CMPT275-Final Project—
Diagram Drawing Software

Mingqi Tian-301336786

Linhan pei-301323571

Weilong Sun-301308019

Content

Software requirements specification

1. Introduction

1.1 Purpose:

This software is used to help the users to draw some basic graphs easily. Within the drawing process, it will show methods and features about the software. During drawing the expected graphs, we will ask some details about the expected graphs then we can approach these graphs. The intended audience and users are the students or the persons that need to draw the graph and do some basic analysis about the graphs.

1.2 Scope:

This software can be used to draw graph basically. Besides, the users can observe the graph, and finish related graphing tasks. We will present the graphs in dimension two and three. This software will provide convenient operating mode. The users can get the expected graph by clicking some buttons and inputting some parameters to get the graphs under no WIFI connection. In this way, the students can be improved the studying experience and efficiency. It also develops the students' understanding about the graphs.

1.3 Glossary:

2D
This means we will provide some basic graphs in two-dimensional environment.
3D
This means there are some basic graphs can be represented in three-dimensional environment.

2. Overall Description

2.1 Software support:

We use JAVA to implement this software. We defined two groups. One is 2D group and another one is 3D group. Within each group, there are some basic graphs.

2.2 Assumptions and dependencies:

We assume the users want to solve the problem about some basic graphs quickly. Then there is no WIFI connection. Thus, the users need to use this software.

2.3 User stories:

This section outlines the user cases for each type of graphs.
>   2.3.1 User case: Algebra function in 2D
>   Brief description: As an engineering, I want to draw a specific algebra function in 2-dimensional, so I need an application to draw my own function.
>   2.3.2 User case: Several different selection types in 3D

Brief description: As an engineering, I want to draw some specific three-dimensional shape, so I need to select which shapes that I want.

2.3.3 User case: Functions comparisons by drawing different functions

Brief description: As a mathematician, I want to compare some different functions, so I need an application that can draw multiple functions at same time.

2.3.4 User case: Plot editor

Brief description: As an architect, I want to view a part of a function, so I can change the scale of x and y values.

2.3.5 User case: Figure generated

Brief description: As a student, I want to get a picture of a function, so I can save the function as .jpg.

2.3.6 User case: Zoom function applied

Brief description: As a measurer, I want to view a diagram as detail as possible, so I need to zoom-in or zoom-out the diagram.

2.3.7 User case: Function viewer

Brief description: As a university student, I need to analysis some unit-step function, so I need an application to draw one.

2.3.8 User case: Function plot

Brief description: As a primary school student, I want to know simple y=x, so I can write it and plot it.

2.3.9 User case: Erase the current plot

Brief description: As a student, I want to re-draw my function, so I can edit the current functions to change the plot.

2.3.10 User case: Plot viewer

Brief description: As a math-learner, I click '3D' button by fault, so I can cancel the option in check dialog.

2.3.11 User case: Drawing diagram

Brief description: As a PC user, I want to draw some diagram on computer, so I need the UI of an application fits PC.

2.3.12 User case: Drawing three parameters functions

Brief description: As a mathematician, I want to view a complex three-parameters function, so I need an application that can draw it.

2.3.13 User case: Correcting problems by showing data of plot

Brief description: As a programmer, I want to know the correctness of my released function plot, so I need an application that can show the data of plot.

2.3.14 User case: Diagnosing signal graphs by drawing them

Brief description: As a video editor, I want to know a shape of signal, so I can plot it and view it.

2.3.15 User case: Drawing graphs in 3D

Brief description: As a primary school student, I want to draw what I want and as simple as possible, so I need an application that can draw both 2D and 3D graphs.

2.3.16   User case: Inputting parameters and function concurrently
Brief description: As a student, I want to use a plot application convenient, so I need an application can both enter the parameter and enter the whole function.

2.3.17   User case: Modeling some functions
Brief description: As a teacher, I want to take some function in an assignment, so that I can view function examples in the application.

2.3.18   User case: Total view
Brief description: As a foreigner, I need an application to plot function with reminder, so that the application is easy to read by image.

