CS5001 Practical 4 Design Report

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Introduction

This report explains design idea and descript the implementation of a java program which made a GUI-driven Fractal generator and allows users to view and explore the Mandelbrot set graphically.

The structure of the functions will be represented, and explanation will be made to show how the functions works. Then some examples will be given to show how the system works in actual situations. Finally is the processes of finding problems in the system and how those problems were solved.

Design decision and implements

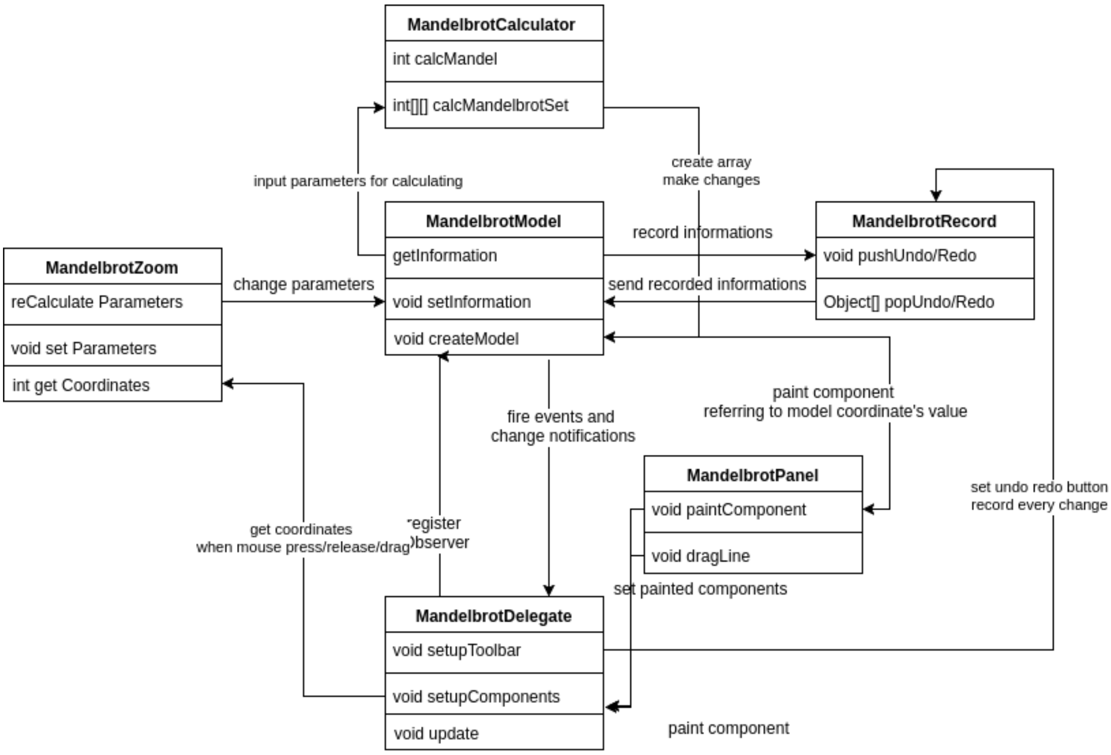


figure 1: the program structure

To imply the functions below, a MVC system was designed. As show in figure 1. the basic observer is MandelbortDelegate and the observable is MandelbortModel.

The MandelbortCalculator is the function to calculate the mandelbort model in a coordinate by using some parameters.

MandelbortModel

The parameters used in the program is saved in the Model function.

Other classes can get those parameters and reset the parameter by “get(Parameter)” and “set(Parameter)” methods in this class.

The calculate process is doing and the data model is generated in the Model.

After the data generated, the information will be send and finally represented by Delegate.

MandelbortDelegate

The GUI is designed by swing in Delegate. And there are three main methods in it. setupToolbar and setupComponents show the GUI. The toolbar includes some buttons and menu for users to explore the Mandelbort. The component is the graphic of Mandelbort. And update function is used to update the graphic after each change has made.

MandelbortPanel

MandelbortDelegate is the paint the graphic of Mandelbort by using the data model created by MandelbortModel. The paintComponent is the method to deal with it. While a dragline method is also designed to show the selection box when zooming.

MandelbortRecord

This class is implied for the undo and redo function. Two stacks are created to store the information of each change. And when press the undo or redo button. It pops the information and recreated the mandelbort graphic by using those information.

