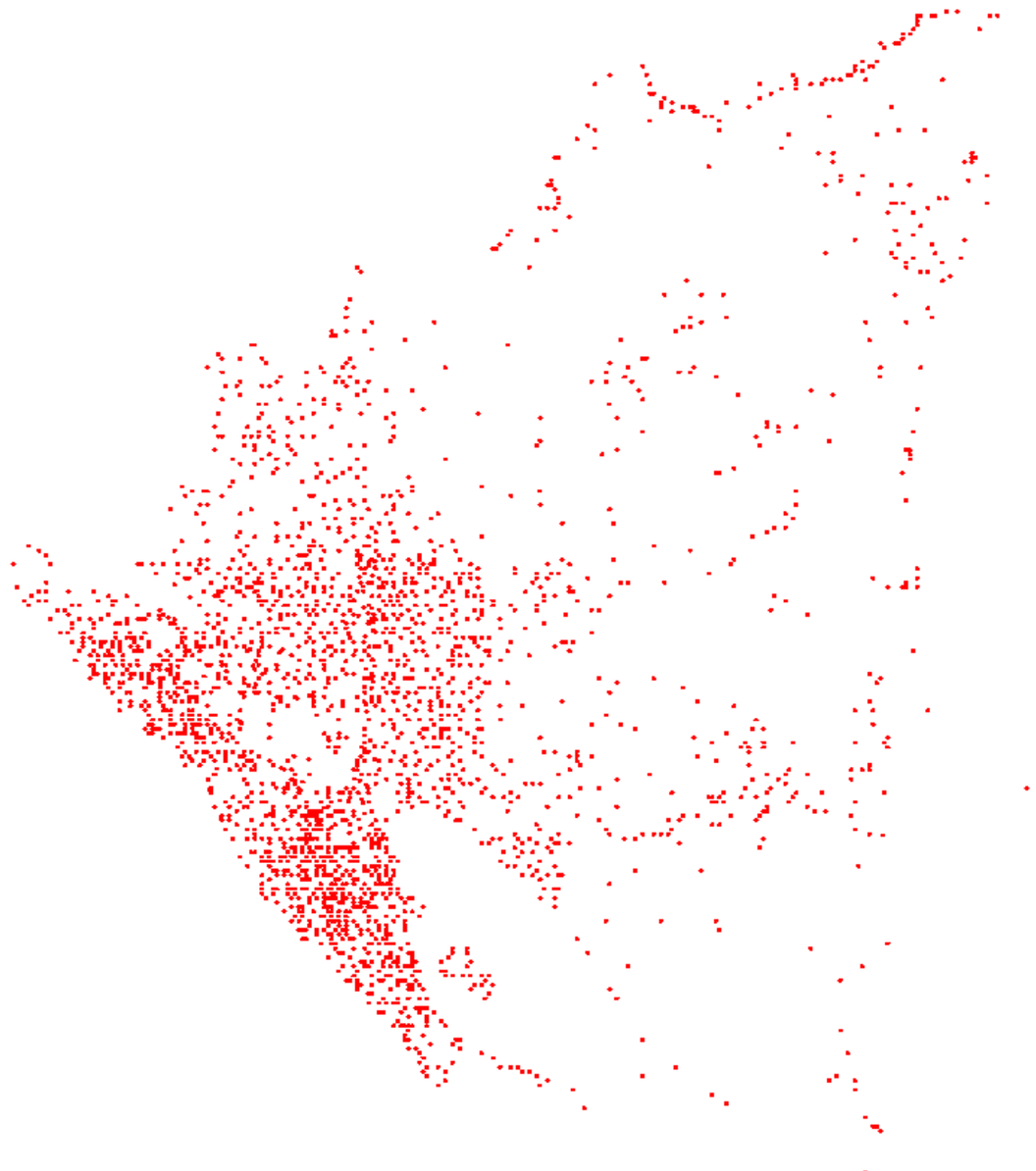
Coursework #2: TSP

CS454 AI-Based Software Engineering

Shin Yoo

Travelling Salesman Problem

- Given **`N`** points in space (usually 2D surface)
- Find the shortest tour of all points.
- Search space: **`N!`**
- Computational complexity: NP-complete
- Brute Force: **`O(N!)`**



