Data Visualization with Gnuplot

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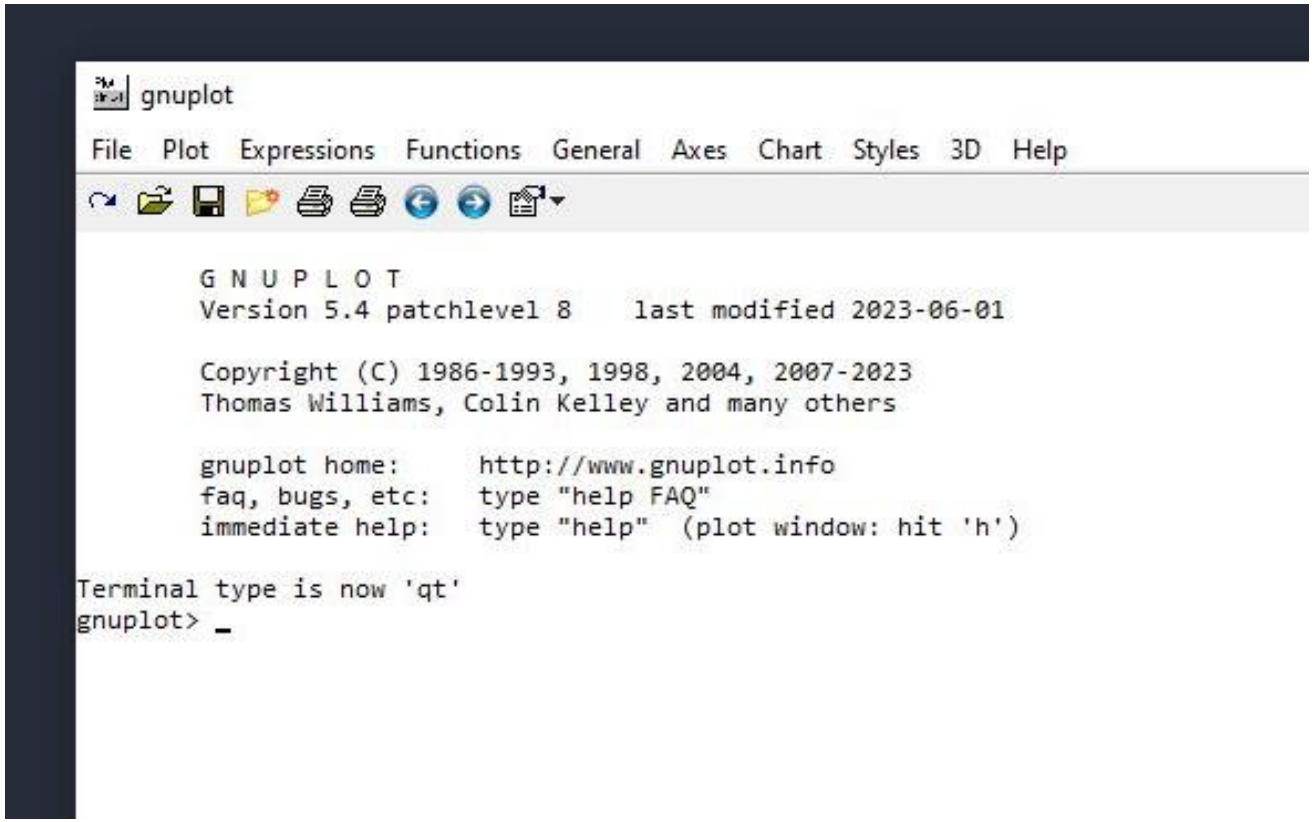
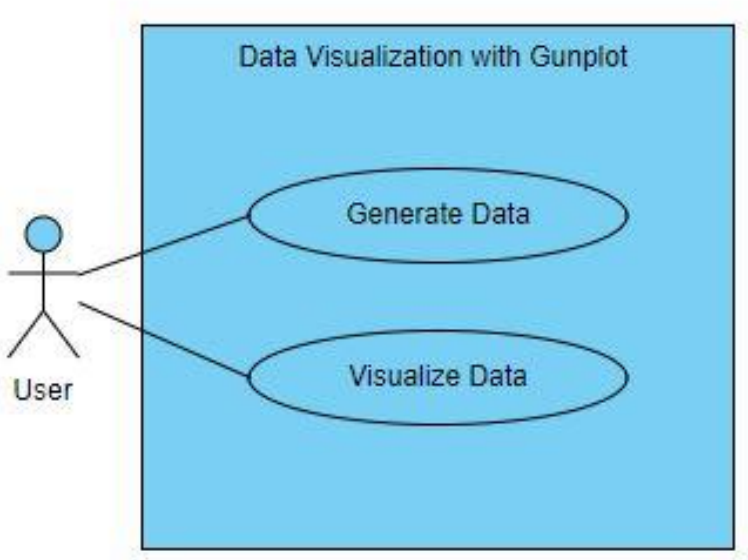
https://github.com/TKVuBER/pic-wise23-DataVisualization-project