MandelbortZoom

This class is for users to zoom the graphic. The coordinates of mouse press and release will be catch in delegate by using mouseListener and the coordinates and current model parameters will be sent to MandelbortZoom and then new parameters will be calculated by those informations and send to model to create new model.

Results

The results will be show sorted by functions requested in the practical.

The first picture is the default interface when users run this program. It concludes a toolbar has file(save and load), undo,redo,reset, different color set and a text field where users can input the precision level they wanted and apply it.

Basic display

display the mandelbort in black and white and under default model.

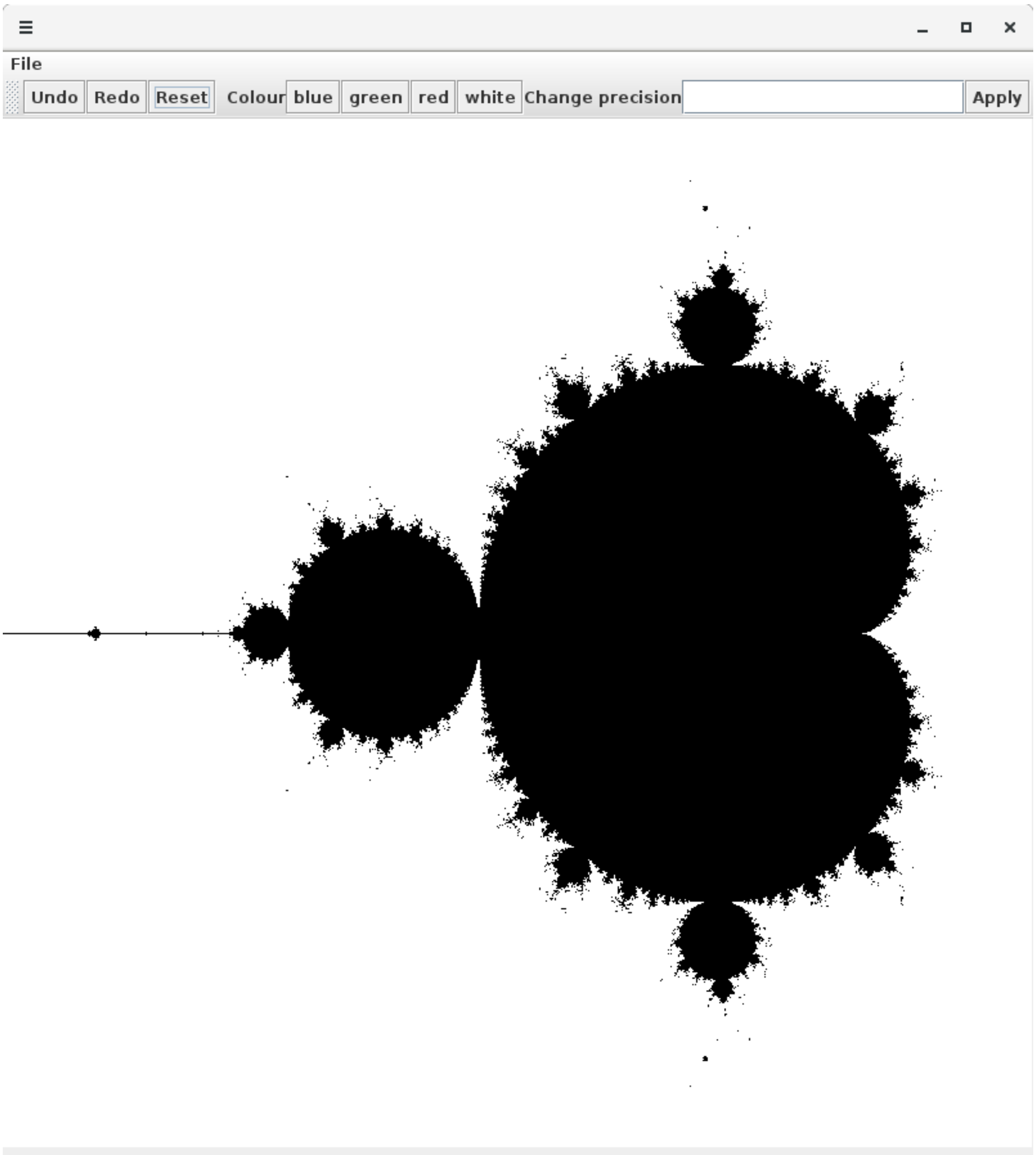
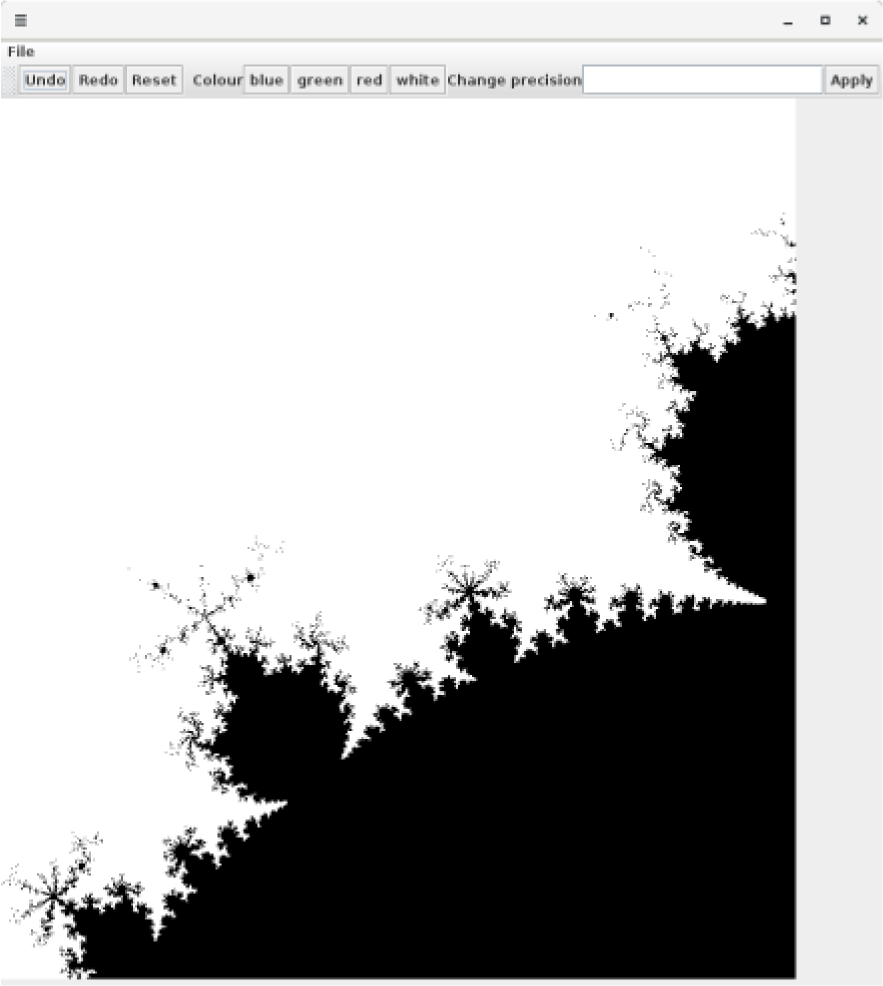


