

Project 4: Simple EDA

Due: 5/5/2022

Total: 100 points.

Invocation (same as previous project if you extend this to implement cGA, or can be entirely new code):

> sga [-h] [-g] [-G] [filename]

with filename being the name of your settings file. If this filename is left off, by default it should use a settings file called "gasettings.dat". All of the arguments are optional

-h : Should output a help message describing what the options do and then terminate..

-g : Limited debugging information should be displayed while running.

-G : Full debugging should be displayed while running.

The settings file can be same as before, but needs less options here.

Task 1: Implement the compact GA

I want you to write your own version of the compact GA, that is, the EDA using a simple probability vector to implicitly store the population. Note that you do not need to actually store a population for this but you will have a parameter for population size and of course string size.

Each "generation" you will sample your probability vector to get two children. You will then compare them and update the probability vector based on your population size parameter. You should continue this until your probability vector has converged to all 1s or 0s or you have found the global optimum. Note that if you are checking for convergence of the probability vector, due to rounding you should check for when the individual elements are "very close" to 0 or 1.

Task 2: Try it on onemax and compare to sGA

I then want you to compare the sGA from previous projects to your cGA implementation on onemax. Using uniform crossover and elitist selection, how close are the results? Try this

for string sizes of 20, 30 and 40 at least. Note that you do not necessarily need to redo results, so if you have results from previous experiments, please feel free to use them.

TASK 3: Try it on trap-4 and compare it to sGA

Experiments:

Now try your cGA on trap-4, comparing it with results . cGA is not particularly good at trap-4, so do not expect good performance. Is cGA better, worse or about the same as the sGA with uniform crossover on trap-4?

Submission:

I expect the following:

- 1) A readme.txt file describing how to compile and run your project. This file should also outline briefly the results of your experiments above.
- 2) A word document or pdf (called results.pdf or appropriate suffix) describing your experiments and results of bisection on all the different settings variants.
- 3) A summary at the end of this word document detailing any conclusions you can draw from this.
- 4) All your source files

To submit, put all these files in a folder and compress them using tar or zip. Then attach the archive to canvas.