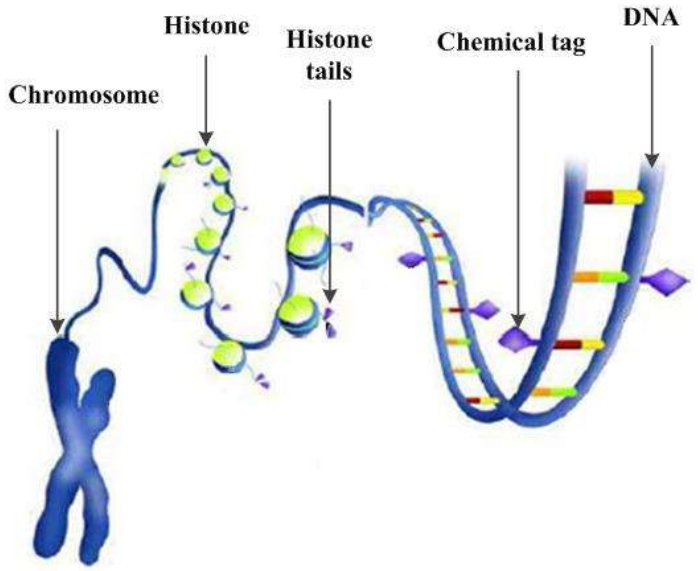
PROJECT REPORT

Solving Equations Using Genetic Algorithms



Course	:	Project 1
Course ID	:	IT3910E
Instructor	:	Assoc. Prof. Tran Dinh Khang
Group	:	HelaX

Table of Contents

1. Introduction

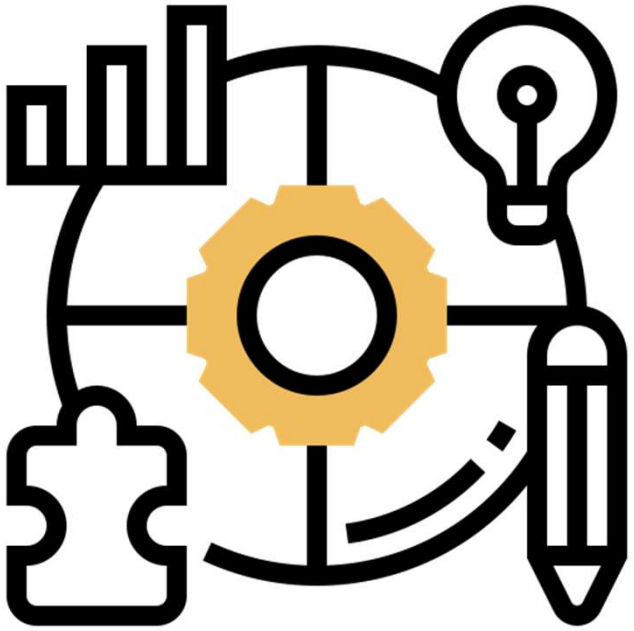
$$f(x) = 0 \qquad \rightarrow x = ?$$

> $f(x)$ is an elementary function (polynomial, trigonometric,...)
>
> x is a real root of the equation

