

Genetic Algorithm and Genetic Algorithm with Local Search

Overview

This repository contains Java implementations of a Genetic Algorithm (GA) and a Genetic Algorithm with Local Search (GALS). These algorithms are powerful optimization techniques inspired by the process of natural selection and genetics. While the Genetic Algorithm performs global optimization by simulating evolution, the Genetic Algorithm with Local Search incorporates local search techniques to enhance convergence speed and solution quality.

Contents

GA.java: Contains the implementation of the Genetic Algorithm.

GALocalSearch.java: Contains the implementation of the Genetic Algorithm with Local Search.

Main.java: File run the simulation of the GA and GA with Local Search.

GA.txt: Contains sample space of the Best Solution (Value only) for GA used the hypothesis test.

GALocal.txt: Contains sample space of the Best Solution (Value only) for GA with Local Search used the hypothesis test.

Calculation.xlsx: The calculation of the mean and variance used in the hypothesis test.

Report Specification.pdf: Details the report about the GA and GA with Local Search.

Addition there are other files from the assignment zip.

Requirements

Java Development Kit (JDK) 8 or higher

Usage

Run the Main.java

You can change sample space of the algorithms by changing the file name. Which is done changing contents of File in the Main Function.

You can change seed used by algorithms by changing the seed value. Which is done changing contents of seed in the Main Function.

Hypothesis Testing

To perform the hypothesis test the following was done

Uncomment the loop structure in the main function.

Clear GA.txt and GALocal.txt and uncomment the function call AppendResultToFile in Simulation Function and Simulation2.

Run the code.

In the GA.txt the solutions found by the Genetic Algorithm will be stored. In the GALocal.txt the solutions found the GALocal will be stored. The values were then copied and pasted into Calculation.xlsx to find the means (Average) and variance associated with samples bases. Which was used in the hypothesis test.