2.3.19   User case: Analysis math 2D
Brief description: As a statistician, I need to compare two variables, then I can enter a==b in 2D area.

2.3.20   User case: Moveable plot by using controller device
Brief description: As a mathematician, I want to move the plot because my function always too big, so I can use mouse to move the coordinate system.

2.3.21   User case: Visible continuously coordinate system
Brief description: As a graph drawer, I want to see the coordinate system continuously, so the application should have a panel to show that all the time.

2.3.22   User case: Changeable points
Brief description: As a mathematician, I want to return to original point if a move the plot too much, so I need the application have restituting function.

2.4   Non-functional requirements:

In this application, it shall plot the graphs as quick as possible. Then, it shall provide users enough space to enter the functions. Besides, it shall have a UI that fit most users' aesthetic requirements.

2.5   Special cases:

The most special cases are the users could enter too many parameters that out of the range of the dimensions of the requirement in application. (at most three dimension) And we need to give them notification or other ideas.

2.6   Constraints:

The application cannot open too many graphs windows that affect the efficiency of the user's device.

2.7   Limitations:

There are not enough data and graph types within this stack. Therefore, you can only select the decided dimension, there could not have the types what you want. Workaround: But do not worry about it, you can plot by yourself.

3. System features and requirements

3.1   External Interface requirements:

The users need to enter the required detail into the application. Then it will check the valid of the function. If valid, the function will be plotted. If not, there will be informed the users through the color.

Design

High level architecture: Attached.

Detailed design diagrams: Attached

Component diagram: Attached

ECB Diagram: Attached

Test cases

Normal test cases:

Hint: A, B, E, c, d, ω, and φ are the parameters that need the user to input. (A, B, E, c, d,

ω, and φ, are the constants here.)

2D function:
Linear algebra function: y = Ax + B

Sine function: y = Asin(ωx + φ) +B

Cos function: y = Acos(ωx + φ) +B

Polynomial function: y = Ax^c + Bx^d + E
Logarithm function: y =A log(Bx) + E & y =A ln(Bx) + E
Exponential function: y = A^x + B
3D function:
Linear algebra function: y = Ax + B

Sine function: y = Asin(ωx + φ) +B

Cos function: y = Acos(ωx + φ) +B

Polynomial function: y = Ax^c + Bx^d + E
Logarithm function: y =A log(Bx) + E & y =A ln(Bx) + E
Exponential function: y = A^x + B
z = sin(Ax)*cos(By)

Boundary test cases:

Tangent function: y =Asin(ωx + φ) +B. (A, B, ω, and φ are the constants here.)

Working software

Codes files attached in the folder.

Video attached in the folder.

Post-performance analysis(PPA)

Although we have tested all the test cases and boundary cases we met before, there are still some improvement for our project.

For the functions that have the infinity value within his range, the plot of them will be not perfect as we think about. For example, tangent function has the infinity value with his range since the value of x approaches to pi/2 (in Radians). In this case, if the users need to see the absolute correct result of plotting, we can make the domain of x is between -pi/2 and pi/2. By doing this, our plot will be correct perfectly. We did some analysis why this problem happens in our project before. Lastly, we think this is because our API cannot solve this problem. Since the value of this function approaches to the infinity, the API do not approach the infinity. It just tries to find next valid point of function. If there is such valid point, the API will help us to connect this valid point with the previous point. In this way, our plot will look weird. Thus, we think if we can change some conditions inside of API or find any better APIs, we will make our project better than now in the future.

In the place that is used to input the functions whatever 2D or 3D it is, we cannot make let users to input too many functions concurrently. Users can input at most eight functions. Since the users want to enter more functions, uses need to remove the functions that the users have already entered firstly. Then, users can re-enter the functions.

The 2D functions' domain represents x. The 3D functions' domains represent x and y. Since the user want to use any other characters to represent domains, this leads to an error. If we will accept other characters to represent domains, this will make our software better.

Contribution List

	Mingqi Tian	Linhan Pei	Weilong Sun
Requirement	40%	30%	30%
Design	30%	40%	30%
Coding	40%	30%	30%
Report	30%	30%	40%