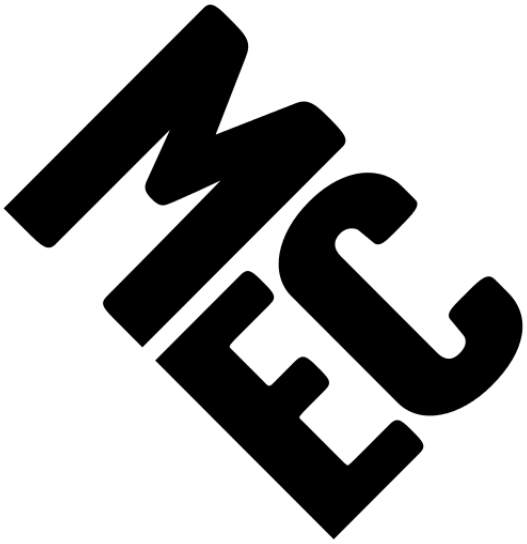
Math Expressions Calculator



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Summary

There are many tools for performing calculations and data processing (like wolframalpha.com and MS Excel) but they cannot allow you to create custom new operations (functions, brackets, etc.). That is why our program is better than them. This project aims at making an application, which calculates and simplifies expressions with custom data types. It is different than the other tools because it provides an option for run-time addition of custom operations, variables, arrays, pairs of brackets and functions. It can be used for scientific and learning purposes.

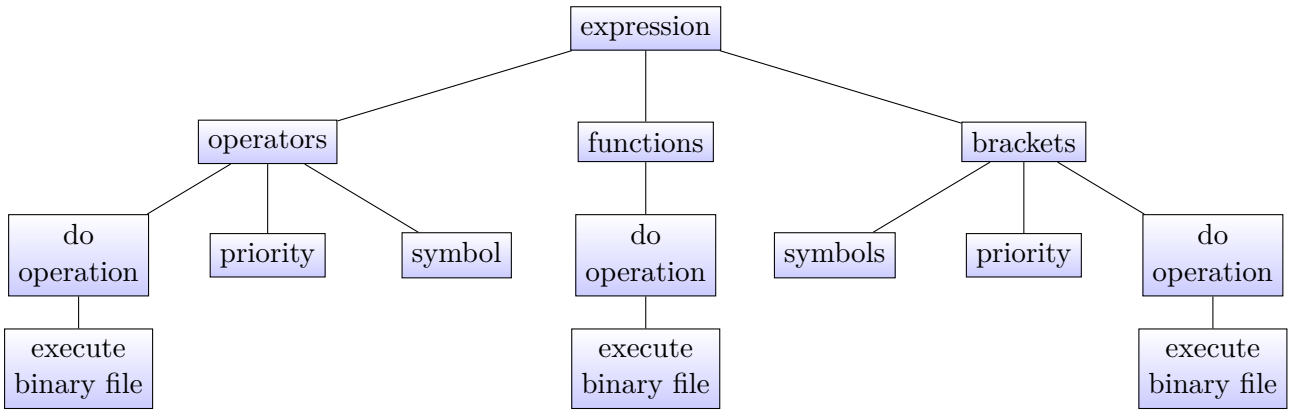
1 Introduction

This application improves the work with databases and big data, because it makes the code easier to read. This is useful for both scientists and young students, because it can help them with suggestions for better solutions by checking their answers.
We have implemented expression calculation with an option for run-time addition of operations, variables, pairs of brackets, functions and find derivative functions.

2 Implementation

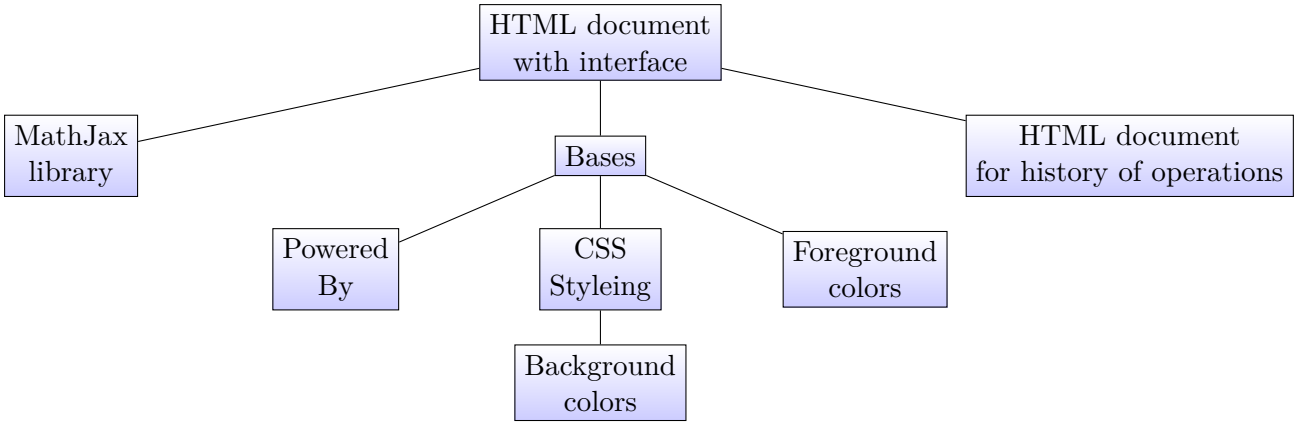
2.1 Structuring

For the structuring we use Object-Orientated Programming(OOP) with C++.



2.2 Graphical view

For the graphical view we use HTML and MathJax.



3 Functions of application

In the following table are described the functions of our program:

Function	Description	Example
No/End	Each of the execution	End
I want more!	Adds new functions	
(...)'	Gives you the derivative function	(a+b)'
calc	Calculates the expression	calc (a+b)*c
set	Sets value of a variable	set d (a+b)*c

4 Technologies

To implement the software we use C++ for better performance (speed and memory) and easier structuring of the OOP part. We make the graphical preview using HTML and JavaScript (MathJax). For the run-time addition we downgrade the math script to C++ and compile it with GNU Compiler Collection (GCC).

Calculated: $1 + a \circ 3 + b[4] + f\left(90, 5; 5^6; l\right) + \sqrt{5} = 10$

5 Future work

This project provides space for future improvement. We will work further on the interface and the functionality(by adding case defined functions and others). This is something like:

$$f(expr) = \begin{cases} f(a) + f(b), & \text{for } expr = a + b \\ 0, & \text{for } expr = const \\ b * a^{b-1}, & \text{for } expr = a^b \\ \dots & \dots \end{cases}$$

Ex.1: ***derivative function***

6 Conclusion

This project helps working with big data and databases by making the code more human readable. This is useful for both scientists and young students, because it can help them by checking their answers and suggesting them better solutions.
In the future this project will include arrays and integral calculation. It will be modified so that it could be used as an open-source library.

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- Bulgarian Academy of Sciences
- Sofia High School of Mathematics
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References

[1] *GNU Compiler Collection*. `https://gcc.gnu.org/`.
Copyright © 2009 Free Software Foundation, Inc.

[2] *MathJax*. `https://www.mathjax.org/`.
Copyright © 2015 The MathJax Consortium.

[3] *LaTeX*. `https://www.latex-project.org/`.