Data Structures and Algorithms (INFO-F413)
Assignment 2: Maximum Satisfaction

Jean Cardinal (jean.cardinal@ulb.be)

December 2021

The Max 3-SAT Problem

We are given a Boolean formula in conjunctive normal form (CNF), in which every clause has exactly three distinct literals, and no clause simultaneously contains a literal and its complement. The Max 3-SAT problem consists of finding a variable assignment that maximizes the number of satisfied clauses.

Your work

1. Describe and analyze a Las Vegas algorithm for the Max 3-SAT problem that always satisfies at least a fraction 7/8 of the clauses.
2. Implement this algorithm in your favorite programming language.
3. Run experiments and give empirical estimates of the fraction of satisfied clauses and the distribution of the running time.
4. Compare these to the bounds predicted by your analysis, and explain.

Benchmarks 3SAT instance can be downloaded from the SATLIB website :

`https://www.cs.ubc.ca/~hoos/SATLIB/benchm.html`

You are required to hand in a typeset report following the plan above, with the source code of your experiments in an appendix.

Deadline: Monday December 20, 2021.

Further readings

- M&R Textbook, Chapter 5 – The Probabilistic Method