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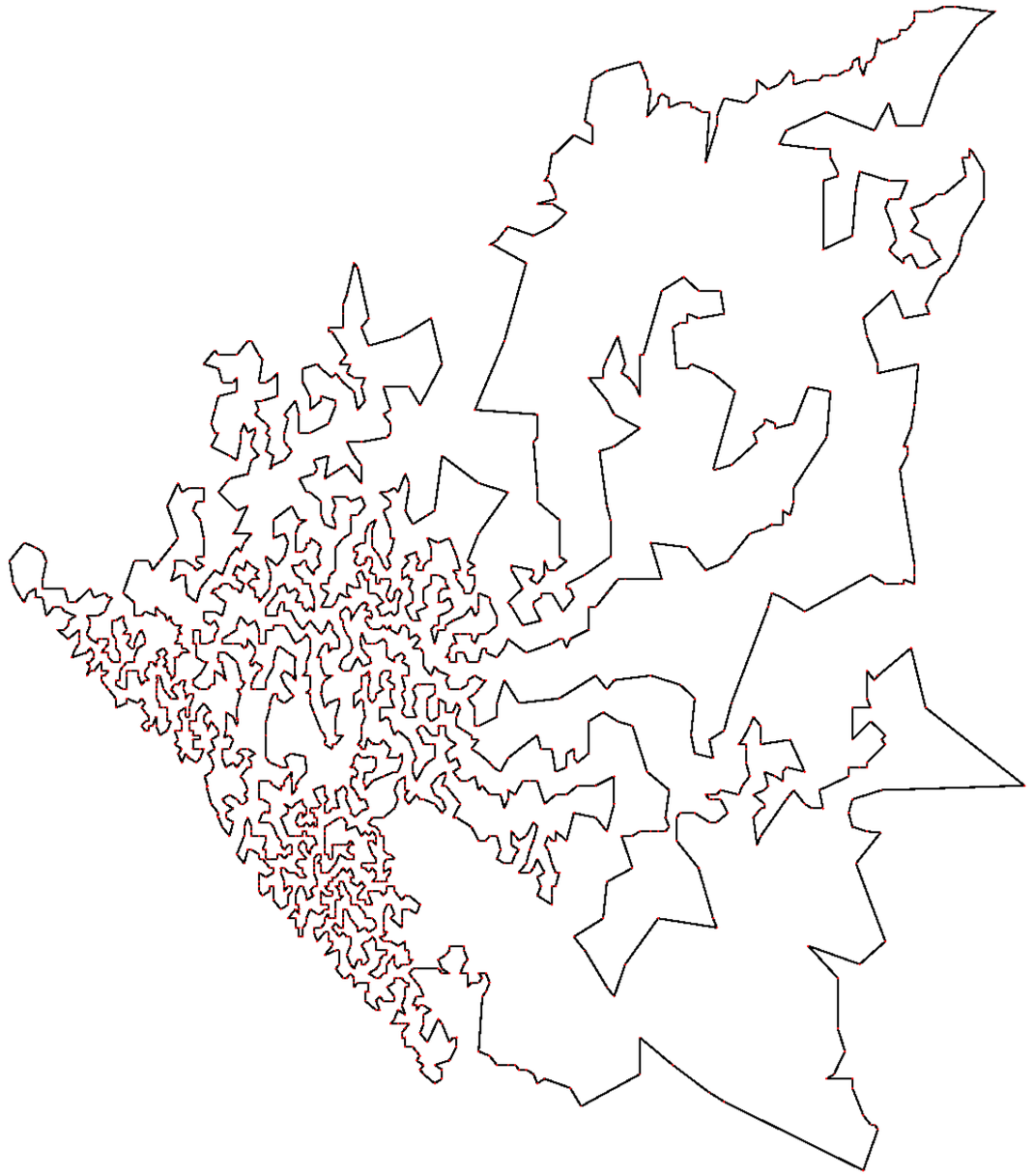


Exact Algorithms

- Early dynamic programming
  - Held-Karp algorithm: $O(n^2 2^n)$
- Linear Programming
  - 15,112 German cities: 22.6 CPU years on 500MHz Alpha, 2001
  - 33,810 points on a circuit board: 15.7 CPU years, 2005
  - 85,900 points: 136 CPU years