2. Method

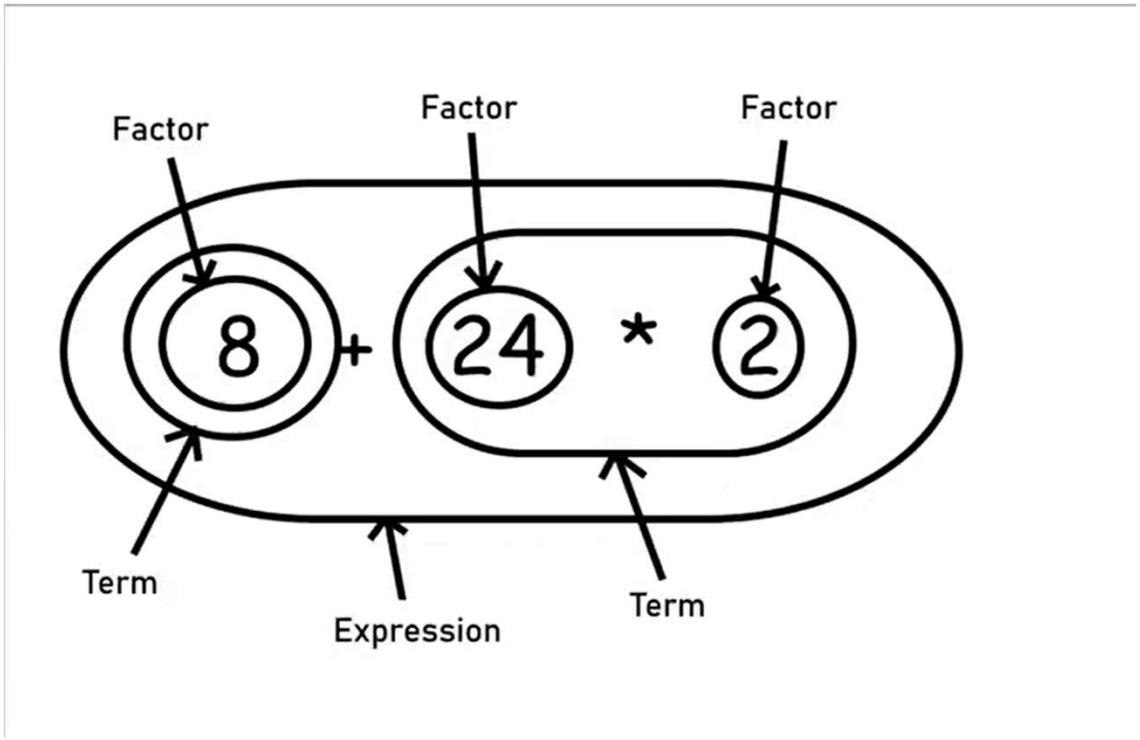
2.1. Input Handling

2.2. Genetic Algorithm



2.1. Input Handling

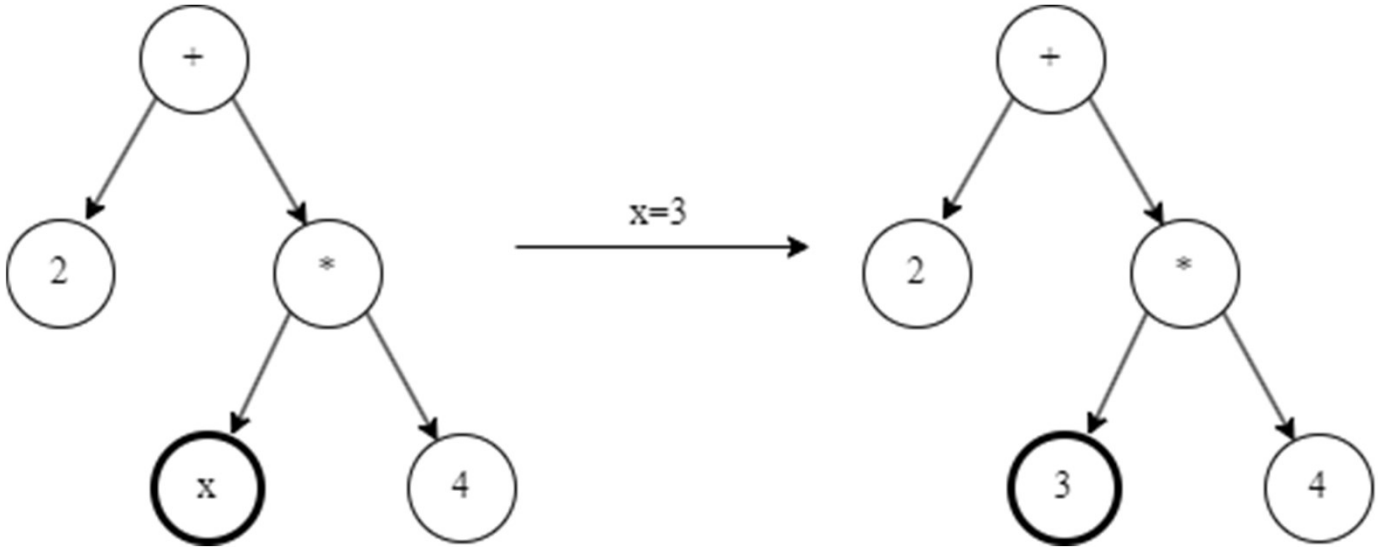
Order of precedence:



