CSE 318 - Assignment 3

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This report summarizes the results of running various constructive and perturbative heuristics on the Traveling Salesman Problem (TSP) for the **a280.tsp, berlin52.tsp, bier127.tsp, ch130.tsp, ch150.tsp, eil101.tsp, eil51.tsp, eil76.tsp, kroA100.tsp, kroB100.tsp, kroC100.tsp, kroD100.tsp, kroE100.tsp, lin105.tsp, lin318.tsp, pr124.tsp, pr144.tsp, pr76.tsp, rat195.tsp, rat99.tsp, st70.tsp** problem instances.

Summary Statistics

- Total number of TSP problem files: 21
- Total number of constructive heuristics: 6
- Total number of perturbative heuristics: 3

Constructive Heuristics

- **NearestNeighbour**
- **SemiGreedyNearestNeighbour**
- **CheapestInsertion**
- **SemiGreedyCheapestInsertion**
- **RandomInsertion**
- **MSTSimple**

Perturbative Heuristics

- **TwoOpt**
- **NodeSwap**
- **NodeShift**

Results

In the following tables and figures, the relative performances of the constructive and perturbative algorithms are analyzed according to mean values over 10 test runs for each combinations.

Heuristic Combination	Win Count
RandomInsertion+NodeShift	11
MSTSimple+TwoOpt	4
NearestNeighbour+TwoOpt	4
RandomInsertion+TwoOpt	2

