USER MANUAL

QUINE-MCCLUSKEY CALCULATOR

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INTRODUCTION

Introducing the **Quine-McCluskey Calculator**, a sophisticated Java software crafted to aid in comprehending and utilizing the Quine-McCluskey method for reducing Boolean functions. Developed by Arianne Jayne Acosta and Christian Jesse Bonifacio, this program offers a robust solution for simplifying complex Boolean functions.

The Quine-McCluskey method is a crucial technique in digital design and Boolean algebra for minimizing logical functions. By iteratively combining terms and identifying essential prime implicants, the method produces a simplified Boolean expression that retains the same logic as the original but with fewer terms. This simulator aims to demystify the Quine-McCluskey method, making it accessible to students, educators, and professionals in the field of digital logic design.

The software undertakes a **dual-phase approach** to achieve Boolean function simplification. Initially, it utilizes the Quine-McCluskey method to detect prime implicants and iteratively enhance the expression. The subsequent stage entails additional refinement through techniques like row dominance, column dominance, and the utilization of **Petrick's method**.

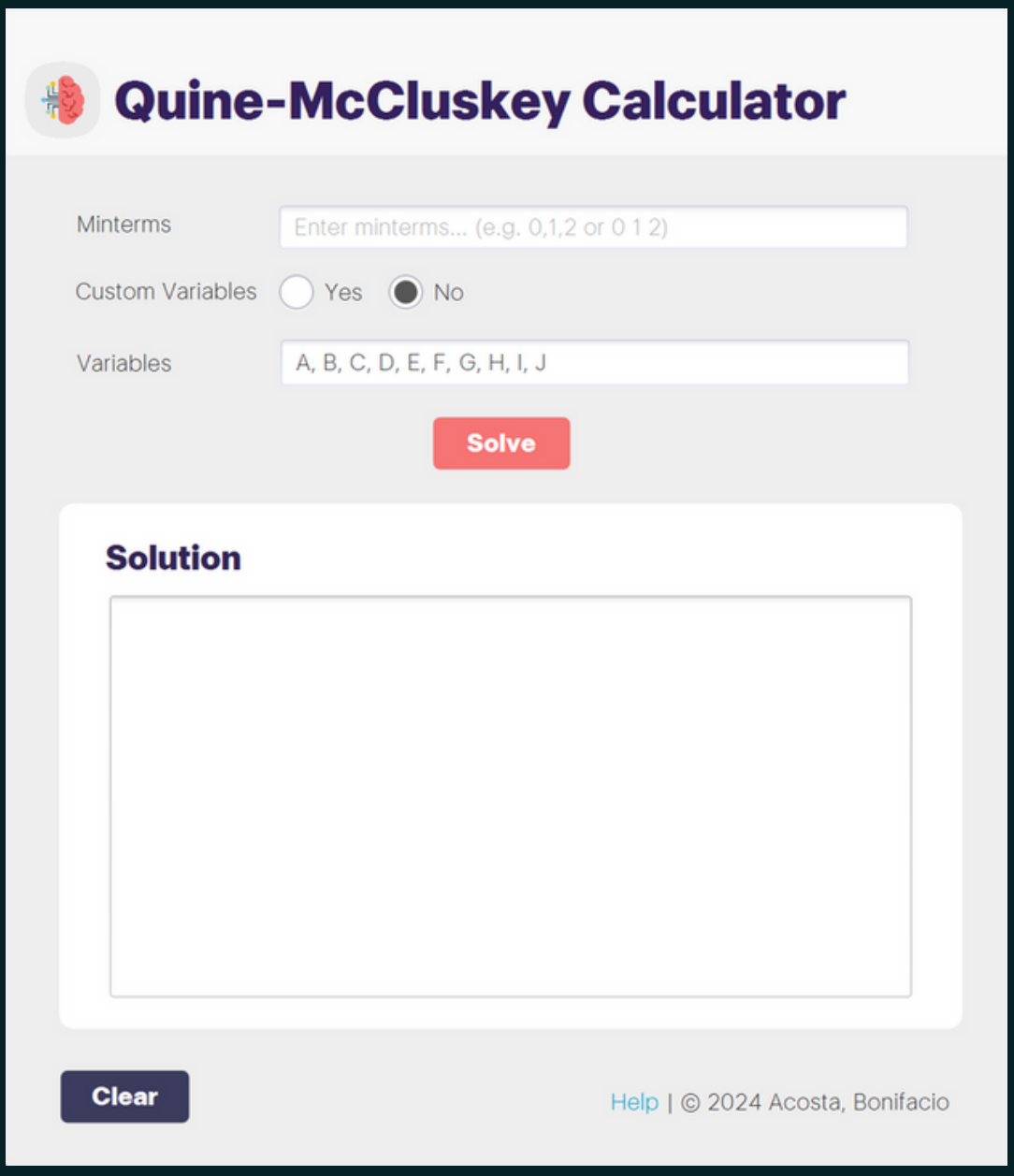
This software accommodates a wide-ranging audience encompassing individuals engaged in digital logic design, computer science, and associated disciplines. Whether you're a student wrestling with Boolean algebra or a professional in search of a dependable tool for function simplification, this program is tailored to suit your requirements.