2.1. Input Handling

User input: **2 + x * 4** ⟶ **F(x)**

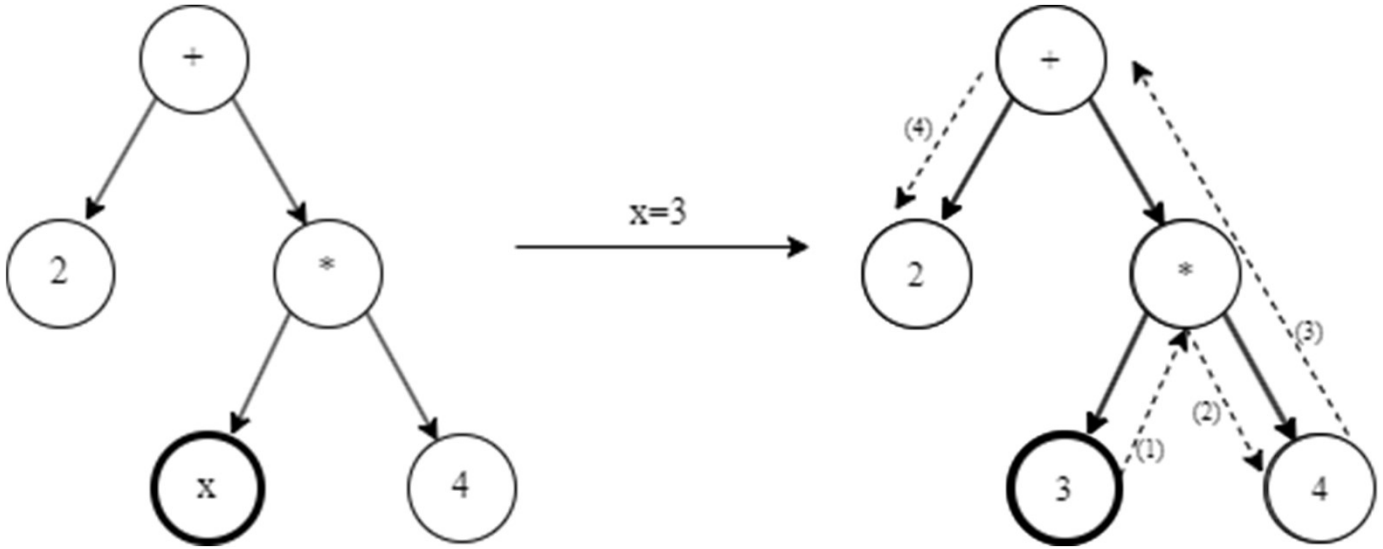
Abstract Syntax Tree:



2.1. Input Handling

User input: **2 + x * 4** ⟶ **F(x)**

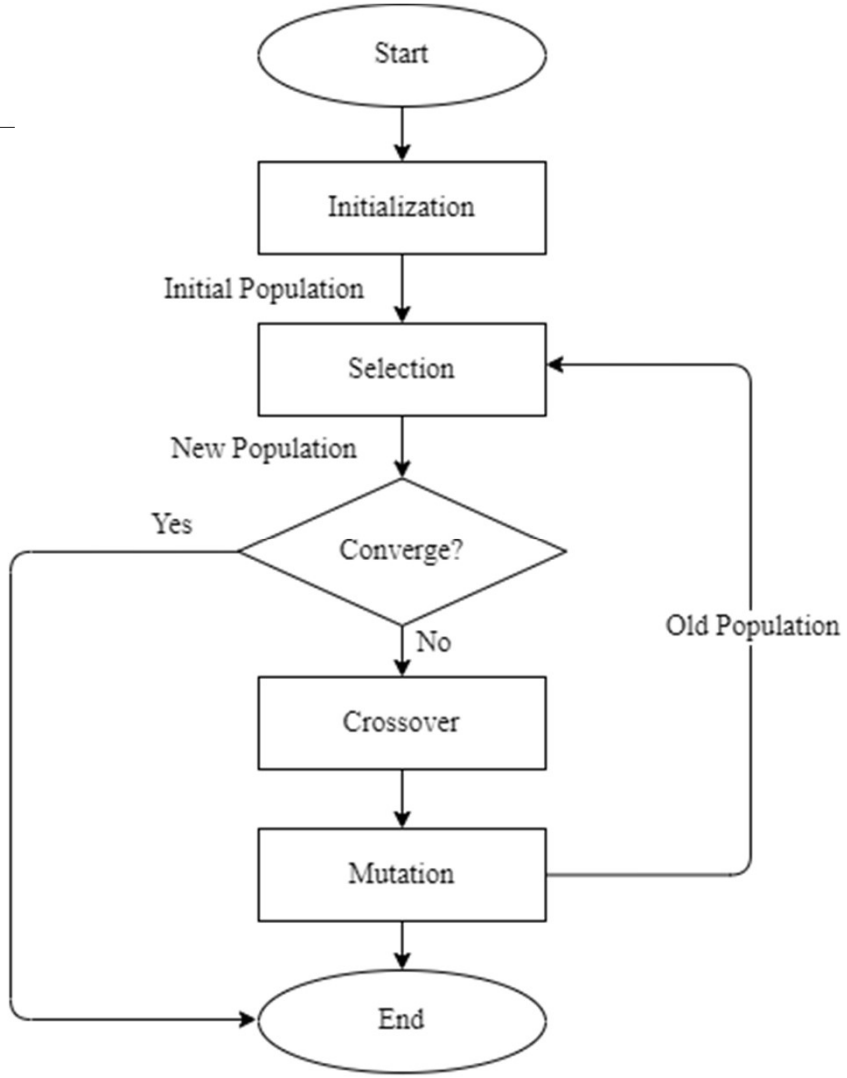
Abstract Syntax Tree:



