Scalable cross-platform software design (EEEE3084 UNUK)

Coursework 3 Report Cover Page	
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Q1:

In this task, an abstract class for bin method was designed to be the parent class for calculating bin number based on individual rules. A main class file was also created under binmethod package to test the classes in this package and can be run by pressing SHIFT+F6. The UML diagram for classes defined in this question is shown below:

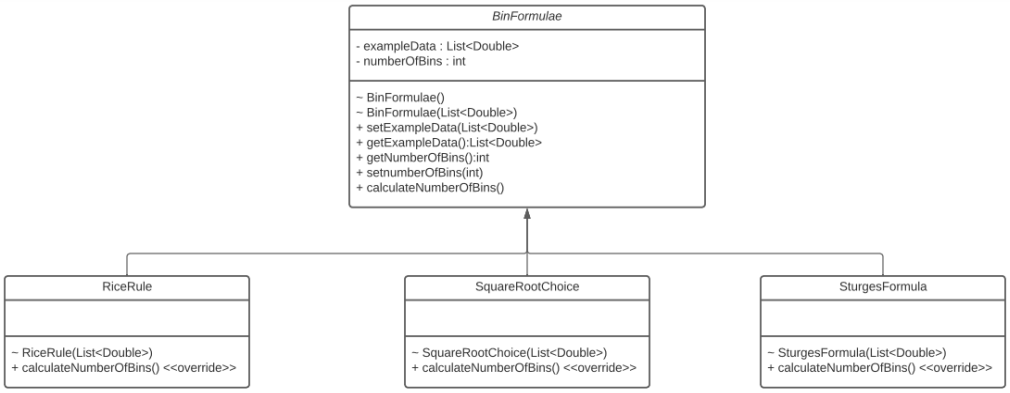

Figure 1.1: UML Diagram for Classes in binmethod Package

The classes were tested with an example data list, and the algorithm output matches exactly with the expected output as shown in the code and figure 1.2. Therefore, the classes defined in the binmethod package could be further used.

```
[Info] Example Data: [1.0, 2.0, 3.0, 4.0, 5.0, 6.0, 7.0, 8.0, 9.0, 10.0, 11.0]
By Sturges Formula: 5
By Square Root Formula: 4
By Rice Rule Formula: 5
```

Figure 1.2: Screenshot of the Unit Test Code Output

Q2:

In question 2, an abstract class and two subclasses which are inherited from the abstract class were created. There is also a main unit test class created to drive and test and calculate the statistics. The UML Diagram is shown in figure 2.1:

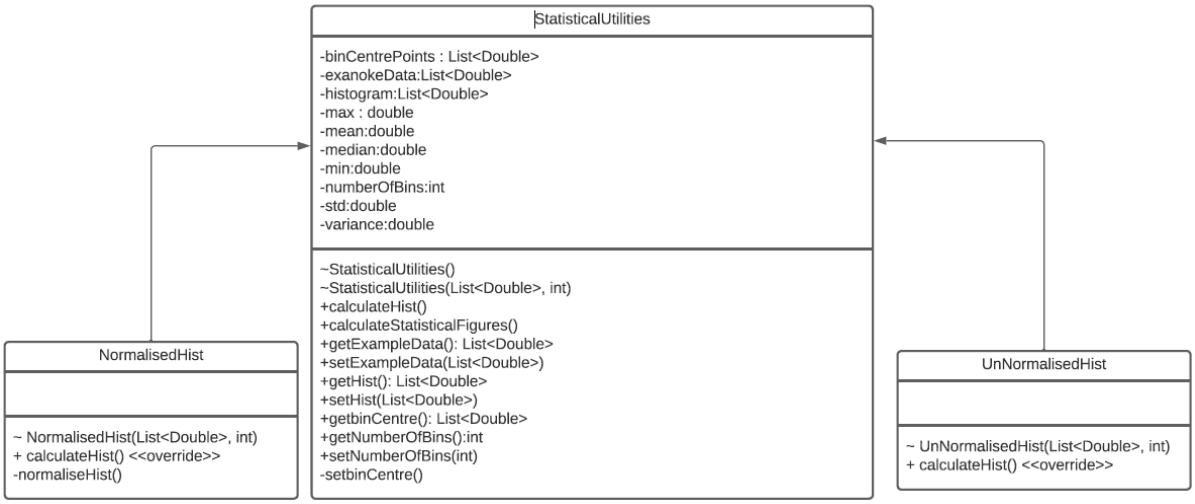

Figure 2.1: UML Diagram for Classes in statutils Package

The classes were tested with a unit test main class file with an example data list. As shown in

screenshot of code output, the code can categorise counts, obtain statistics correctly and perform normalization.