GUI

Graphical User Interface (GUI)

The system incorporates a Graphical User Interface (GUI) is designed with JavaFX, providing a user-friendly and intuitive interaction platform.

The GUI maintains a clean and organized layout, enhancing the overall user experience. It simplifies complex operations and presents information in an easily understandable format, making the system accessible to all users.

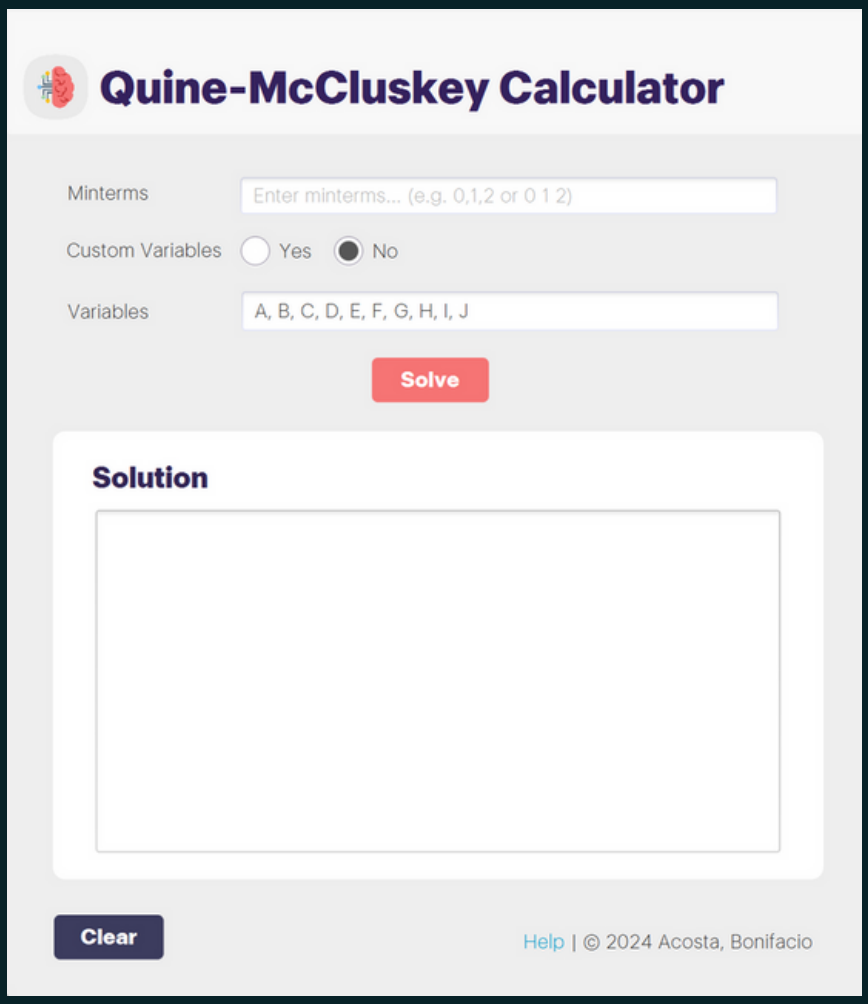


GUI

LAYOUT

Main Input Fields and Controls

Solution Panel



Footer

GUI

COMPONENTS

1. Main Input Fields and Controls

Components which allow users to interact with the program and run the Calculator

Enter Minterms Text Field

Text field where users enter the list of minterms of the Boolean function to be simplified. It is required that the minterms be integers which are delimited by commas or spaces. Throws error windows* if format is not followed.

Custom Variables Radio Buttons

The “yes” and “no” buttons determine if the user prefers to use their own variables for the program.