Problem Statement

- Develop a data visualization that generates charts, plots, and graphs from input data.
- Use of open-source software Gnuplot within a C application (Codeblocks)



Use Case-Diagram

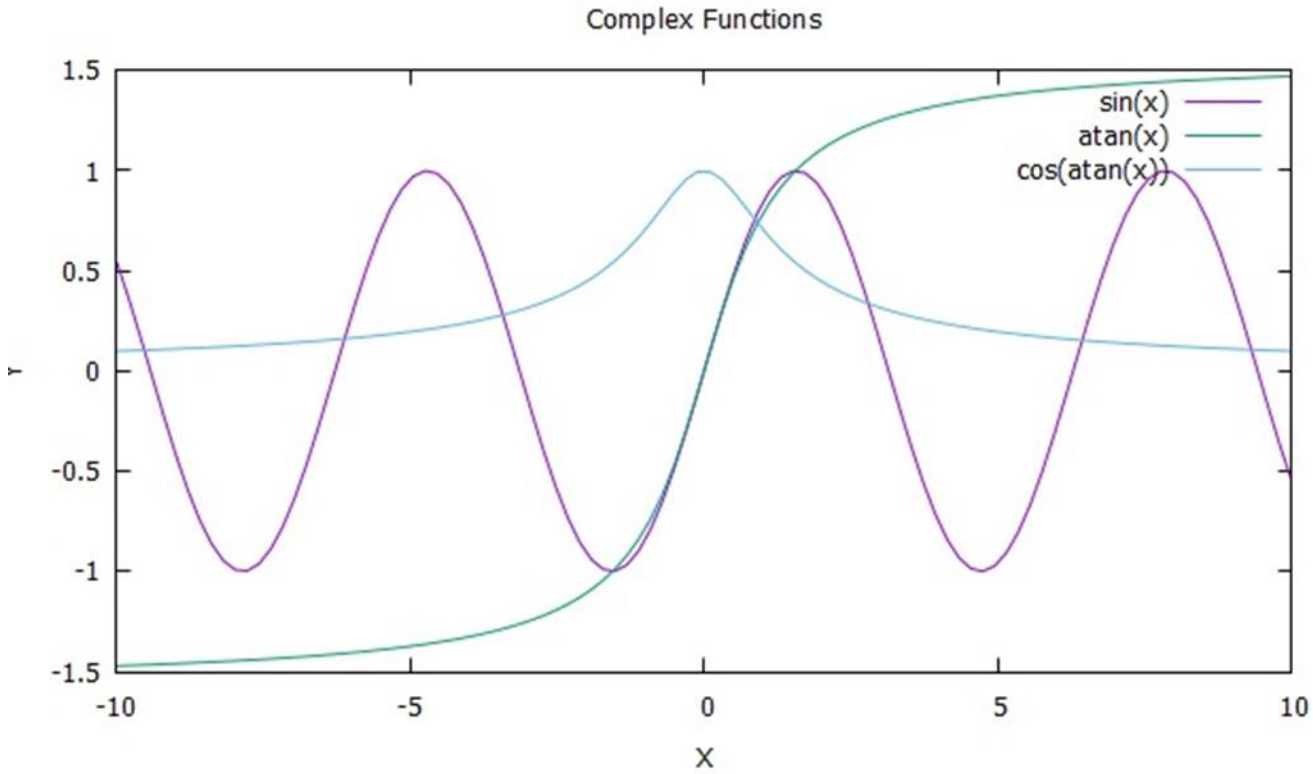


1. Generate Data:
   - User specifies data parameters

2. Visualize Data:
   - User request data visualization
   - System utilizes gnuplot to visualize data

Features and Functionalities

- With a modification of the code, the user can display the desired function



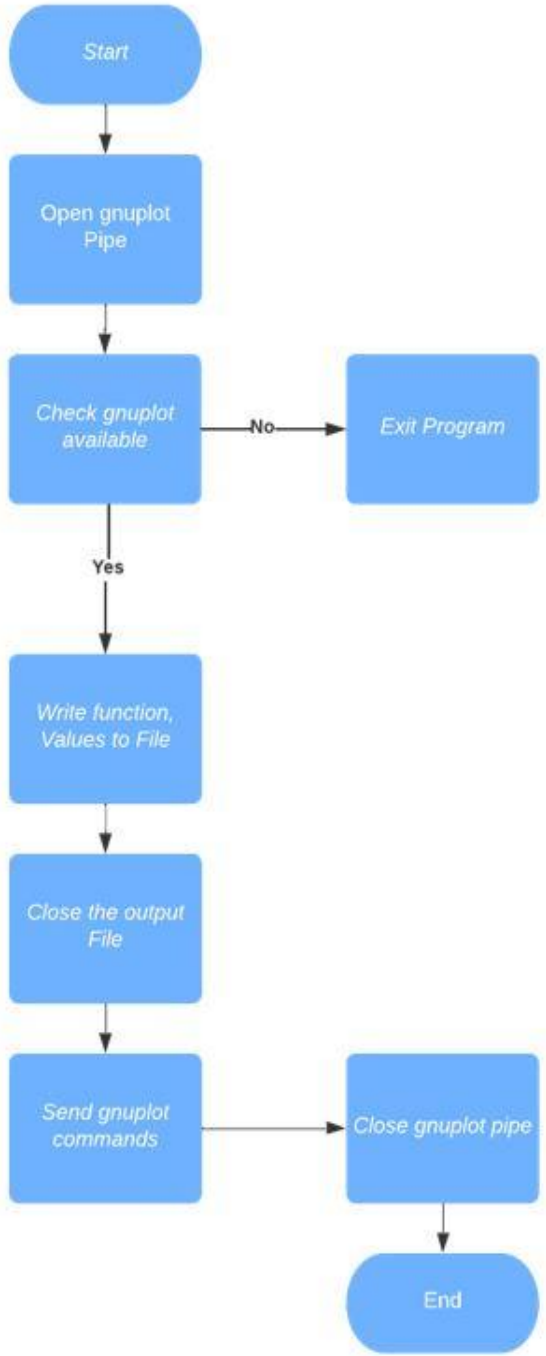
- Enhanced Understanding
- Data Exploration
- Detection of Anomalies
- Decision-Making Support

Scheduling Table

Task	Responsible Team Member	Deadline
Project Planning	Mohamad Kisanieh	30.10.2023
Development	Can Ay Sang-Joon Han Mohamad Kisanieh Trong Khang Vu	07.01.2024
Testing/ Debugging and Refinement	Mohamad Kisanieh Sang-Joon Han	10.01.2024
Documentation	Trong Khang Vu	12.01.2024

Algorithm Flowchart and Technology Used

- Codeblocks 20.03
- Gnuplot ver 5.4 patchlevel 8