Table 1: Win Counts by Heuristic Combination

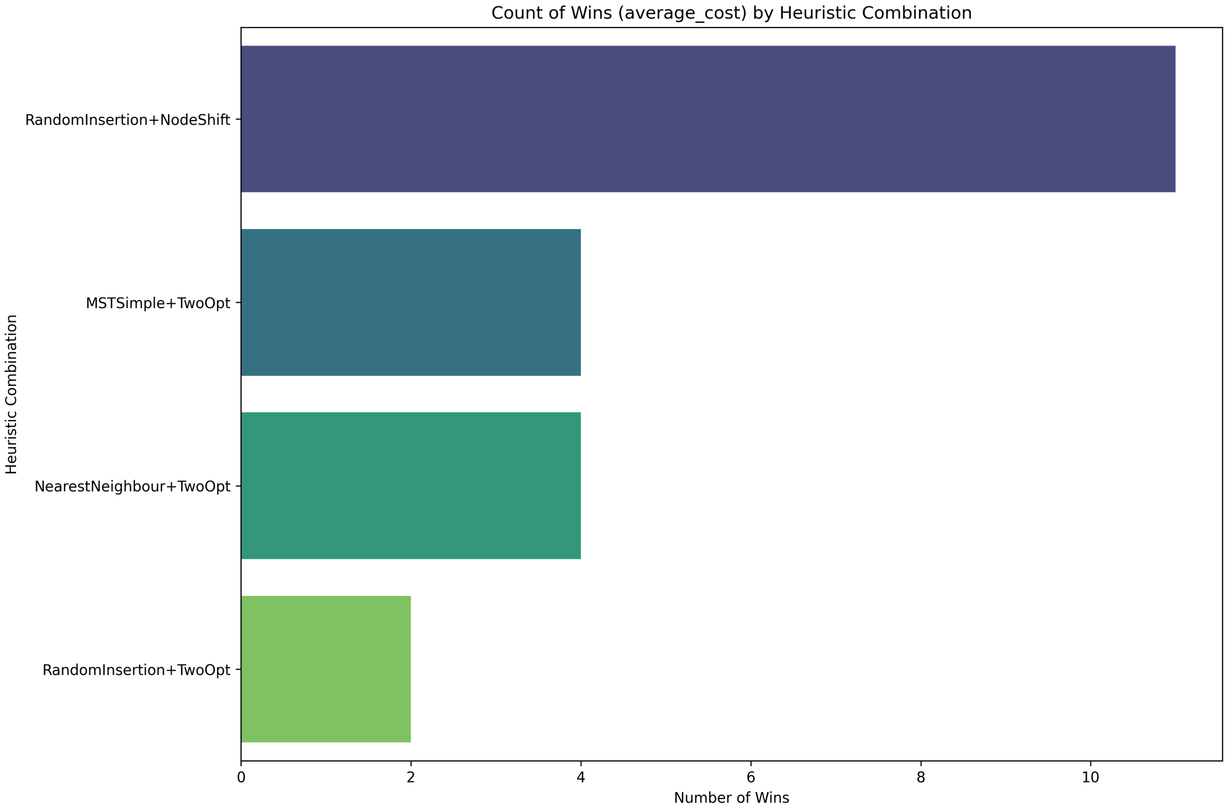

Figure 1: Count of Wins (average wins) by Heuristic Combination

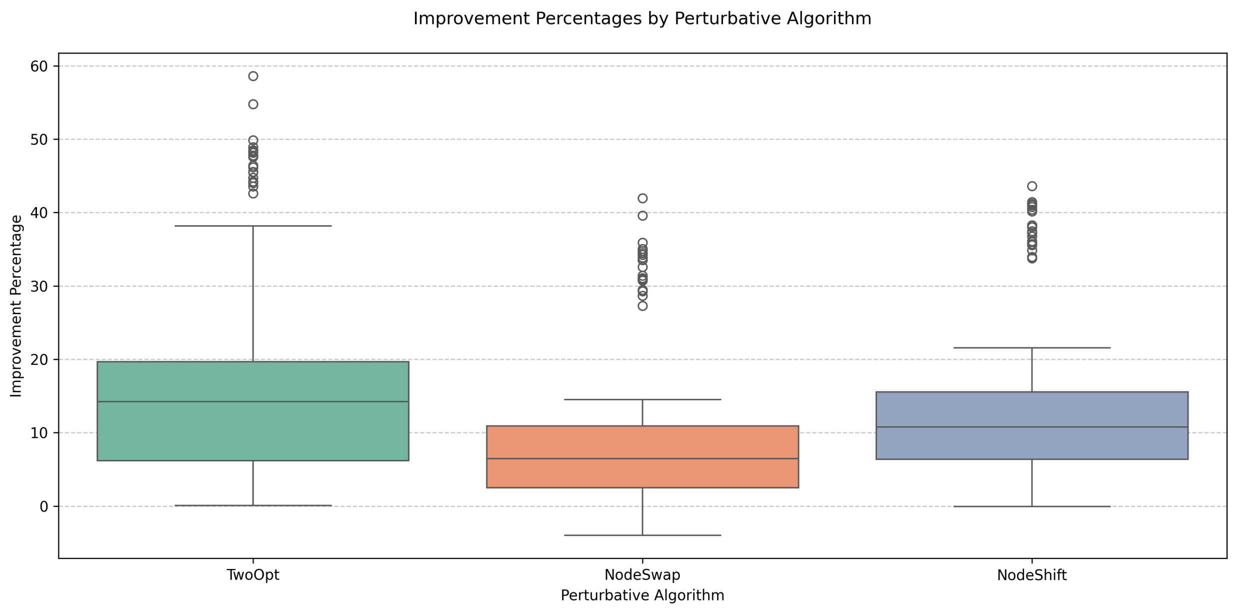

Figure 2: Improvement Percentages by Perturbative Algorithm

Constructive	Perturbative	Mean Deviation
CheapestInsertion	—	0.0445
CheapestInsertion	NodeShift	0.0429
CheapestInsertion	NodeSwap	0.0470
CheapestInsertion	TwoOpt	0.0537
MSTSimple	—	0.0539
MSTSimple	NodeShift	0.0516
MSTSimple	NodeSwap	0.0643
MSTSimple	TwoOpt	0.0489
NearestNeighbour	—	0.1231
NearestNeighbour	NodeShift	0.1028
NearestNeighbour	NodeSwap	0.1235
NearestNeighbour	TwoOpt	0.0655