Depending on which button is clicked, the Variables Text Field is updated.

Variables Text Field

Displays default 10 variables (A,B,C,D,E,F,G,H,I,J) or allows for custom variables if user clicks Yes.

***Yes* selected**

***No* selected**

Solve Button

Runs the program. Error windows* are displayed if minterm and/or variable input is invalid.

*See page 15 for Troubleshooting.

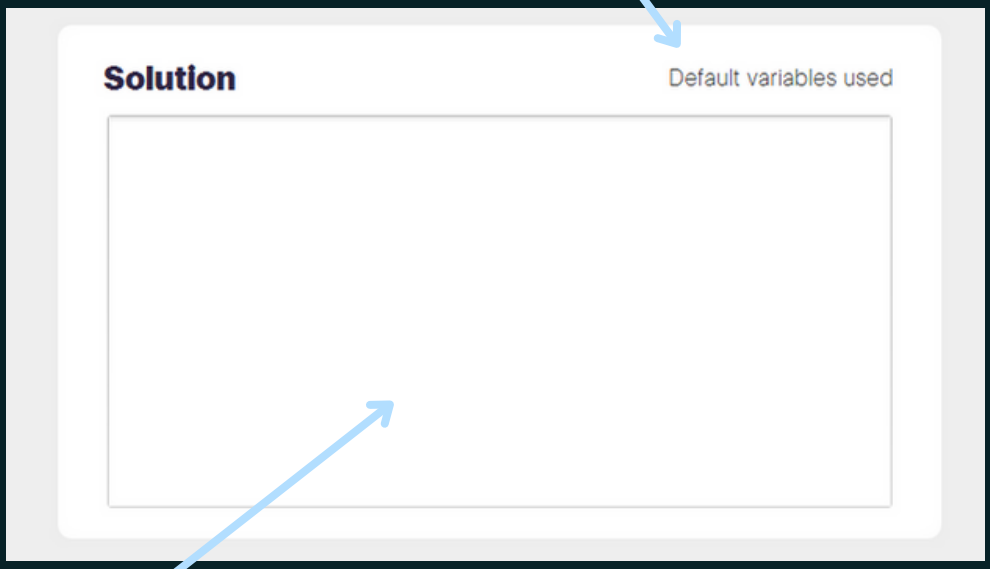
GUI

COMPONENTS

2. Solution Panel

Variables Information Label

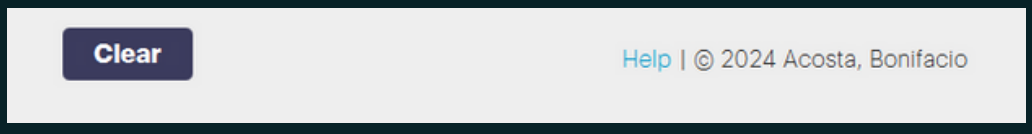
Once Solve is clicked, it appears and displays information based on the variables chosen for the simplification.



Solution Text Area

Displays simplified Boolean functions. May display more than one solution depending on inputted minterms.

3. Footer



Clear Button

Clears all input fields and solution window. Resets radio button to default variables (no).

Help Hyperlink

Redirects user to user manual.

