Project Presentation (control continu DFO Part I)

A. Auger

Updated December 22nd 2017

might be updated, check the last version on the webpage

Overview

The "control continu" for the first part of the DFO class consists in small projects that can be done in groups of 4 to 5 students.

Each project consists in evaluating the performance of different derivative-free-optimization algorithms.

For this, you will be using the Comparing Continuous Optimizers platform (COCO) https://github.com/numbbo/coco

Also look at goo.gl/HZvFQ9

The main task

The main task is assess the performance of some derivative-free optimizers scientifically and critically.

- You will need to understand the methodology for performance assessment implemented into the COCO platform.
- The difficulties modeled in the different test functions
- How to interpret the different processing graphs provided with the platform

The algorithms

You will need to

- use algorithms that have already been benchmarked within the COCO platform http://coco.gforge.inria.fr/doku.php?id=algorithms-bbob

- (for some project) benchmark novel algorithms (to be compared with 2 already benchmarked algorithms)

Suggestion of Projects

Project P1: Implement and benchmark algorithm A2
A2 algorithm from Nikolaus Hansen, Andreas Ostermeier, and Andreas Gawelczyk: "On the Adaptation of Arbitrary Normal Mutation Distributions in Evolution Strategies: The Generating Set Adaptation". In Proceedings of the Sixth International Conference on Genetic Algorithms, pp. 57-64, 1995"
• Compare it with algorithm BIPOP-CMA-ES ; IPOP-CMA-ES

Project P2: Implement and benchmark the simulated annealing algorithm
Simulated Annealing: from Anton Dekkers and Emile Aarts: "Global optimization and simulated annealing". In Mathematical Programming 50, pages 367-393. North Holland, 1991.
• Compare it with algorithm (1+1)-ES with one-fifth success rule (ONEFIFTH) ; IPOP-CMA-ES

Suggestion of Algorithms

Project P3: Implement and benchmark algorithm (mu/mu,lambda)-sigmaSA-ES

Algorithm 2 described in Nikolaus Hansen, Dirk V. Arnold and Anne Auger: "Evolution Strategies". In Janusz Kacprzyk and Witold Pedrycz (Eds.): Handbook of Computational Intelligence, Springer, Chapter 44, pp.871-898, 2015.
- Compare it with algorithms BIPOP-CMA-ES ; IPOP-CMA-ES

Project P4 Compare algorithms BFGS ; NELDER ; NEWUOA ; BIPOP-CMA-ES; (1+1)-ES with one-fifth success rule (ONEFIFTH)

Project P5 Compare algorithms PSO ; NEWUOA ; BIPOP-CMA-ES; CMA-ESPLUSSEL, IPOP-CMA-ES

Note: You can propose to benchmark other algorithms or look at different comparisons

For Friday 15th December:

Form the groups, send me an email (one per group) once the group is formed containing:
the name of the group members, their mail addresses and your choice of project.

install the COCO platform following the instructions here:
https://github.com/numbbo/coco

report if you have encountered some technical issues

Reports and Grading

See the google doc document: goo.gl/HZvFQ9

Deadline

Send the report by email by January 24th (midnight)

Oral defense: Weeks of the 29th of January or of the 5th of February (see google docs)

Plagiarism

Plagiarism is a serious issue. Please make sure that you are aware about what is plagiarism: (for instance look here http://www.plagiarism.org/article/what-is-plagiarism)

In the report, you should use your own words to rephrase what you have understood.

Yet, if you want to reuse certain sentences from papers or figures for your report, it is possible but for sentences, you have to put quotation mark and add the reference of where the sentence is taken and for the figures you have to say where you took it from.

If I detect plagiarism the student who did the plagiarism will fail