RandomInsertion	—	0.0678
RandomInsertion	NodeShift	0.0586
RandomInsertion	NodeSwap	0.0730
RandomInsertion	TwoOpt	0.0617
SemiGreedyCheapestInsertion	—	0.0990
SemiGreedyCheapestInsertion	NodeShift	0.0785
SemiGreedyCheapestInsertion	NodeSwap	0.0852
SemiGreedyCheapestInsertion	TwoOpt	0.0699
SemiGreedyNearestNeighbour	—	0.1778
SemiGreedyNearestNeighbour	NodeShift	0.1599
SemiGreedyNearestNeighbour	NodeSwap	0.1673
SemiGreedyNearestNeighbour	TwoOpt	0.0765

Table 2: Algorithm Combination Consistency Analysis

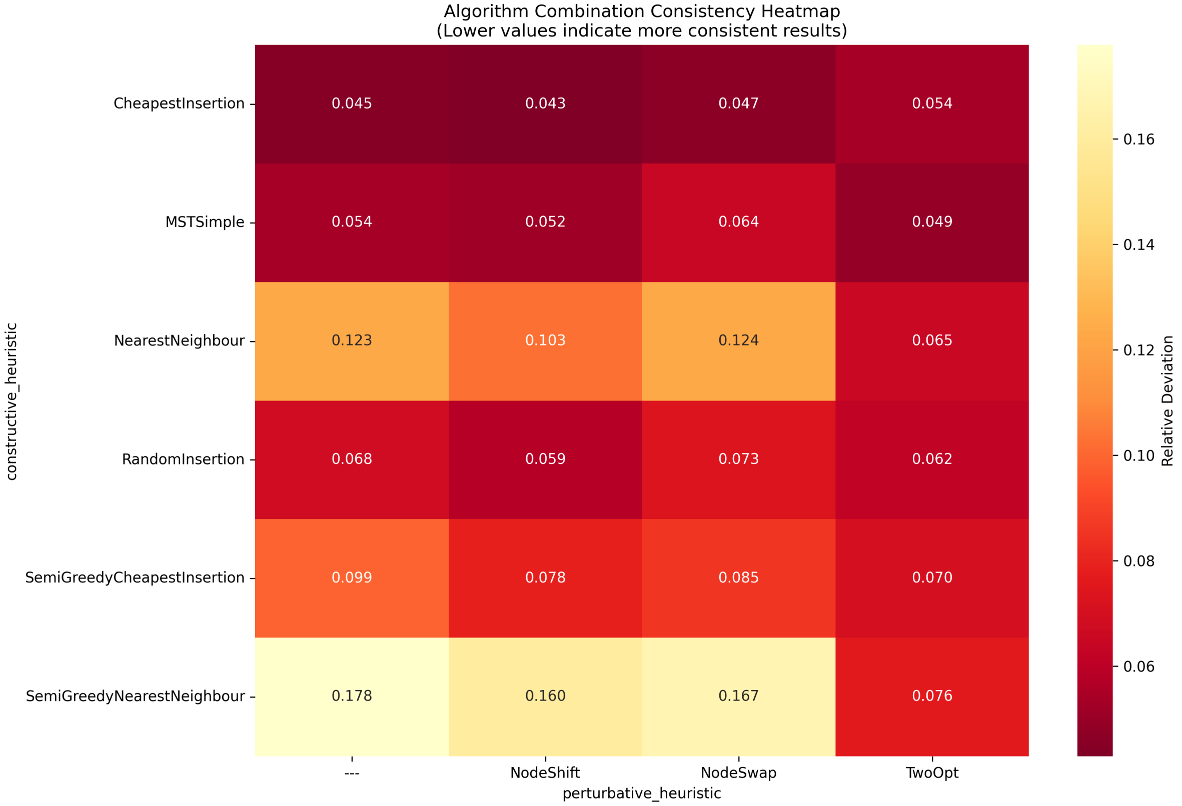

Figure 3: Algorithm Combination Consistency Heatmap (Lower values indicate more consistent results)