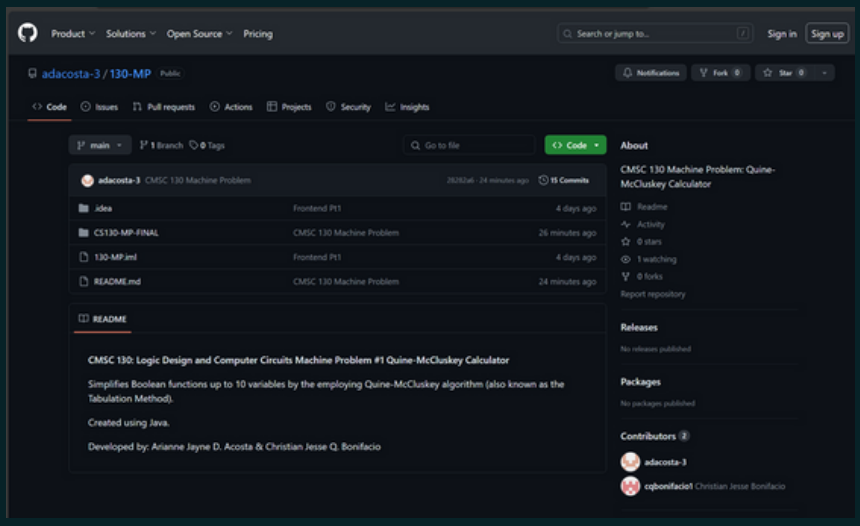
GUI

INSTALLATION

STEP 1: DOWNLOADING

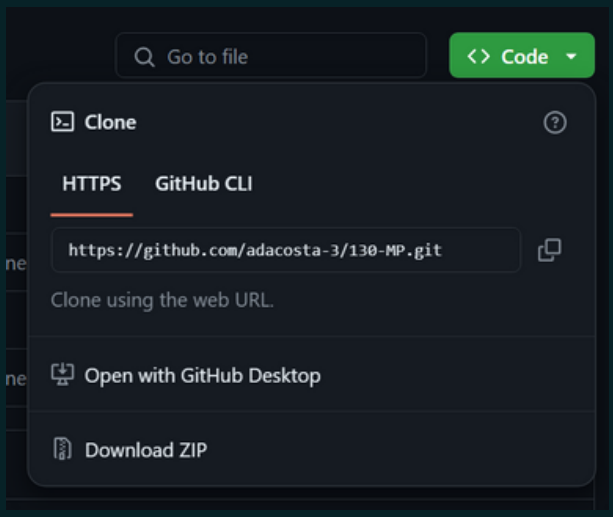
1. Open Github link

Click the icon above to be redirected to the 130-MP GitHub directory.



2. Download ZIP file

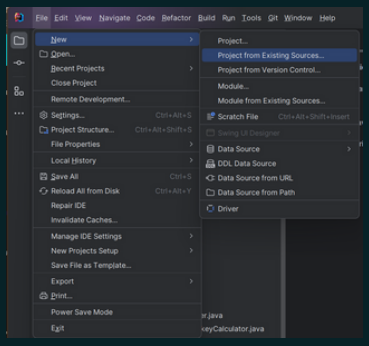
Hover over the <> Code button, and click it to reveal Clone options. Click Download ZIP. Unzip the file in your chosen directory.



INSTALLATION

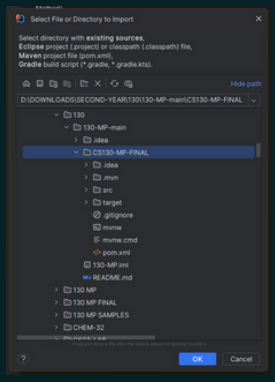
STEP 2: OPEN PROJECT

1. Create Project



Open your chosen IDE. To run this program, we recommend using **IntelliJ by JetBrains**. Under File -> New, create a Project from Existing Sources.

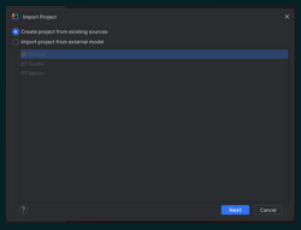
2. Select File

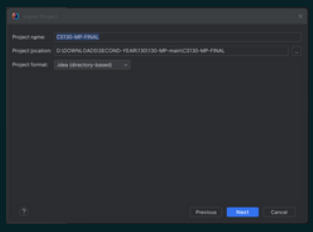


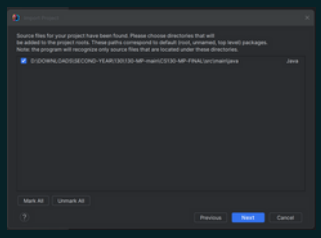
Navigate to the directory you saved the 130-MP-main folder in, click the folder “CS130-MP-FINAL”* then press OK. The folder you selected must have the files seen in the image.

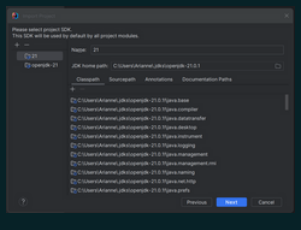
3. Import Project

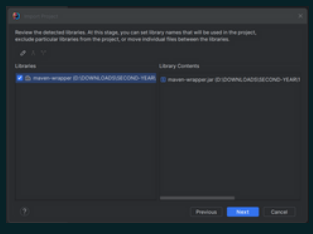
Follow the images below in importing the project. You may choose to set your own name for the project.