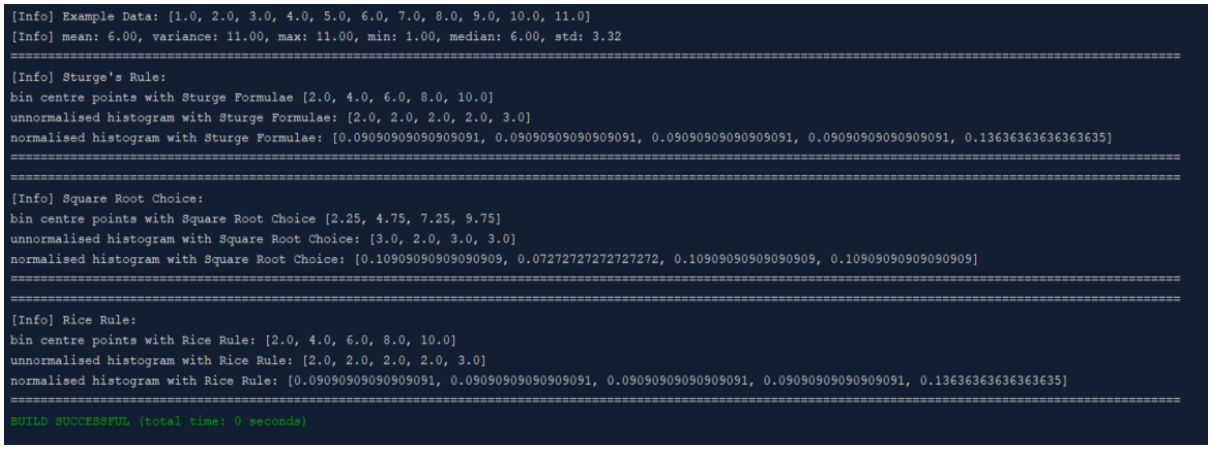

Figure 2.2: Screenshot of the Unit Test Code Output for Question 2

Therefore, the developed statutils package can be successfully used.

Q3:

In this question, measurement data was loaded from the downloaded text file from Moodle. A package called mathutils was created, inside which, a static member function was created to calculate the PDF parameters which will be used later for plotting PDF. The static function uses commons-math libraries provided on Moodle. The libraries were in the project workspace directory and were manually added and linked to NetBeans complier.

Running the unit test, it can be known that the measurementData.txt file contains 100,000 data points, which by Sturge's rule, will have 18 bins in histogram. The PDF parameters were calculated below by the GaussianCurveFitter class.

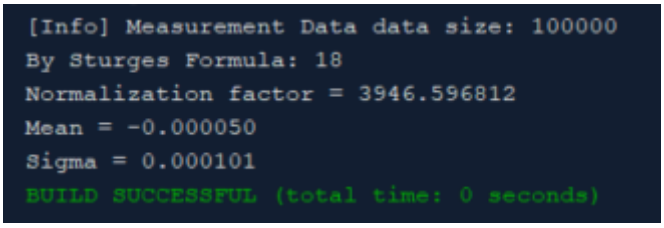

Figure 3.1: Screenshot of the Unit Test Code Output for Question 3

When input the calculated PDF parameters into a function and plot the function, the output matches with the normalized histogram, which can later be verified in question 4.

Q4:

In this question, a JavaFX package named gui_driver was developed, inside which there are a GUI controller file - GUI_FXMLController.java, a FXML file and a main file called GUI_Driver to run and drive the GUI. The previously developed packages: binmethod, statutils and mathutils were also included in the source file folder.

The GUI was designed with FXML UI designer as shown in figure 4.1. By clicking data file

locator button, the data file can be located and loaded from the local machine with a file browser. Different bin method can be chosen by clicking the combo box (the default method is square root choice).
Clicking calculation button, all required statistics will be calculated and displayed. The plot button displays the histogram and PDF plot. The save button saves the histogram and PDF plot to the work directory of this NetBeans project. The completed final GUI display is shown in figure 4.2

