Lab of Applied Computational Intelligence

IST

2023/2024

Deap - Evolutionary Algorithms Library

Guide 9

10 October 2023

(Week 5)

1 – Objectives

With this work the student should be able to start using the Deap Library and solve some problems with evolutionary algorithms.

2 – One Max Example

The deap library url is the following:

https://deap.readthedocs.io/en/master/

We will start with the One Max example. First read the documentation regarding this example in the following url:

https://deap.readthedocs.io/en/master/examples/ga_onemax.html

You have several functions to define what is your population and how the individuals should be created.

Then you can use several different functions to perform the classical operators of evolutionary operators (evaluate, mate, mutate and selection).

Run the example with the debugger and see what it does. See how the population each chromosome and each gene is created. See how the crossover and mutation functions are chosen. Then how the population evolves.

Now lets try to make some modifications to the program. Print the best individual in each generation. Compare it with the allOfFame.

Make 10 runs of the program and compute how much time it took to perform each run.

Change the crossover function and mutation functions and see if there is any difference in the run time.

3 – New function Optimization

Now lets try to solve a new problem with a little more complicated function. Find the maximum value of the following function $f1(x1, x2)$:

$$Z1 = \sqrt{X1^2 + X2^2}$$
$$Z2 = \sqrt{(X1 - 1)^2 + (X2 + 1)^2}$$
$$f1 = (\sin(4 * Z1) / Z1) + (\sin(2.5 * Z2)/Z2)$$