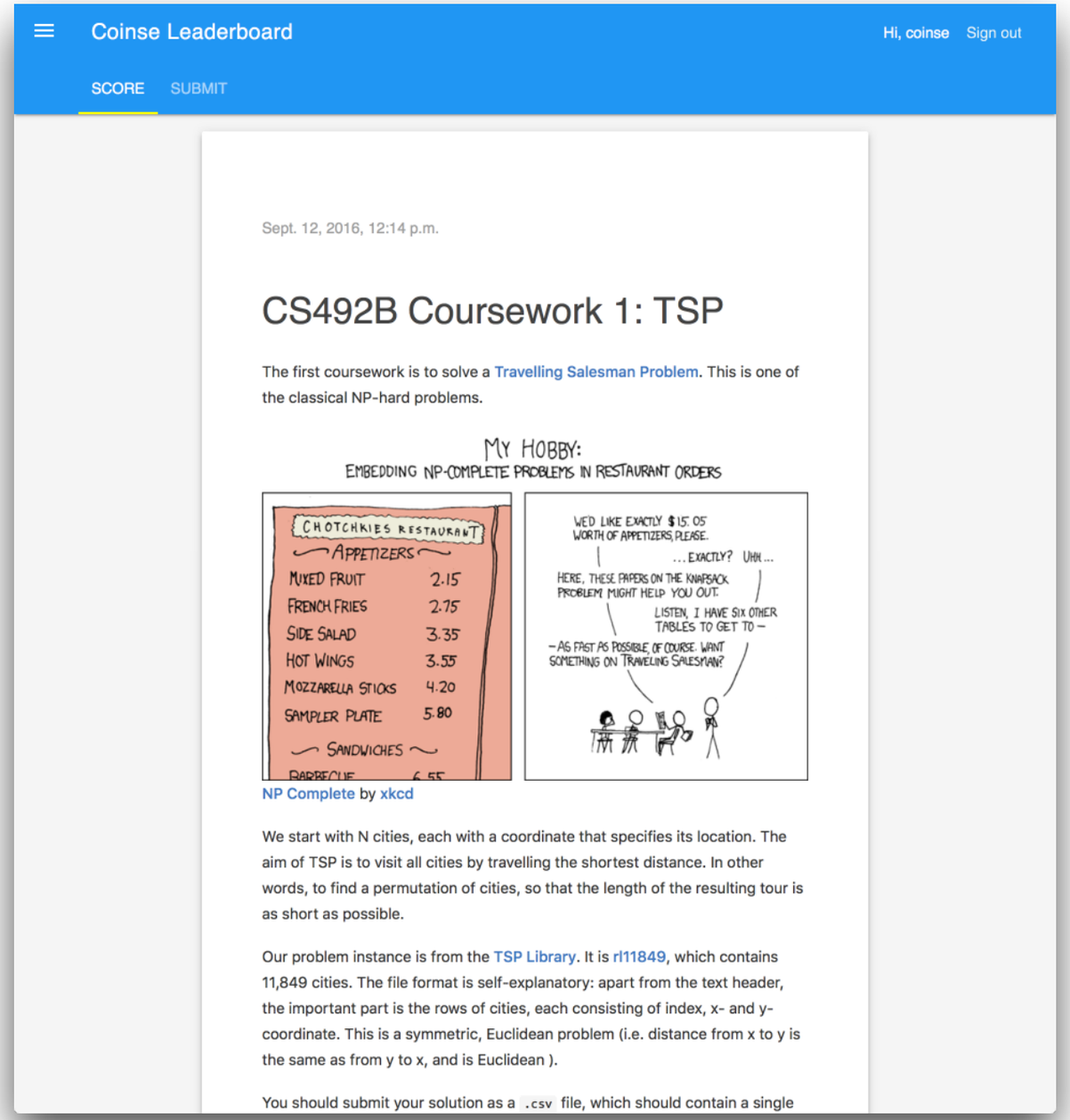
Heuristic Approach

- Many specific genetic operators have been designed.
- Use domain knowledge. For example:
  - Euclidean TSP observes triangular inequality.
- We're still introducing new algorithms: you can apply them as we go.