figure 2: default display



Zoom

Figure 3: first zoom

It allows users to zoom the graphic. When users dragging, a selection box will show. And after users released mouse, the selected zone will zoom in. it can apply several times.

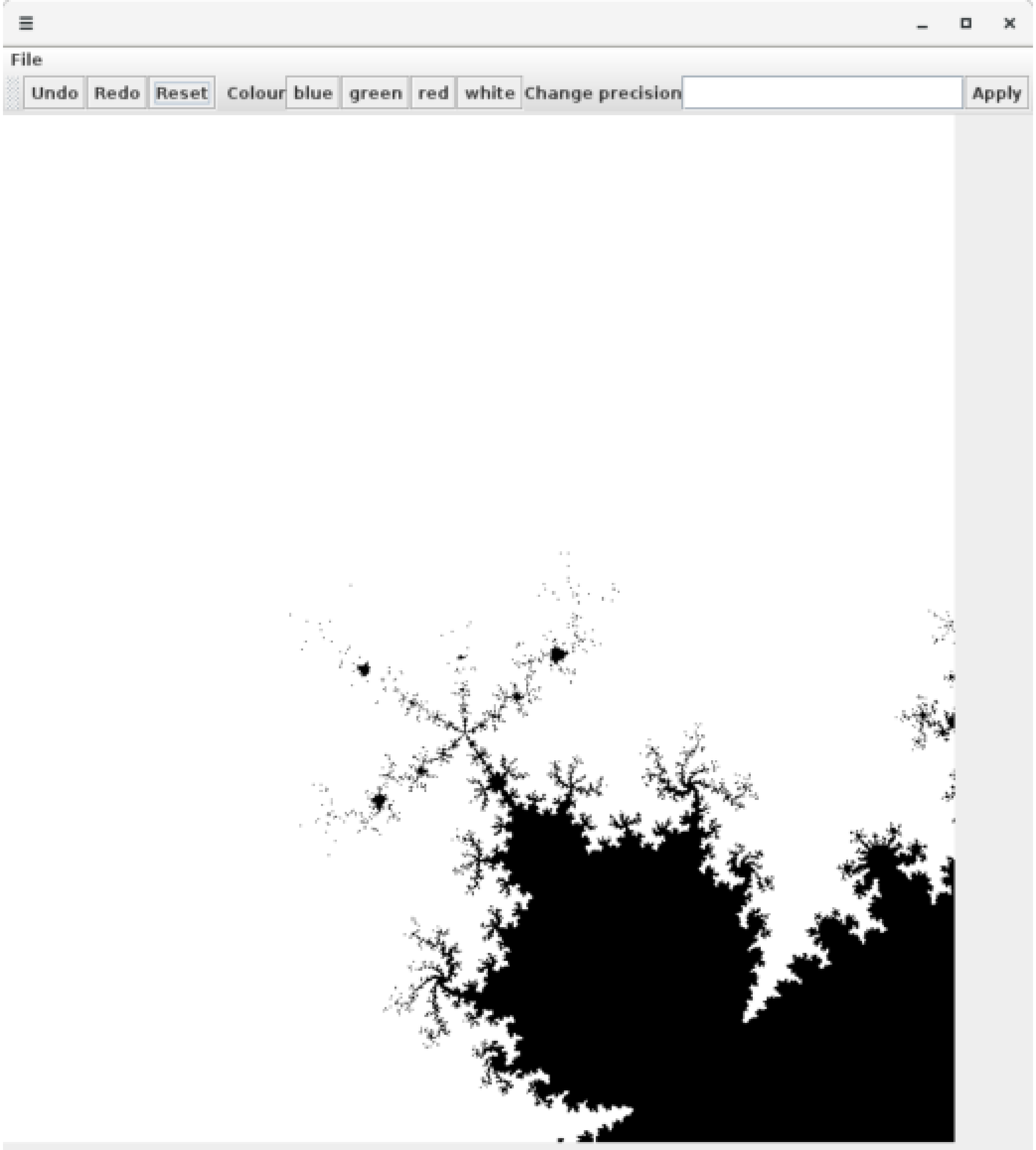


figure 4: second zoom

Alter precision

Users can input max iterations number and press Apply button to apply it.

Undo,redo,reset

These three button allows users to getting back to the graphics before, next and the default graphic. It is tested several times, and added codes to fit all the possible conditions. (for example, after serval operations, press undo-undo-redo-redo-reset-undo-redo-changecolor-undo etc.)

Enhancements

Different colours

This program allows users to select colours for the image from blue, red, green and white. And it can be applied after other operations.

