Term Project

MATH 8650, Fall 2018

Due: November 30, 2018

You may work in groups of two. (Other team sizes require permission in advance.)

Deliverables

- Code (Jupyter notebook preferred)
- 3–5-page written report
- 10-minute presentation

Grading

- Code: well structured, well documented, object-oriented, automated tests
- Presentation: Clear introduction to the problem and your approach, benchmarks
- Report: Problem description, solution approach, challenges, references, team roles

Topics You can choose, but should address

- complexity
- performance
- data structures

Suggested Projects

- Board game with computer playing one side using minimax, game tree search. Quarto, checkers, nim, tic-tac-toe ($n \times n$), connect4, connect5, four-in-a-row 3d, etc.)

- Puzzle solvers or generators (Conway's life, sudoku, kakuro, etc.)

- Path finding (`https://en.wikipedia.org/wiki/A*_search_algorithm` vs. Dijkstra, for example).

- Advanced search trees (AVL trees, splay trees, red-black trees, etc.)

- Minimum spanning trees using union-find with path compression

- Fibonacci heap

- Graph coloring (`https://en.wikipedia.org/wiki/Graph_partition`, minimum k-cut, Lin-Kernighan, etc.))

- Traveling salesman (Christofedes, Lin-Kernighan, etc.)