2.2. Genetic Algorithm

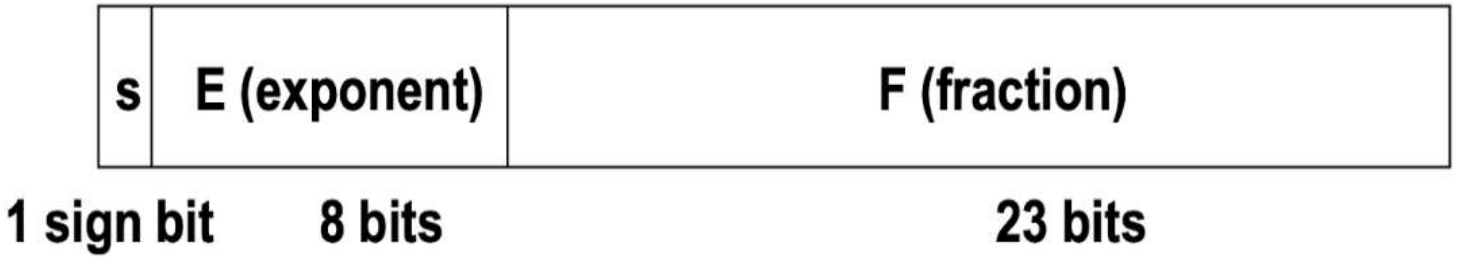
General of Genetic Algorithm

- Initialization
- Fitness Assignment
- Selection
- Reproduction
- Termination



2.2. Genetic Algorithm

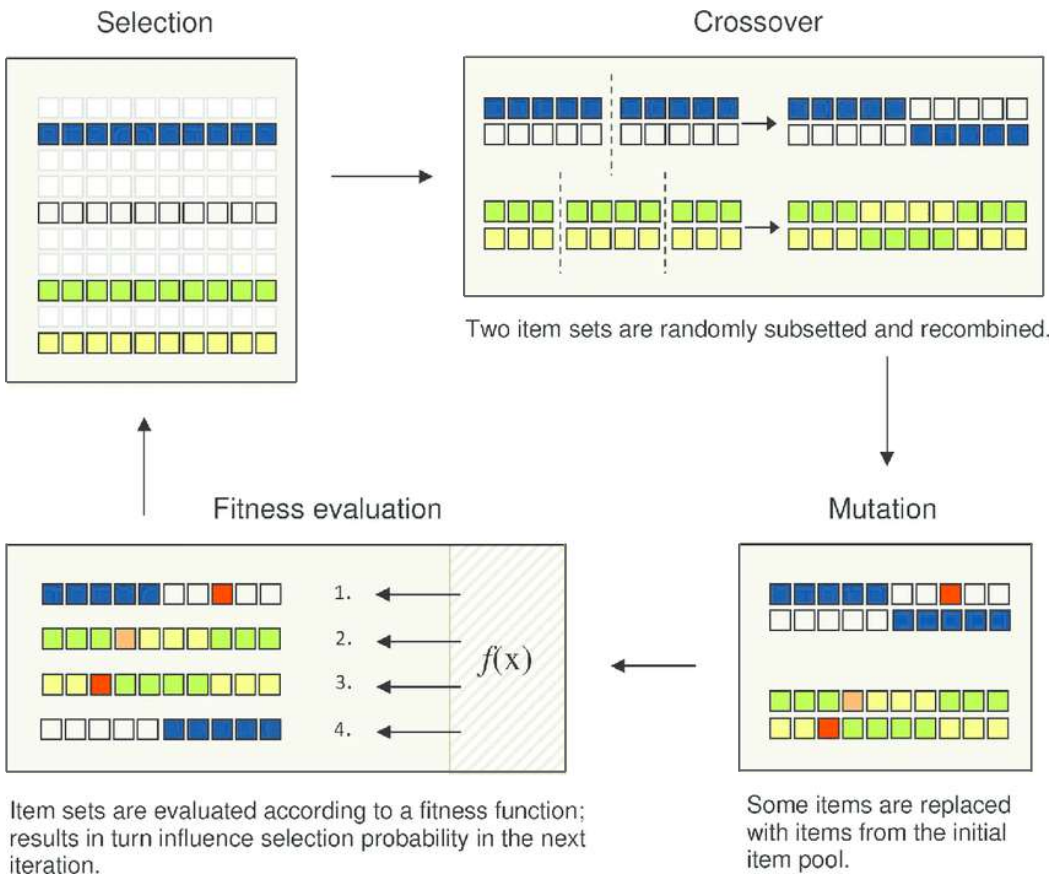
Search Space



