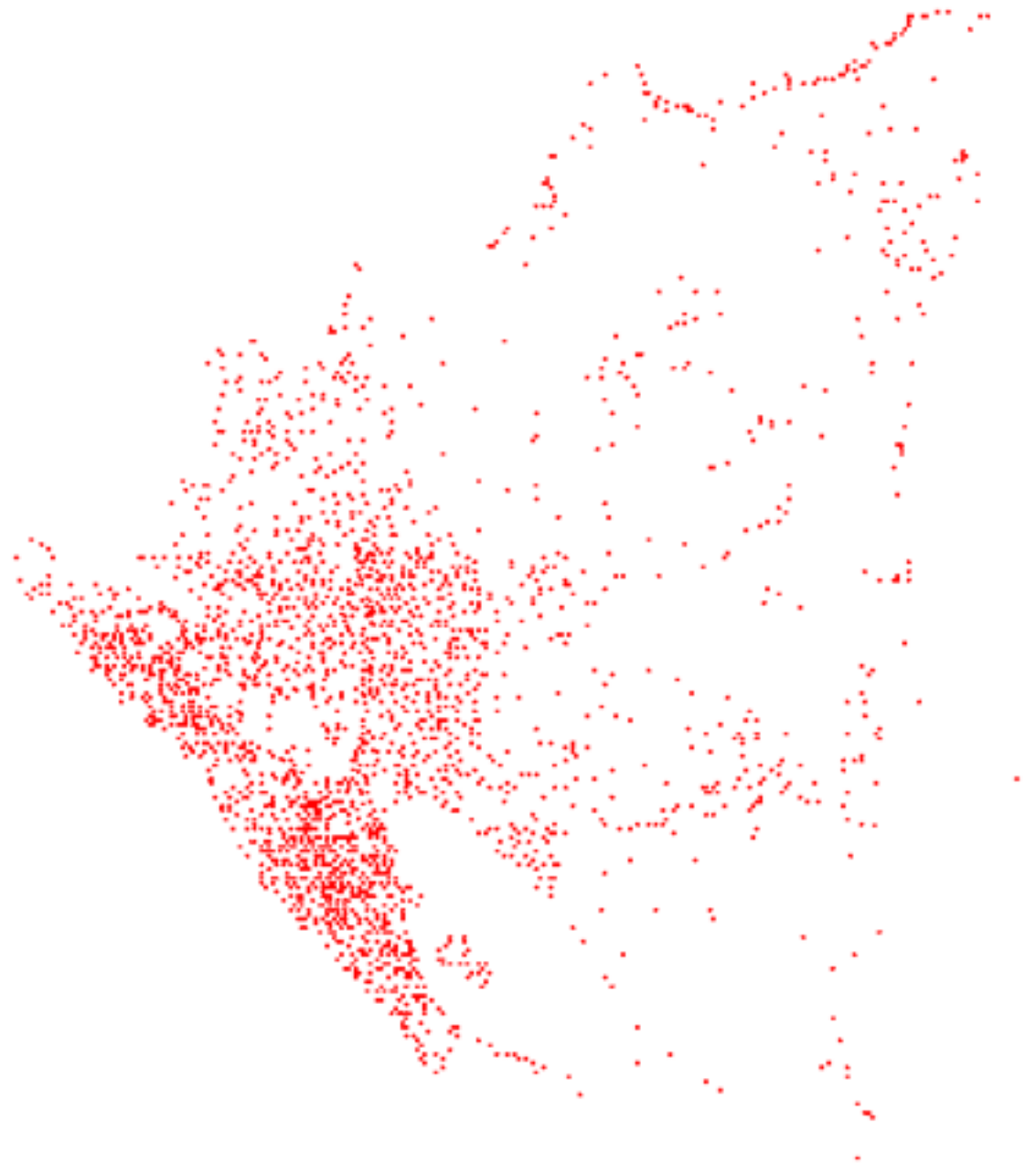# Coursework #1: TSP

CS492B, Autumn 2016

Shin Yoo
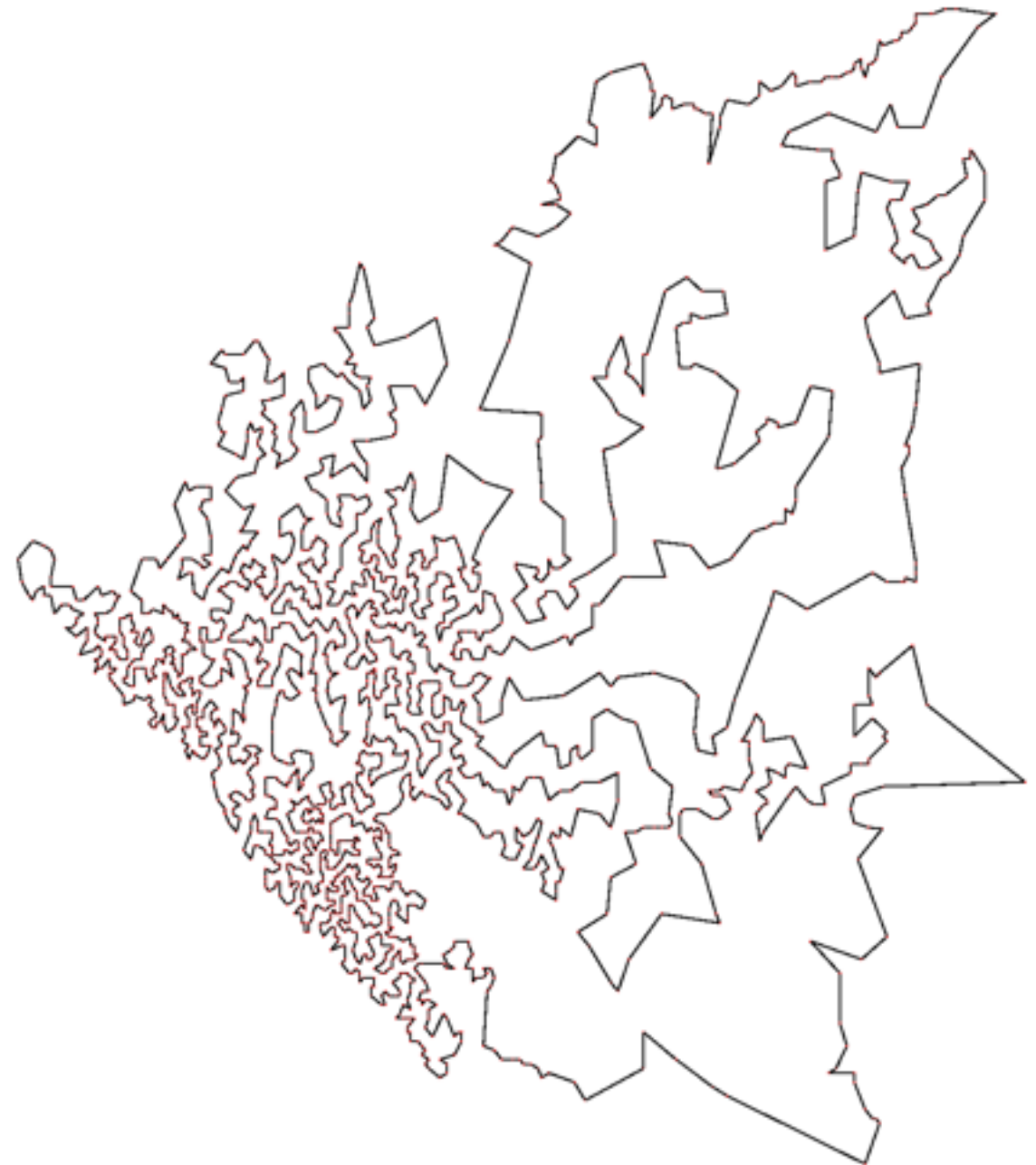
Travelling Salesman Problem

- 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:8000

- 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 CS492B Coursework 1: 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.

In the cloud

- Optimisation can take long, especially given the size of the TSP instance we're tackling (it is not trivial)

- We are setting up MS Azure accounts that you can use: you will get account access after the holiday. Coming soon!