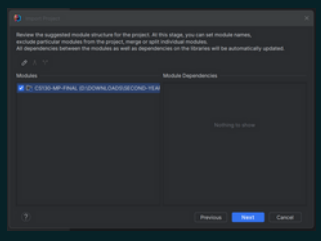


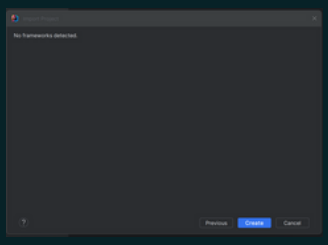












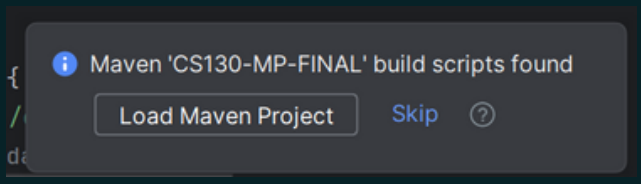
Finally, click Create.

INSTALLATION

STEP 3: INSTALL LIBRARIES

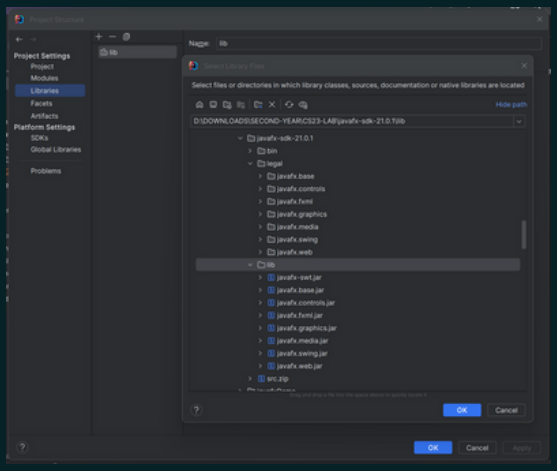
1. Load Maven

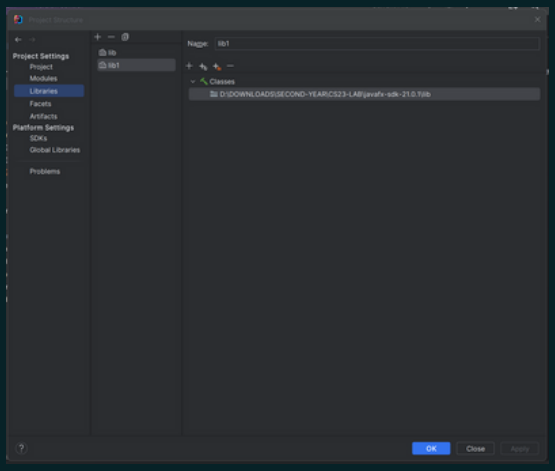
Upon opening the project, you will see a small window on the bottom-right of the screen indicating that Maven build scripts have been found. Make sure to click **Load Maven Project** to ensure that the application will run.



2. Import JavaFX Library

If JavaFX is not installed on your IDE, navigate to Project Structure and import the **lib** folder of your downloaded JavaFX SDK from Gluon. Click OK, then **Apply**.