$$value = (-1)^{-s} \times 1.F \times 2^{E-bias}$$

2.2. Genetic Algorithm

Operators



2.2. Genetic Algorithm

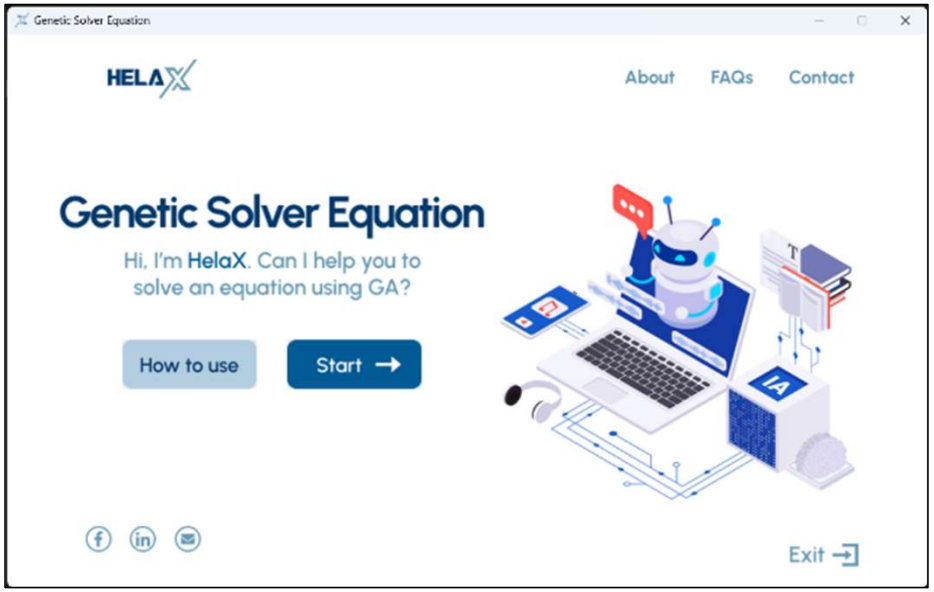
Fitness Score

$$Difference = abs(LHS - RHS)$$

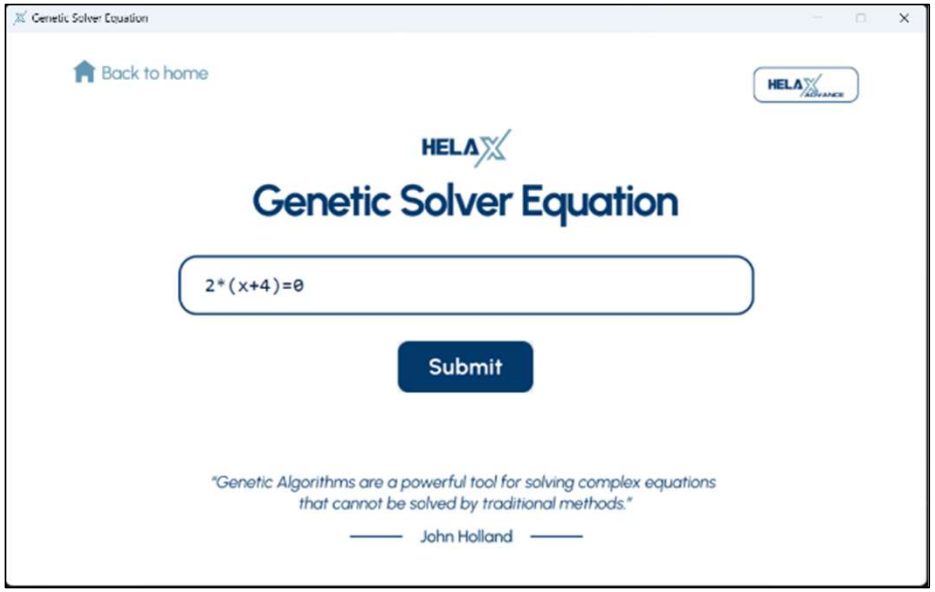
$$Fitness\ Score = 1 / (Difference + 1)$$