Graphical User Interface (GUI)

data visualization tool.c

```c
#include <stdio.h>
#include <math.h>

int main(void) {
    FILE *fp = NULL;         // Ausgabedatei
    FILE *gnupipe = NULL;    // Stream für die Gnuplot-Pipe
    char *gnuCommands[] = {"set title '3D Function Demo'",
                           "splot 'data_3d.tmp' with lines"};

    fp = fopen("data_3d.tmp", "w");
    gnupipe = popen("gnuplot -persist", "w");

    if (fp == NULL || gnupipe == NULL) {
        printf("Fehler beim Öffnen der Datei oder der Gnuplot-Pipe.");
        return 1;
    }

    // 3D-Funktion schreiben (Beispiel: z = sin(x) * cos(y))
    fprintf(fp, "# 3D-Funktionswerte\n");
    for (double x = 0; x <= 2 * M_PI; x += 0.1) {
        for (double y = 0; y <= 2 * M_PI; y += 0.1) {
            fprintf(fp, "%f %f %f\n", x, y, sin(x) * cos(y));
        }
    }

    fclose(fp);

    // Gnuplot-Befehle senden
    for (int i = 0; i < 2; i++) {
        fprintf(gnupipe, "%s\n", gnuCommands[i]);
    }

    fprintf(gnupipe, "exit\n");
    pclose(gnupipe);

    return 0;
}
```