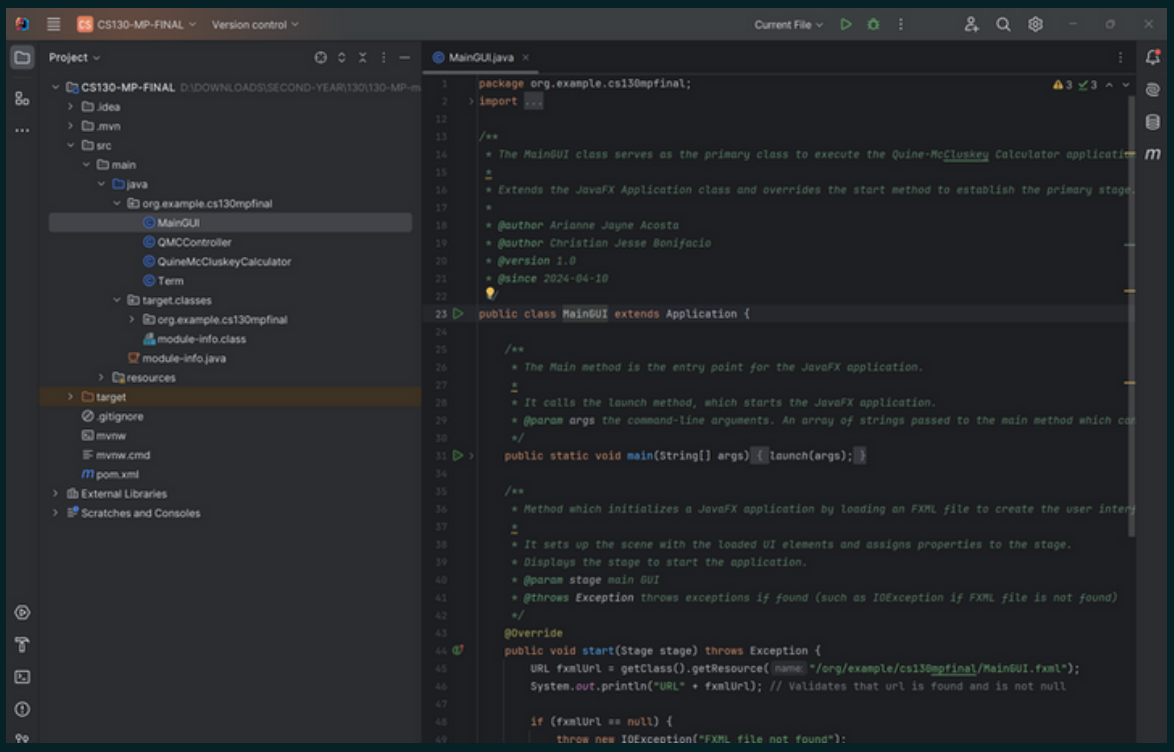


INSTALLATION

PROJECT

Installed Project

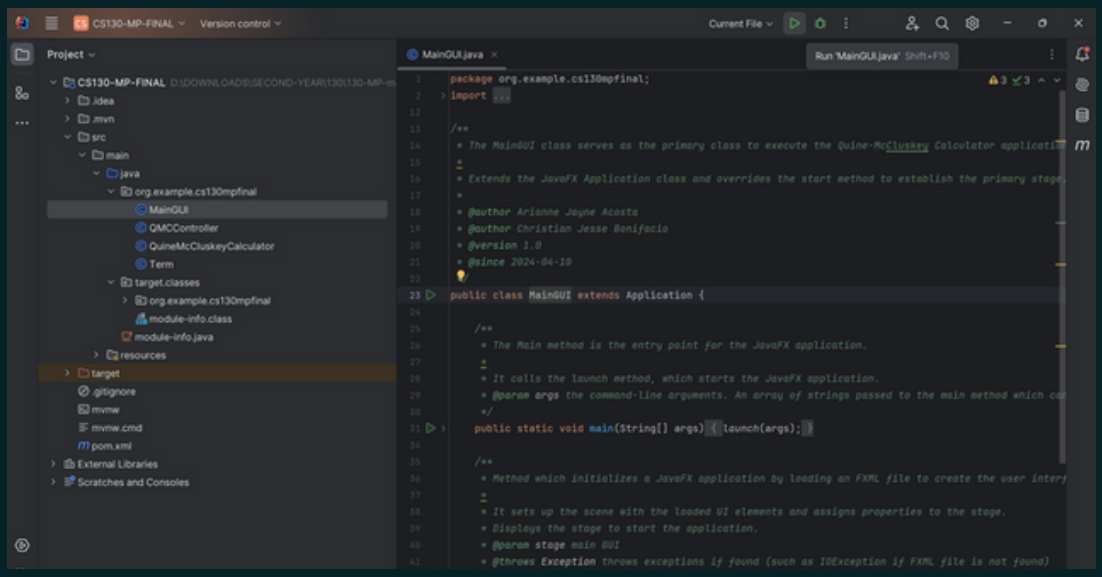
After following all the steps, your Project must look like this.



RUNNING THE PROGRAM

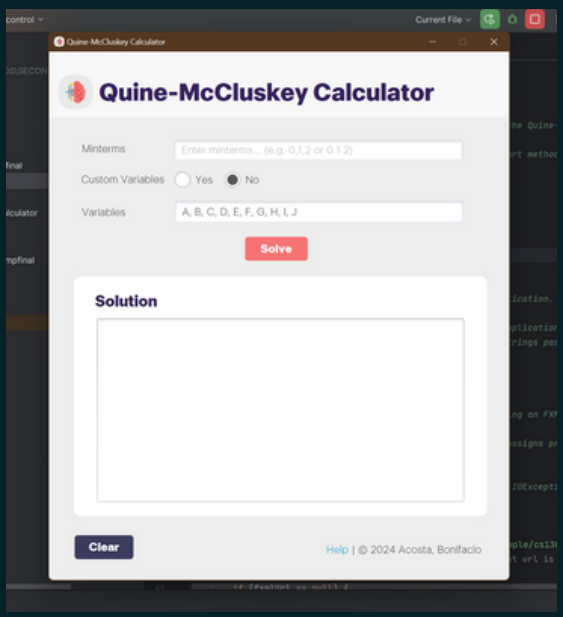
1. MainGUI

After properly installing the project, navigate to the **MainGUI** class to run the program. On the upper right-hand corner of the screen, click the ▶ symbol to run the program.