When Difference --> 0 => Fitness Score --> 1

3. Results

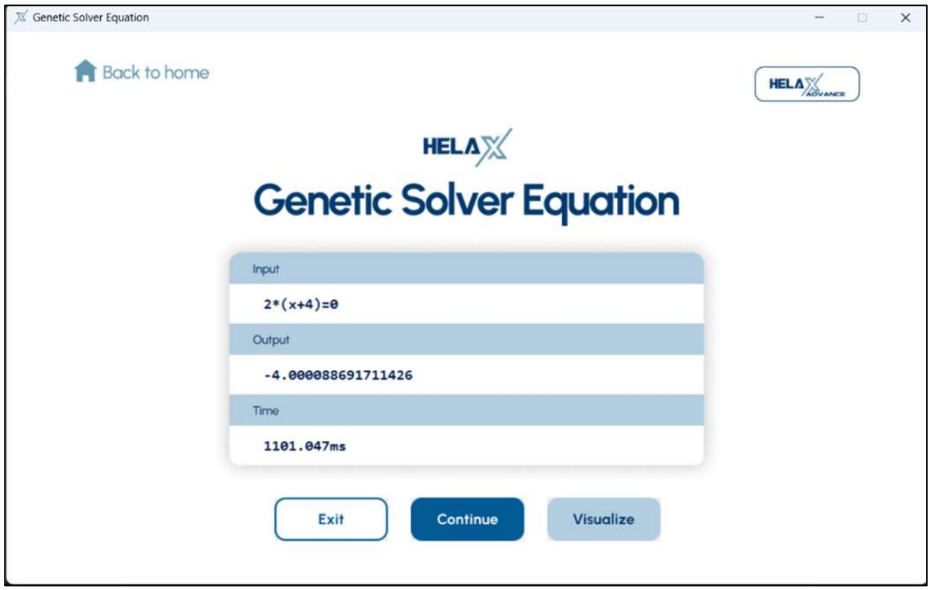


Menu

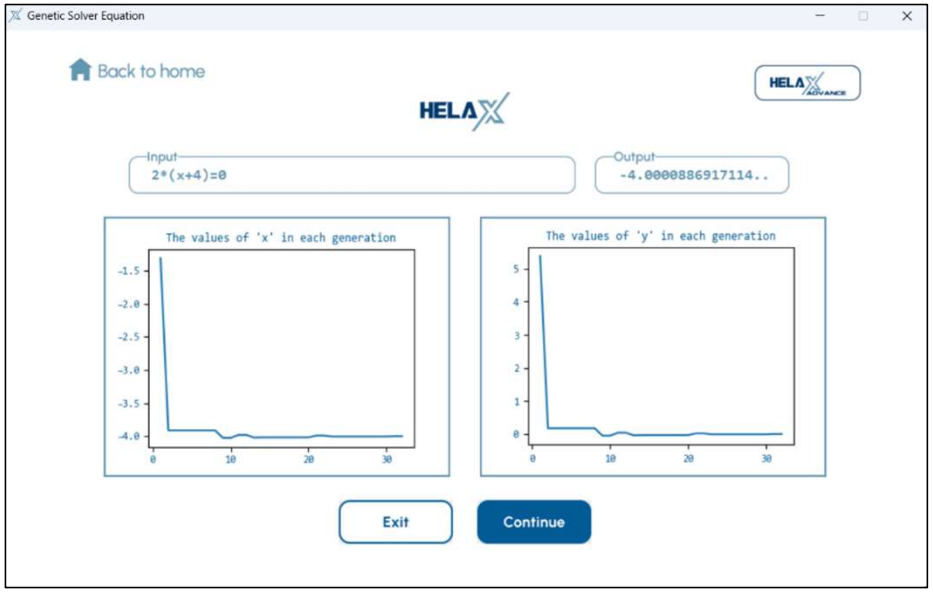


User Input

3. Results

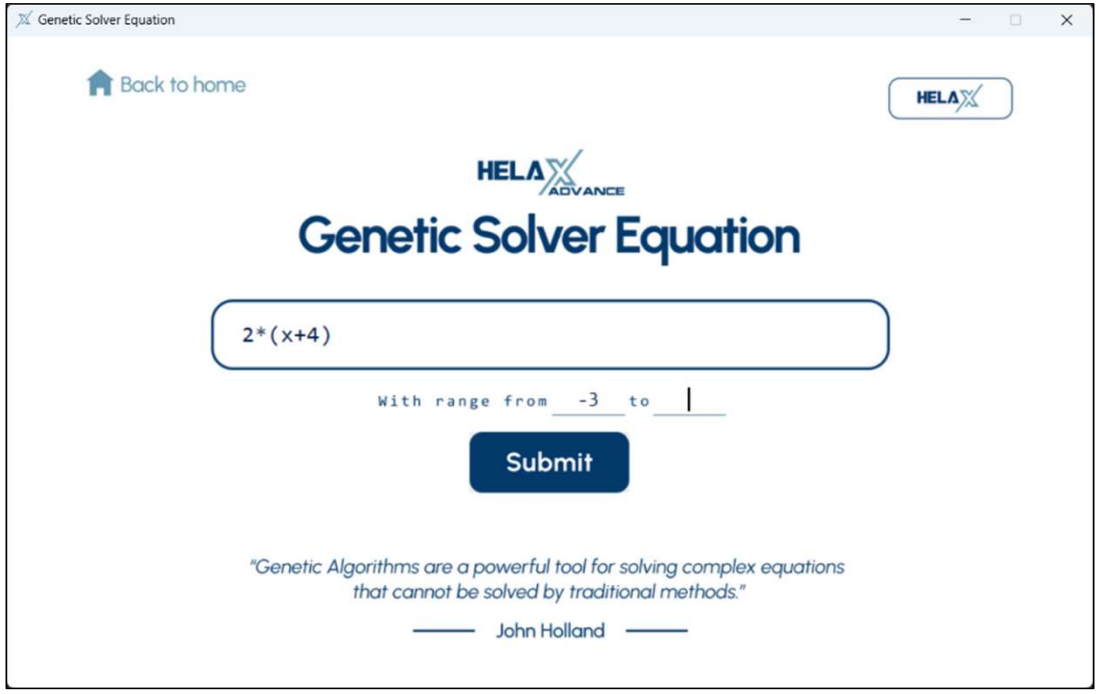


Result



Visualize

3. Results



