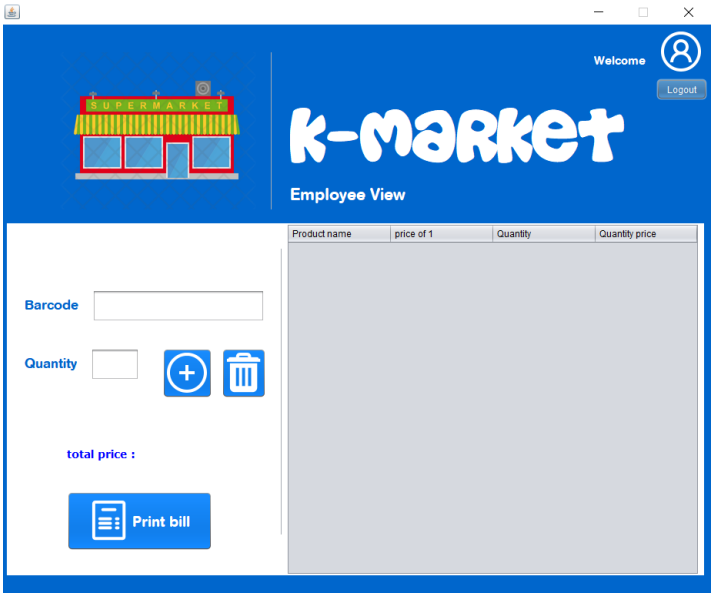
I'm Pola Hano, a Computer Engineering student at my 3rd year. I am passionate about 2 fields programming and designing so I found UI/UX field is the best suits me. I have very good experience with Java, OOP, Algorithms, Data Structures, Java Swing, Android Development and worked on projects with them and also familiar with Git. I am professional with Java Swing. I am always responsible for GUI of any project required in my team at university.

I have worked on more than a project using Java Swing and designed many frames for projects and have experience with .xml formatting which is so close to Javafx .fxml formatting.

Here are some of my designs of UI for a supermarket system:







In spite of the fact that I have little experience with Javafx platform, I already continue learning it now and practice more on it until coding phase to be ready for the project.

9. References

Here are some projects that I've made before:

- Supermarket Desktop App
- Simple Painter Desktop App
- Search for Movies App

10. Questions

1. Are you a SCoRe contributor/ Have you contributed to SCoRe before?

   This is my first year to contribute with SCoRe and I wish to contribute in their projects especially Image Lab.

2. How can we reach you (eg: email) if we have questions about your application?

   You can reach me by Gmail or LinkedIn profile:
   pola.hano@gmail.com
   https://www.linkedin.com/in/pola-hano/

3. What is your github username(s):

   Pola Hano Shehat

11. Project Specific Questions

4. Which SCoRe GSoC project are you applying for (please submit separate applications for each project):

I apply for Image Lab project.

- ✓ Image Lab project is a perfect tool for those who have no experience with image processing (editing) and want to learn it.
- ✓ For those who have previous experience with image processing, it is also a useful tool because it gives them deeper look on how exactly that process or that filter is done by small blocks that are organized each above.
- ✓ By it you can teach the young about image editing by using the new blocks design that looks like Scratch Blocks style that are familiar and loved for kids.

5. What do you plan to accomplish over this summer for this project? (Please tell us
   a. What project you want to work on,
   b. How you will approach that project portion (with your milestones))

a. The project I chose to work on is improving Image Lab user experience project.
b. I have divided the idea of project into small ideas as mentioned in Project Goals and I will walk through these ideas during my Timeline one by one and work on them so that I can complete these ideas' implementation by the end of GSoC period.

6. If you have your own project to propose, please describe it here:

7. Projects related details:

Have you tried that project you selected from SCoRe project list?

Of Course, I have tried Image Lab many times.

What problems, if any, were presented?

There was more than a problem I faced:

- There is no guide to tell me how to use the application
- It lacks some functionalities that make good user experience.
- Its GUI is not very organized and old fashioned.

- It needs more operators to be added.

And I will work this summer to solve these problems with GSoC.

What prevented you from getting the entire system up and running?

On my first use to the application there were some errors appears when running it but I've solved these errors in that Pull Request #59 .

8. List down any plans you have during this summer (over the time period of GSoC, such as classes, job, vacation plans, thesis, etc.)

I postponed all my classes and vacation plans after GSoC (after 23 August).

9. Education:

a. What year are you in school?

I am on my 3rd year.

b. What programming courses have you taken?

- Programming Fundamentals
- Java Programming language
- Object-Oriented Programming
- Data structures and algorithms
- Computer Graphics Fundamentals
- Databases Fundamentals (This semester)
- Operating Systems (This semester)
- Machine Learning
- Deep learning (This semester)

c. What is your major?

Computer Engineering

d. Have you done group projects (programming or otherwise)?

Sure, we have done many group projects like:

- Supermarket simple system project.
- Microprocessor Using Risc-V and Verilog.
- Microprocessor Using MIPS.
- Thermodynamics project (Steam Engine)
- Small stereo using electronics principles

- Simple warning system circuit

e. What was your primary contribution to/role in the group?
   - I was the leader for my team in all projects of all classes. I was distributing what each member should do, encourage them while working and collecting all results at last.
   - In programming projects, I was responsible for designing the application GUI.

10. Do you have work experience in programming? Tell us about it.

I have not work as a programmer till now but I train myself on small projects at home.

11. Do you have previous open source experience? Briefly describe what you have done.

This is my first year to involve into open-source community so I have some small contributions. I started contributing with modifying README.md files as a start and here are some examples of my first PRs : 1 , 2 , 3 .I know they seem trivial but that because they were my first trials . Next days I am going to contribute in projects coding and will solve issues starting with Image Lab project.

12. Tell one interesting fact about yourself.

I can speak 5 languages (Arabic, English, Spanish, Coptic, Sign), Coptic was the hardest to learn.

Thanks for reviewing my proposal

****