2. The GUI

The GUI should now appear on your screen.



RUNNING THE PROGRAM

USING THE CALCULATOR

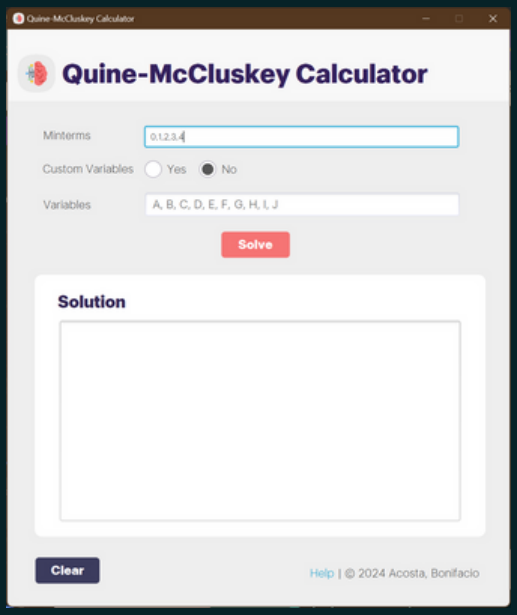
1. Enter minterms

Enter comma-separated or space-separated integer minterms in the given text-field. The inputted minterms must not exceed 1023, the maximum number of minterms for 10 variables. Below are examples of permissible inputs:

- ✓ 0,1,2,3,4
- ✓ 0, 1, 2, 3, 4
- ✓ 0 1 2 3 4

Any other inputs are not allowed and will prompt the appropriate *error windows*.

- ✗ 0.1.2.3,4
- ✗ 0,1,2,b,4



2. Choose your variables

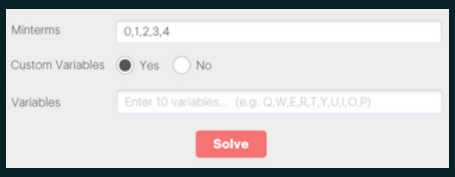
Choose to use the default variables (A,B,C,D,E,F,G,H,I,J) or use your own custom variables by toggling between the radio buttons. Information about the variables used will appear in the Solution Panel once the solve button is clicked.

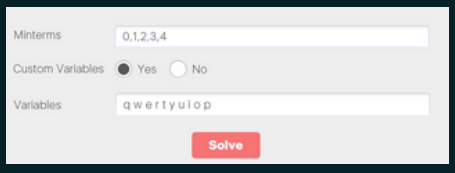
When inputting custom variables, the **variables must be comma or space separated** as well. 10 variables must be inputted.

<10: Program pads variables with default
>10: Program chooses only first 10 inputted.

Default Used

Opting for Custom





RUNNING THE PROGRAM

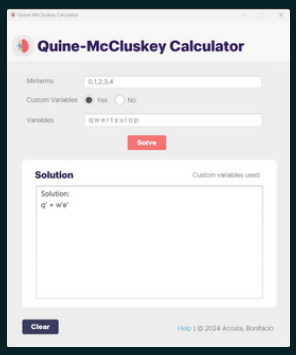
USING THE CALCULATOR

3. Solve

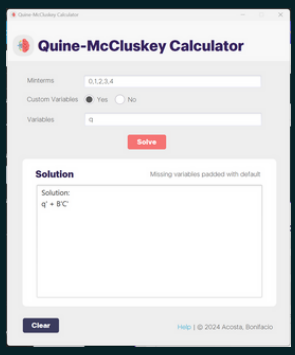
Click **Solve** and see the **simplified Boolean function** in the Solution text area!

Information about the variables used appear on the Solution Panel.