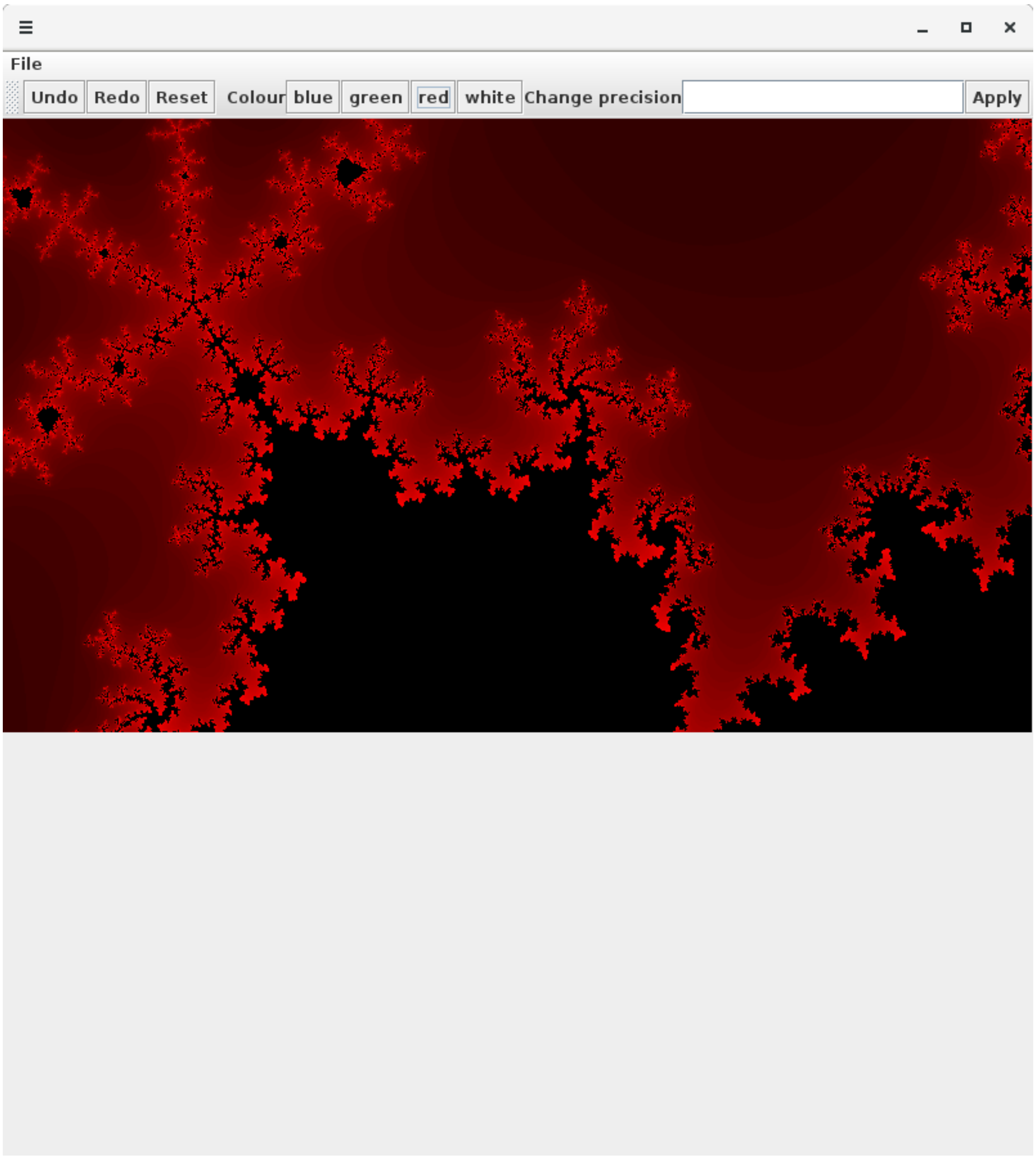
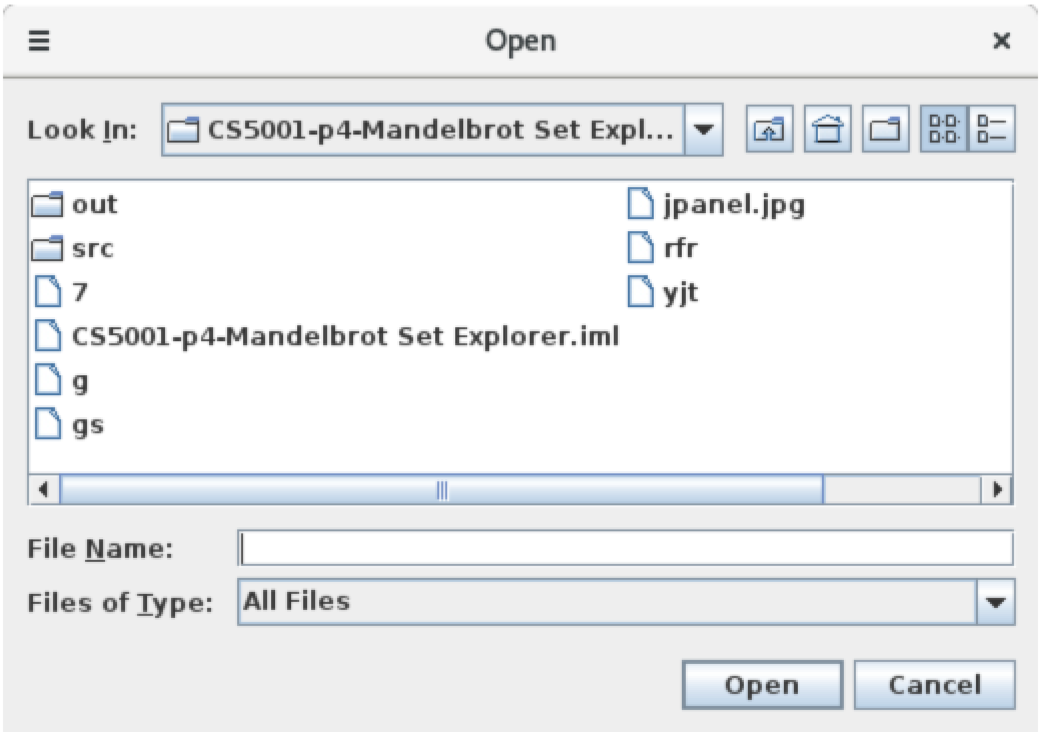


