MINI TUTORIAL for MUGA

MUGA Simulator is a dynamic loader for problems and genetic methods. To run the file system must be this:



Decompress de zip file and execute the run.bat.

MUGA has a intuitive interface to make simulations in genetic Algoritms. To do one simulation just fallows the steps 1 to 7.

1 – Select the problem and create population

👙 Genetic Algo	ve – D 🛛		
Simulation	New Population Files of Simulation	IS	
Selection	İ	Dimension 10	
Combination	Select Problem		
Mutation			
Replacement	GA.Problem.TSP	 Simples Population Multi Population 	
Decimation	Create Population		
Run			

In this screen user select the problem and create the population. The dimension of population is selected int the slider or text box.

Population could be **Simples** or **Multi**. Multi populations take advantages in some methods.

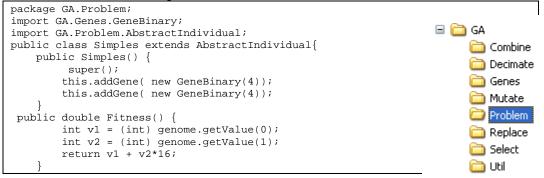
1.1 make yours problems

User can create news problems and solve them in simulator.

To create a new problem write a java class, compile them and **put the *.class in the problem directory**.

We have two types of problems:

- Numerical optimization (AbstractIndividual)
- Combinatorial optimizations (AbstractPermutationIndividual).



```
package GA.Problem;
import GA.Genes.GeneInteger;
public class SimplesPermutation extends AbstractPermutationIndividual{
    public SimplesPermutation() {
        this.genome.addGene( new GeneInteger(0,4, 0) ); //min max value
        this.genome.addGene( new GeneInteger(0,4, 1) );
this.genome.addGene( new GeneInteger(0,4, 2) );
        this.genome.addGene( new GeneInteger(0,4, 3) );
        // GENE [ 0 1 2 3 ]
    }
    public double Fitness() {
        // simples function
// [0, 1, 2, 3] = 90.0
                                 [g0 + g1^2 + g2^3 + g3^4]
         int v1 = (int) genome.getValue(0);
         int v2 = (int) genome.getValue(1);
         int v3 = (int) genome.getValue(2);
         int v4 = (int) genome.getValue(3);
        return v1 + java.lang.Math.pow(v2,2)
                   + java.lang.Math.pow(v3,3)
                    + java.lang.Math.pow(v4,4);
    }
```

The user could save or load entire simulations.

2 – Selection

Or

🐓 Genetic Algo	rithms Simulator ver 1.0		9 - 0 🛛
Simulation Selection	Selection Method	Dimension	
Combination Mutation	GA.Select.Default	Dimension $ _{6}$	
Replacement Decimation	Do Selection		
Run			

Select and execute the method and the number of parents in population to reproduction.

3 - Combination

🖢 Genetic Algo	rithms Simulator ver 1.0	• E .
Simulation		
Selection	Combination Method	
Combination	GA.Combine.Default	
Mutation	Do Combination	
Replacement	Do Combination	
Decimation		
Run		

Select and execute the combination method in selected parents.

If the problem is derived from AbstractPermutationIndividual the methods for combination are:

- MultiPMXCrossover
- PMXCrossover
- OXCrossover
- UXCrossover

The others is for the AbstractIndividual

4 - Mutation

👙 Genetic Algo	rithms Simulator ver 1.0		
Simulation		1	
Selection	Mutation Method	Datia	
Combination	GA.Mutate.Default	Ratio	0.01
Mutation			
Replacement	Do Mutation		
Decimation			

Selects and Execute de mutation method and the mutation ratio.

If the problem is derived from AbstractPermutationIndividual the methods for combination are:

• SwapGenes

The others is for the AbstractIndividual

5 - Replacement

👙 Genetic Algor	rithms Simulator ver 1.0	🖸 🖻 🔳 🖸 🖉
Simulation		
Selection	Replacement Method	ELITISM (%)
Combination	GA.Replace.Default	Population 10%
Mutation	Do Replacement	Childs 0%
Replacement	Dorreplacement	
Decimation		

Select and execute de replacement of the parents for the childrens. Select the percentage of the elitism in population and childs.

6 - Decimation

Genetic Algo	rithms Simulator ver 1.0	• E _ (
Simulation Selection	Decimation Method	
Combination	GA.Decimate.Default	
Mutation Replacement	Do Decimation	
Decimation		

Special operator to multipopulations.

7 – Run

b Genetic Algo	rithms Simulator ver 1.0	
Simulation		40
Selection	Runs 🗸	10
Combination	Run	Create New Population
Mutation	Run	Create New Population
Replacement	Calast	
Decimation	Select	
Run	Combine	
Options		
	Mutate	
Close	Replace	
	Decimate	

Execute the selection, combination, mutation, replacement and decimation in population, or all in the Run button.