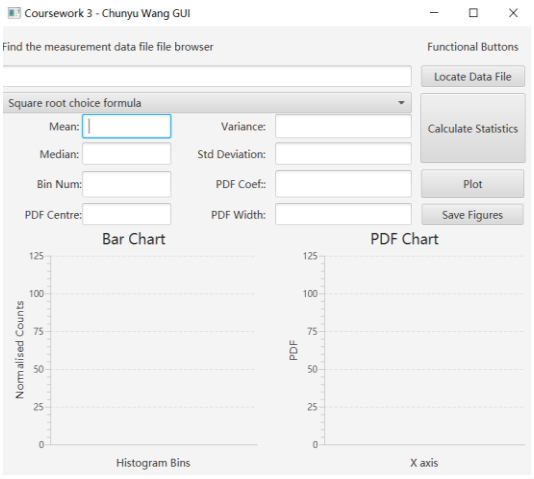

Figure 4.1: Screenshot of GUI Layout

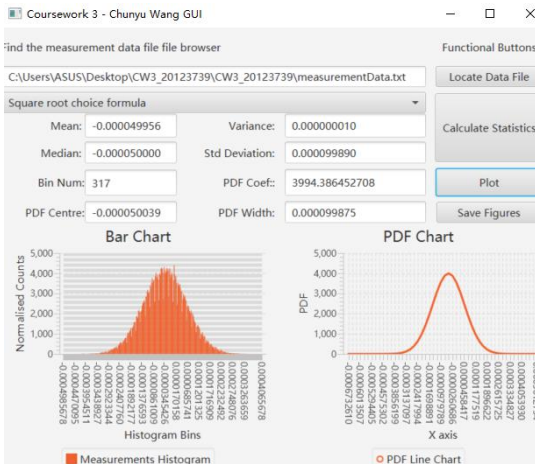

Figure 4.2: Screenshot of GUI Final Display

The hierarchical order of the GUI nodes is displayed in the sequence diagram shown in figure 4.3:

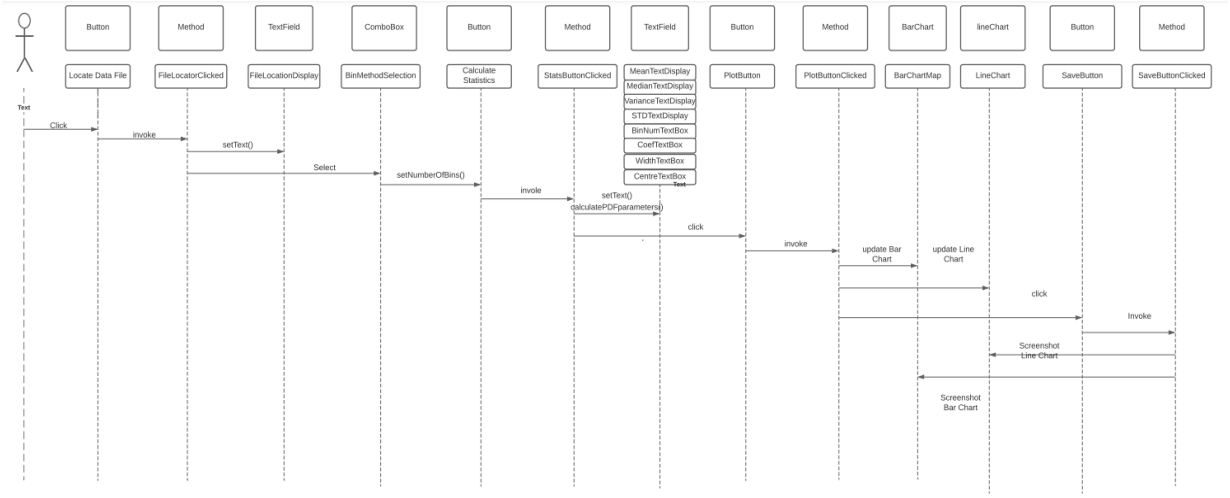

Figure 4.3: Sequence Diagram for the GUI Nodes

The UML diagrams of the app for the GUI controller is shown in figure 4.4:

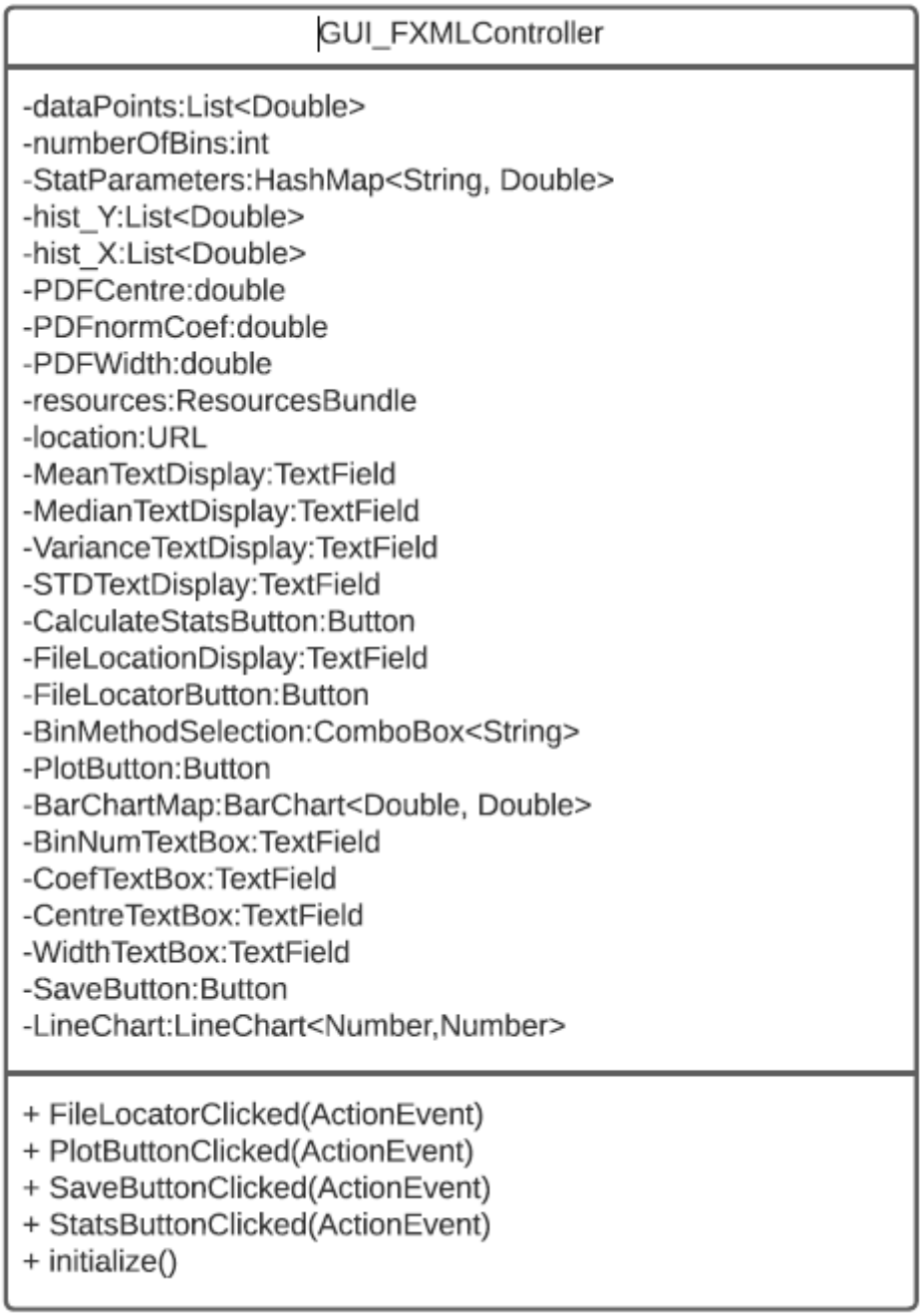

Figure 4.4: UML Diagram for the GUI controller class

The histogram and PDF can be saved to the CW3_20123739/ directory. The histogram and PDF for the Square Root Choice method are plotted in figure 4.5 and 4.6 as an example for the measurement dataset.

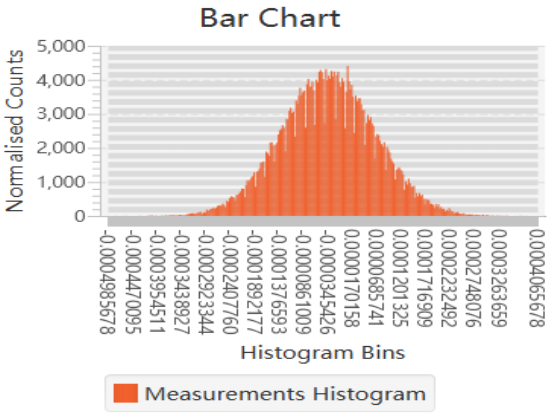

Figure 4.5: Saved Histogram Example

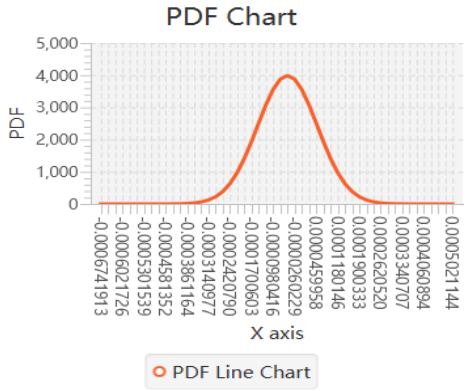

Figure 4.6: Saved PDF Plot Example

Therefore, the whole gui_driver package works and can be integrated together with the previously developed math packages: binmethod, statutils and mathutils to work successfully as a whole.