Leaderboard

- http://coinse.kaist.ac.kr/leaderboard

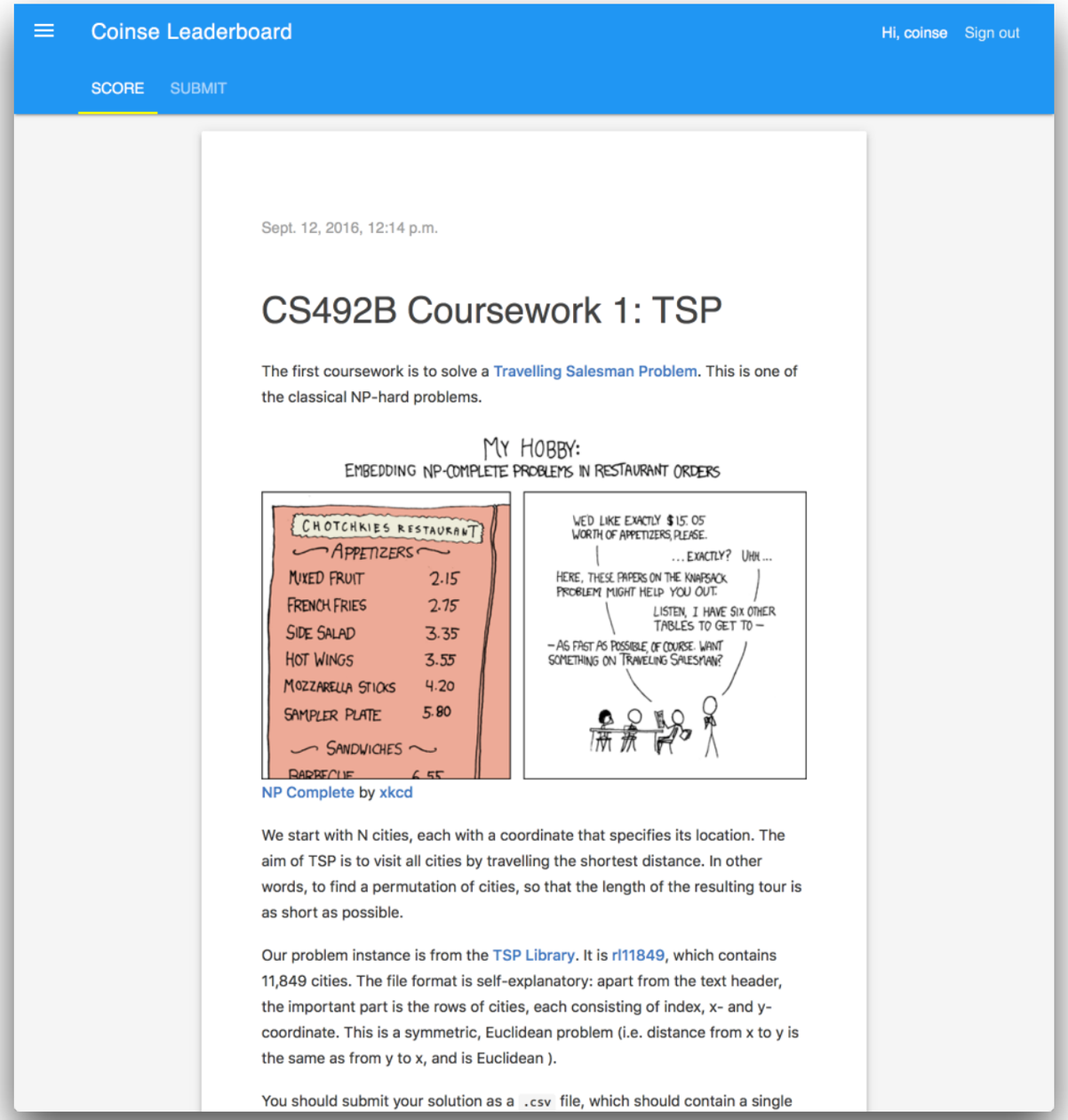
- System has just been developed for this course: we expect initial problems - report bugs, and be kind to T/As and me :)



