

# Data Visualizer

## Project Overview

Muhammad Afzal Ismail  
mai15@aber.ac.uk

Supervisor: Dr Zairul Jilani ([zaj2@aber.ac.uk](mailto:zaj2@aber.ac.uk))

Module: CS39440  
Degree: G400, BSc Computer Science

Date: 4<sup>th</sup> February 2019  
Version: 1.2  
Status: Release

## **Project Description**

Most data visualization programs are difficult to learn and understand. They are complex to use and to obtain useful information from the loaded dataset.

The aim of the project is to provide a simple and easy to use program for data visualization. The software will comply with the principles of the mental model[1] and Shneiderman's 8 Golden rules[2], such as consistency in the layout, informative feedback or prevention of errors. This will allow users with little or no experience to easily get useful information about the data they want to analyze. The GUI layout will be simple and intuitive to allow users to easily familiarize themselves to the functions of the program.

The project consists of a standalone program, that will only be available for desktop. It will be able to import files in either .txt or .csv format. A limit of 20 files will be allowed to be imported. This can be from both the internal memory of the computer or an external drive. The data, once imported, will be processed automatically. Useful statistical information about the datasets will be displayed. These will include:

- highest value
- lowest value
- Mean
- Standard deviation
- Missing data
- Analysis of variance (ANOVA)

The users will also be able to visualize the data with the help of appropriate statistical tools such as histogram, pie chart, line chart, and scattered graph, according to their choice. The charts that can be displayed will be according to the type of data in the dataset.

Cleaned data can be saved to the local drive or exported to an external one in a .txt, .csv or .xls.xlsx format. A report containing useful statistical values can also be obtained. The program will also capture the users' actions and save these so as to keep a trail of how the program is used and how possible errors might occur.

The program will be written in Java and the GUI will be done with JavaFX[3]. The system will make use of either libraries already present in JavaFX for the graphical representation of the data, or it may use additional external packages.

## **Proposed tasks**

The program will be written exclusively in Java, using the IntelliJ IDE. This will include all the algorithms that will give the statistical values for the datasets. Useful feedbacks to the users will also be coded, whether the actions have been correctly made or when errors occur, in which case the feedback will need to be informative so as to correct the mistake.

The interface of the program will be developed using JavaFX, which will allow for a good and consistent design. Furthermore, the UI can be styled using a CSS, giving the program a unique look. There is also a very useful library that will allow files to be chosen from either the internal or an external drive and loaded in the program[4]. Scene Builder[5] is a useful tool that may help for the layout of the UI. It is a visual layout tool that allows a quick design of the application, without the need to code.

For the graphical representation of the datasets, the program will make use of the charts libraries in JavaFX. Research will also be done to use external packages from WEKA[6], for its statistical analysis functions. Another possible tool for the charts is JFreeChart[7], which is an open-source framework specific for the creation of a wide variety of charts in Java.

Another important task is the project meetings, which is at least once a week with the supervisor. Every meeting will have minutes describing the topics that were discussed, the tasks completed during the previous week and what will be covered during the following week. A Gantt chart will be used for the project planning. Both this and the minutes of meeting will be sent to the supervisor for review every week. A Wordpress blog is also available. This will be updated weekly to show the progress of the project.

A version control system will also be set up. In this case a Git repository GitHub[8] will be used to record the changes to the program and for backup.

## **Project Deliverables**

### Mid-project demonstrations slides

This will consist of a few slides explain what the project is about. These will also show the progress of the project, the current state of the software and what remains to be done.

### Final program

A simple and intuitive system that will apply the principles of the mental model, allow files to be imported from both internal and external drives, display statistical values and charts for the datasets. The program will be available in the form of an installation kit, a JAR file, which will be friendly to all environments (Windows, macOS, Linux).

### Documentation

- User manual to guide users on how to properly use the software and also demonstrating the user-friendliness of the software.
- Test specification document, describing the tests that have been carried out to verify if the program is working according to the required scope.

### Project report

This will consist of an assessment of the work carried out, explaining the algorithms that have been used. It will cover the problems that occurred during the project and how they have been overcome. It will also mention any external libraries that have been imported.

## Initial Annotated Bibliography

- [1] Mental models, “A Very Useful Work of Fiction – Mental Models in Design”, Interaction Design Foundation [online]  
Available: <https://www.interaction-design.org/literature/article/a-very-useful-work-of-fiction-mental-models-in-design> [Accessed 7 February 2019]
- [2] 8 Golden rules, “Shneiderman’s Eight Golden Rules Will Help You Design Better Interfaces”, Interaction Design Foundation [online]  
Available: <https://www.interaction-design.org/literature/article/shneiderman-s-eight-golden-rules-will-help-you-design-better-interfaces> [Accessed 7 February 2019]
- [3] JavaFX, “Overview”, Oracle, 2019 [online]  
Available: <https://www.oracle.com/technetwork/java/javafx/overview/index.html> [Accessed 30 January 2019]
- [4] File Chooser, Oracle, 2013 [online]  
Available: [https://docs.oracle.com/javafx/2/ui\\_controls/file-chooser.htm](https://docs.oracle.com/javafx/2/ui_controls/file-chooser.htm) [Accessed 3 February 2019]
- [5] Scene Builder, Gluon, 2019 [online]  
Available: <https://gluonhq.com/products/scene-builder/> [Accessed 6 February 2019]
- [6] Weka packages, Overview, Sourceforge [online]  
Available: <http://weka.sourceforge.net/doc.dev/> [Accessed 31 January 2019]
- [7] JFreeChart, Object Refinery Limited, 2017 [online]  
Available: <http://www.jfree.org/jfreechart/> [Accessed 30 January 2019]
- [8] GitHub, “GitHub Homepage”, GitHub Inc 2019 [online]  
Available, <https://github.com/> [Accessed 6 February 2019]