gnuplot

File Plot Expressions Functions General Axes Chart Styles 3D Help

```
        G N U P L O T
        Version 5.4 patchlevel 8    last modified 2023-06-01

        Copyright (C) 1986-1993, 1998, 2004, 2007-2023
        Thomas Williams, Colin Kelley and many others

        gnuplot home:     http://www.gnuplot.info
        faq, bugs, etc:   type "help FAQ"
        immediate help:   type "help"  (plot window: hit 'h')

Terminal type is now 'qt'
gnuplot> _
```

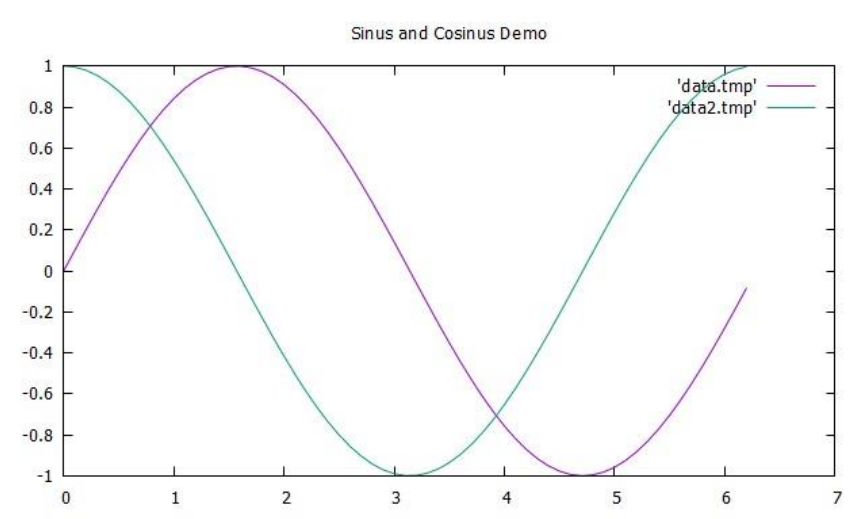
Future Development Plan

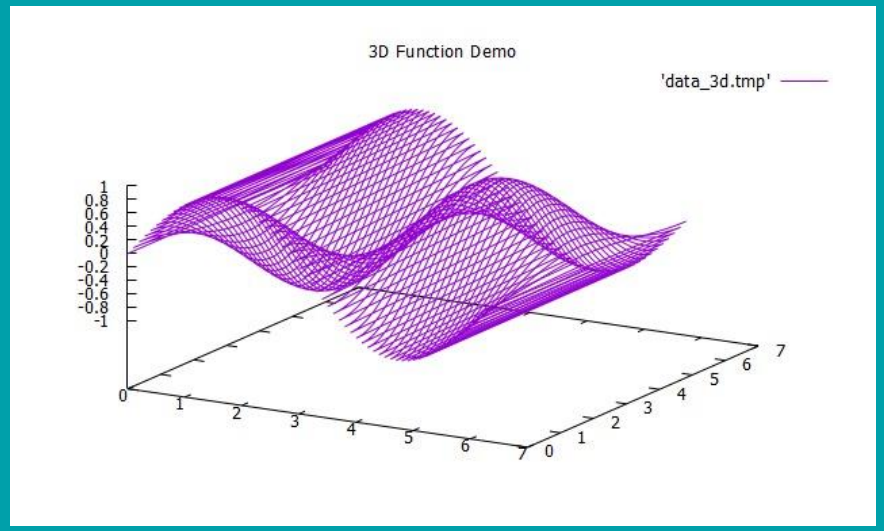
- The next step could be to further develop the program by inputting the functions or function values in a separate file.
- The program would then read these values automatically and graphically represent them.

[1]

Conclusion

- The realization of this project will create a data visualization tool in C, with applications in various fields, including science, education and data analysis. It will also demonstrate the capability of creating charts and graphs in C and showcase the potential of the Gnuplot library.





Thank you for your attention!

Scources

- [1] https://pixabay.com/illustrations/question-mark-question-response-1019820/ 14.01.2024