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Stochastic Optimization I: State of the Art and Beyond

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CSC801-002-2018-sp/Lectures/Lecture-01

January 12, 2018

Room EB2-3265 ; 1:45 PM – 3:00 PM ; 3:15 PM – 4:30 PM

The first part of this lecture provides a tutorial context as well as a template for rigorous asymptotic performance experiments with stochastic solvers we shall introduce in this course. We shall also put to test demos of typical resources that we shall use routinely. The second part of the course synchronizes with the current syllabus: we define and initiate experiments with the R-package DEoptim.

The complete L^AT_EX source directory that contributed to the creation of the file Lecture-01.pdf (this lecture) will serve not only as a template for lectures to follow and for each homework assignments but also as a template for the jointly-authored draft of the manuscript. Excerpts from each lecture as well as excerpts from each homework will provide source material for the manuscript. The manuscript will be jointly edited and completed at the end of the course.

Lecture Outline

- Highlight a cross-section of articles in the context of pages taken by tables, some with small fonts, some with a single table spanning 3 pages. Discuss and agree on a limit on the number of experiment-derived data points one should aggregate into a table to appear on a single page of an article?
- On limits of significant digits and the computational cost of experimentation: this quote is attributed to Richard Feynman, a 1965 recipient of the Nobel Prize in Physics: *“thou shall not attempt to compute a number whose value is not known in advance”*.
- How can experiments with various approximations of π , from the so called “Monte Carlo Buffon’s needle experiments” in 1777 to the rapidly converging BPP formula discovered in 1997 provide a template for plotting the results of comparative asymptotic experiments with stochastic solvers?
- A quick tutorial about the *Differential Evolution* stochastic solver in general and the R-package solver DEoptim in particular.
- The initial template for asymptotic performance experiments with DEoptim.

NOTE:

The lecture write-up under the new (and beautiful) Tufte handout template is still work in progress, <http://ctan.math.washington.edu/tex-archive/macros/latex/contrib/tufte-latex/sample-handout.pdf>. We shall have the template rollout as part of the first lecture tomorrow.

In the meantime, please proceed with the tests as suggested in the email. I am looking forward to the feedback.

On Predicting the Asymptotic Performance of Stochastic Optimization Solvers: Pictures that Replace Thousands of Tabulated Numbers

Franc Brglez, Et Al*

January 11, 2018

ABSTRACT. One of the motivating factors for the working title of this paper is the quote attributed to Richard Feynman, a 1965 recipient of the Nobel Prize in Physics: *“thou shall not attempt to compute a number whose value is not known in advance”*. This paper addresses the problem of experimentally predicting the asymptotic performance of stochastic optimization solvers, in both the continuous and the discrete domains.

... The working title and few lines of the abstract above represents the initial template for the draft of the co-authored manuscript to be completed by April 30, 2018. The \LaTeX source file of this document, the supporting .tex, .bib, graphics (.pdf and .png) and related R-files have been aggregated under the dedicated subdirectories outlined in this lecture.

The subdirectories under CSC801-002-2018-sp/ will archive not only items related to Syllabus/ and the source material associated with each lecture under Lectures/. There will be shared R-code written by instructor and participants under course_lib_r/ and Homework_nameId/ where _nameId associates with the course participant, etc.

In early drafts such as this one, you may see a number of paragraphs that contain pseudo-latin text. The main purpose of such text is to control placement of Figures and Tables on any given page – until the text is replaced by an English text that provides context about the adjacent Figures and Tables. Lorem ipsum dolor sit amet, consectetur adipiscing elit. Ut purus elit, vestibulum ut, placerat ac, adipiscing vitae, felis. Curabitur dictum gravida mauris. Nam arcu libero, nonummy eget, consectetur id, vulputate a, magna ...

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NOTE:

Please review the names, email addresses, and affiliations for correctness. Affiliations marked with ?? are my guesses. Email me any corrections in this format:

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