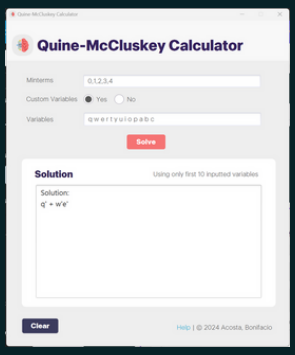
Default



Custom: 10



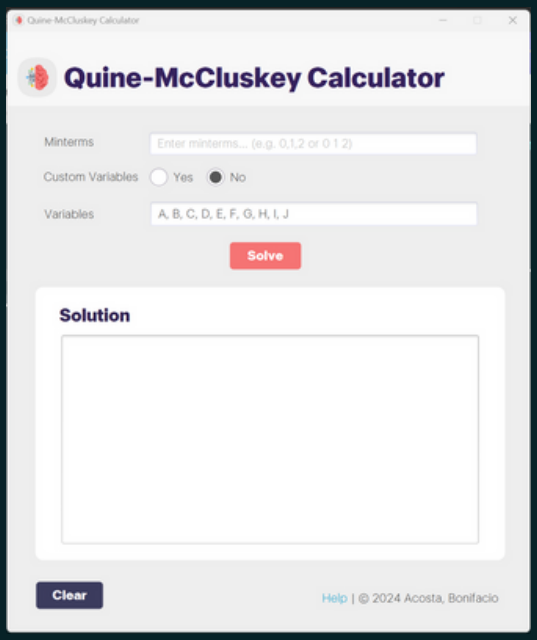
Custom: <10



Custom: >10

4. Clear

Solve for a different simplified Boolean function by clicking the **Clear** button to restore the Calculator to its default.



5. Exit

Exit by closing the Quine-McCluskey Calculator window.

RUNNING THE PROGRAM

TROUBLESHOOTING

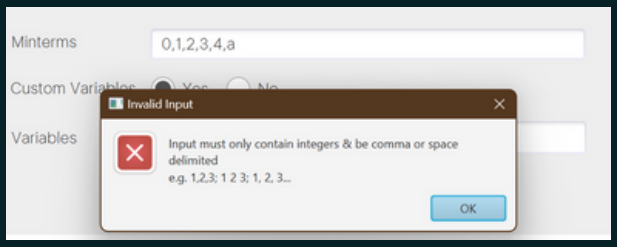
ALERTS

Invalid Inputs

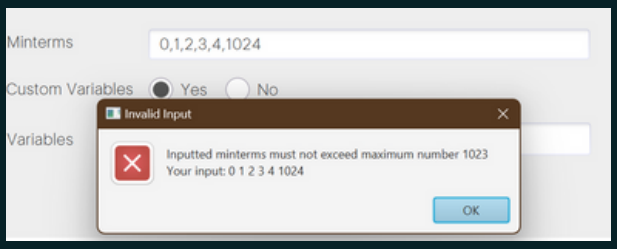
Invalid inputs passed in the text fields, when the **Solve** button is pressed, will prompt error windows, known as **Alerts**, to appear to inform the user. To address this issue, simply close the error window and retype the input, making sure it follows the prescribed format (comma or space delimited).

Below are examples of invalid input error windows.

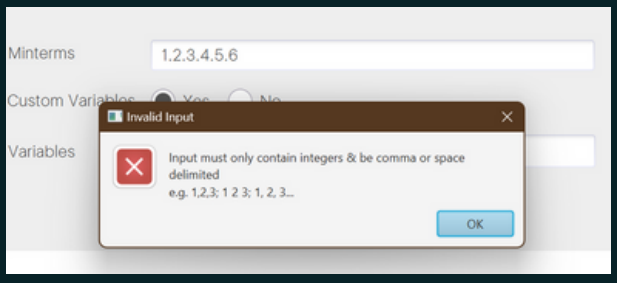
Non-integer input



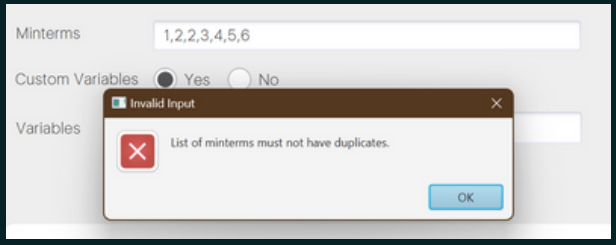
Input above maximum



Not comma or space separated



Duplicates found



TROUBLESHOOTING

SUPPORT

For further assistance or inquiries, please do not hesitate to reach out.

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