Leaderboard

- Register with your KAIST email and student ID number

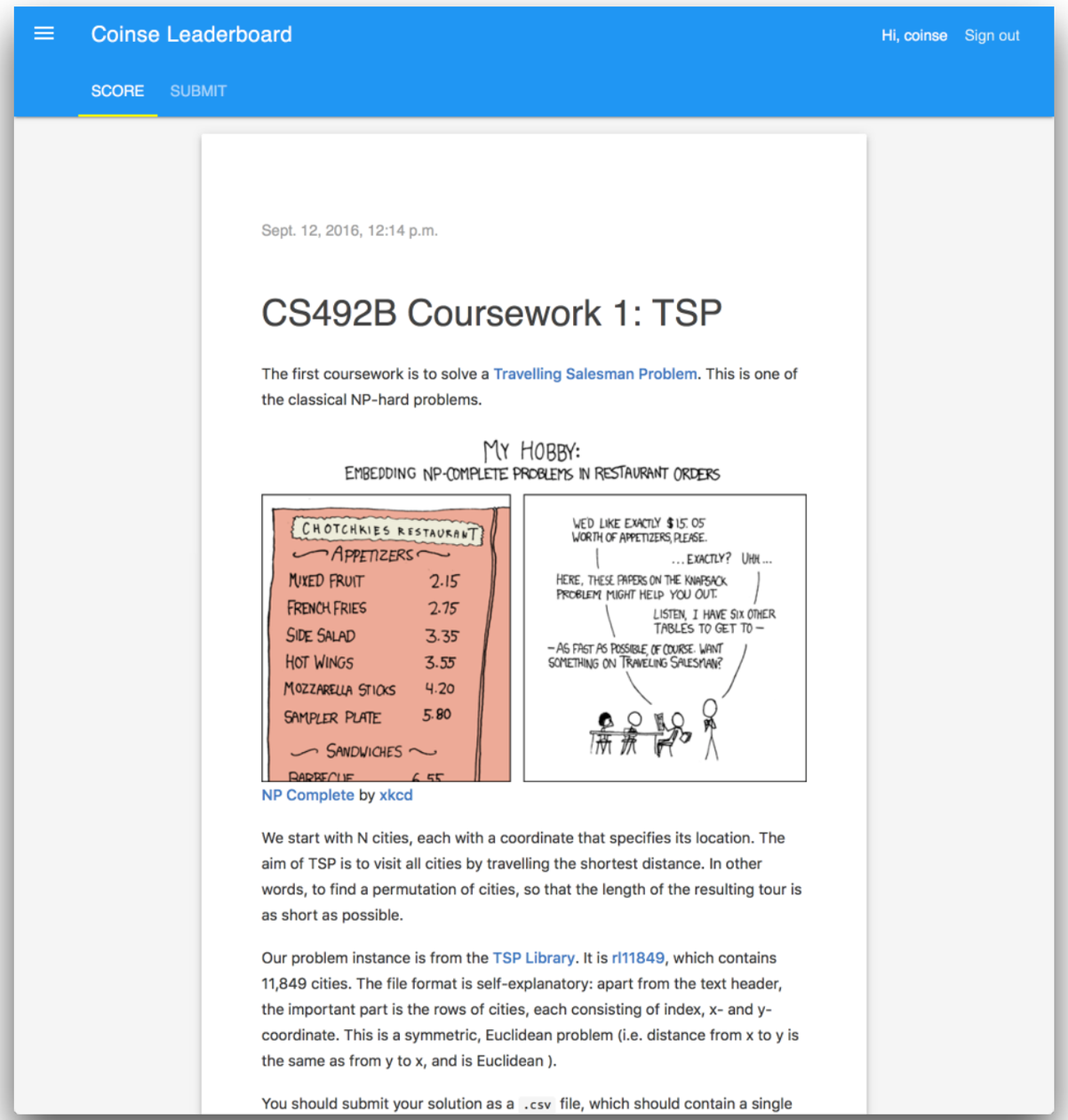
- Submit your solutions to CS454 Coursework 2: TSP



Leaderboard

- Top solution at the end of the coursework period will get a prize :)

- But this is separate from grading, which will also consider the report, the code quality, as well as the novelty in the approach



Note

- Coursework: to write a TSP solver that can take any problem instance (in the TSPLIB format).

- Competition: to submit a solution to `rl11849` instance to the leaderboard using your solver.