

# TSP EA Project Proposal

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## A. EA Design

- Main method and list-based prototype based off of previous assignments
- Modularized problem definitions, so that different problems can be rewritten using minimal code.
- A suite of EA techniques built into specialised modules.
- Decorators which reduce redundancy, and enforce uniformity in the code.

## B. EA Techniques

### *Survivor Selection*

Mu + Lambda Survivor	VS.	Replacement
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### *Parent Selection*

Multiple Pointer Selection	VS.	Tournament
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### *Crossover*

Edge Tables	VS.	Partially Mapped Crossover
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### *Mutation*

Permutation Inversion	VS.	Permutation Scramble
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## C. EA Optimization

- Side by side comparison of EA techniques to select the optimal set of techniques for the TSP.
- numpy/pandas, Cython to provide faster computation speeds by reducing overhead from unnecessary object wrapping.
- Translating GPS locations to a relative central origin, to reduce distance.
- Special focus on fitness function optimization, as that is typically the most time consuming step of the algorithm. Hash tables or memoization of city distances and/or individuals are possible optimizations being considered.
- Heuristic based parent initialization, likely done through identifying node clusters, to minimize cross-map trips.

## D. Team Management

- Nina
  - Writing Lead
  - Heuristic Initialization
- Rebekah
  - Research for New Improvement
  - TSP Brute Force
- Zachary
  - Optimization of Researched Improvement
  - Team Lead
- Daniel
  - Optimization of Heuristic
  - Testing