Week 1 tasks

June 18, 2021

1. Implement an "oracle" class. For now this should be initialized with a function $f(x)$, and have a call method which takes as input two points x, y and returns $+1$ if $f(y) - f(x) > 0$ and -1 if $f(y) - f(x) < 0$. We can expand this later to allow for a probability of being incorrect.

2. Implement a comparison based version of the Stochastic Three Point (STP) method described in the paper [BGR20] (see Alg. 3.1 on pg.7). You will need to think about how to perform step 3 (finding the argmin) using only a comparison oracle.

3. Test your Comparison-based STP (let's call it C-STP) on the two test functions in `benchmarkfunctions.py`. I think that C-STP is the simplest possible comparison-based optimization method. Thus, it will be a great benchmark for us moving forward.

4. Have a look at some of the papers in the bibliography. Follow up on some of their citations, and hopefully find some new papers to add to the list.

References

[BGR20] El Houcine Bergou, Eduard Gorbunov, and Peter Richtarik. Stochastic three points method for unconstrained smooth minimization. *SIAM Journal on Optimization*, 30(4):2726–2749, 2020.