Figure 5: colour example

Save and load

This program allows users to save and load the settings so that users can explore from a saved setting.

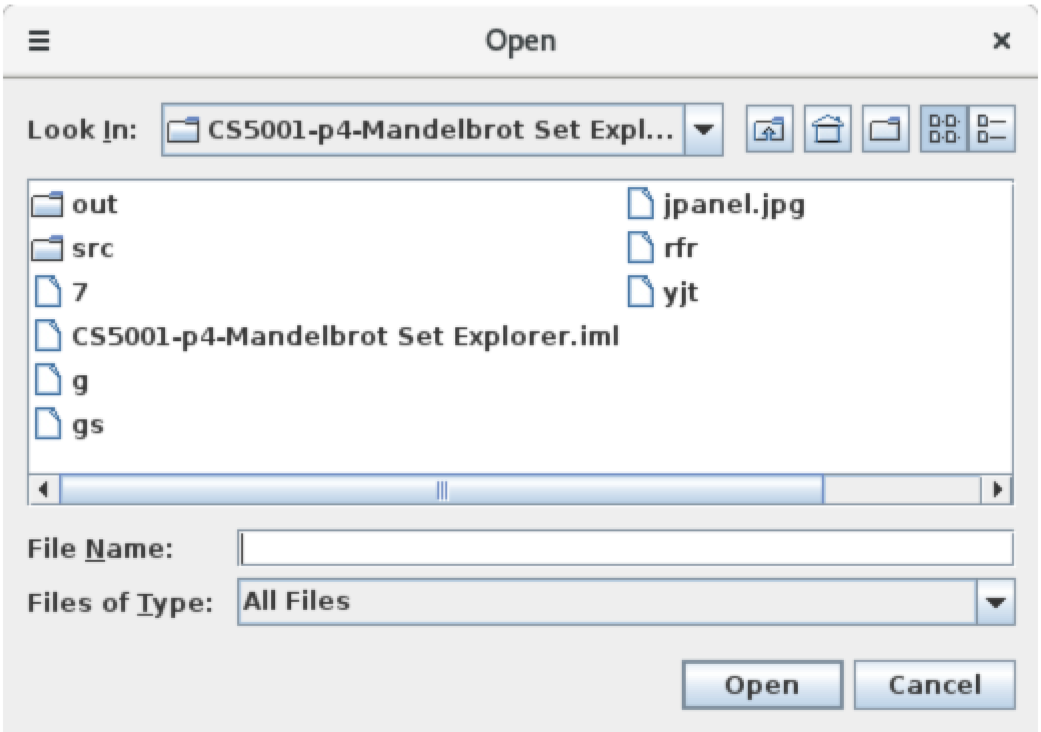


Look In: CS5001-p4-Mandelbrot Set Expl...

File Name:

Files of Type: All Files

figure 6: load file



Look In: CS5001-p4-Mandelbrot Set Expl...

File Name:

Files of Type: All Files

figure 7: save file

Conclusion

This project presents a basic GUI of exploring a mandelbort. it combines the apply of JFrame components and the calculate process of the model. Through the coding, I tested how it works and found several problems. Finally, those problems detected were solved. Most of problems are based on details, which mains that in the future I need to focus more on details when programming.

Finally, this program is just a simple version of using GUI. More operations on exploring mandelbort can be applied on it in the future and the process of functions can be optimized more.