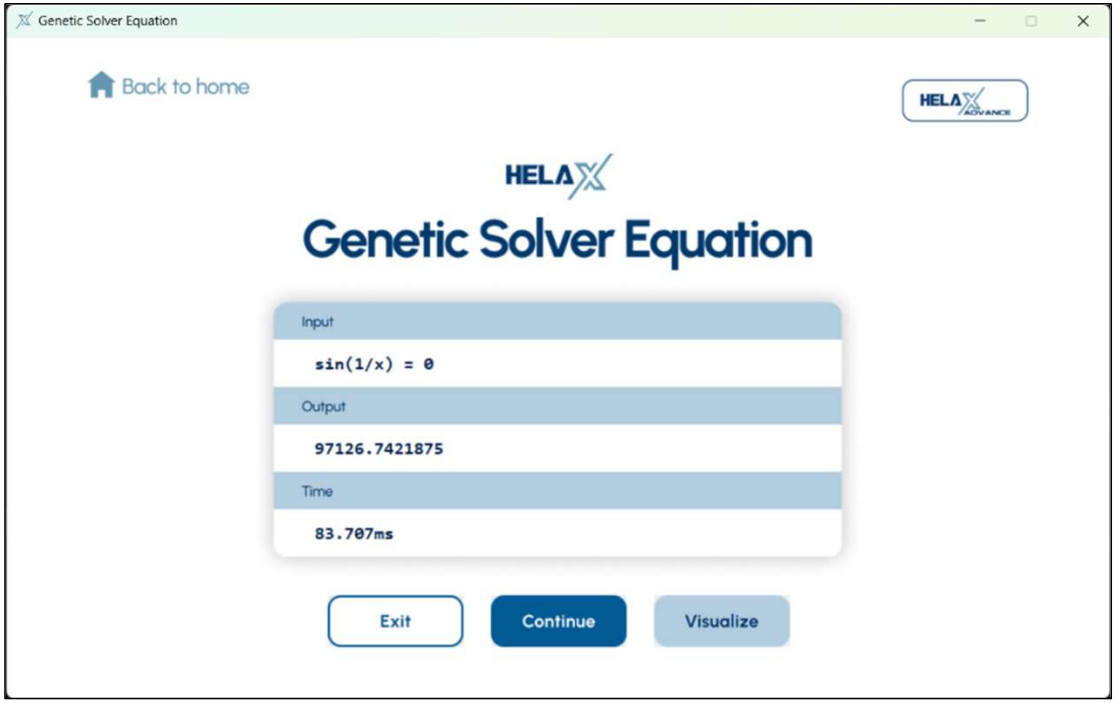
Custom Interval to solve

3. Results

DEMO

4. Discussion

- **No Solution Condition**
- **Slow Convergence**



5. Conclusion

- Easy to find solution but sometime fail
- Try more advance algorithm
- More user-friendly GUI

Thank you!