Evolutionary Computation - Assignment 8 Report

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Problem description

Problem

Provided the previous solutions to the TSP problem, this time we are to analyze the similarity and correlations between different solutions.

Implementation

We have calculated the similarity measures as follows:

- **Edge similarity:** Count the number of identical edges between two cycles (ignoring direction, so edges like 4,1 and 1,4 are treated as equal) and divide it by the total number of edges in the cycle.

- **Node similarity:** Count the number of common nodes between two cycles and divide it by the total number of nodes in the cycle.

The best solution was generated using the Iterated Local Search method, while the 1000 local optima were generated using the Greedy Cycle method with intra-edge swaps and random starting solutions.

Results

TSPA Problem Instance - similarities

TSPB Problem Instance - similarities
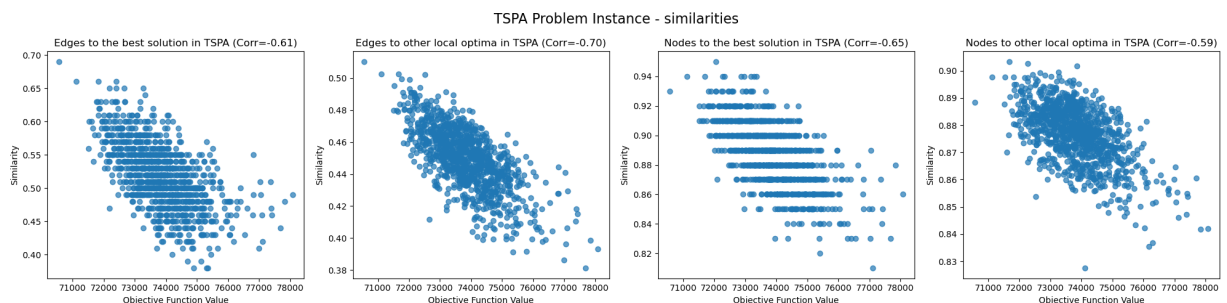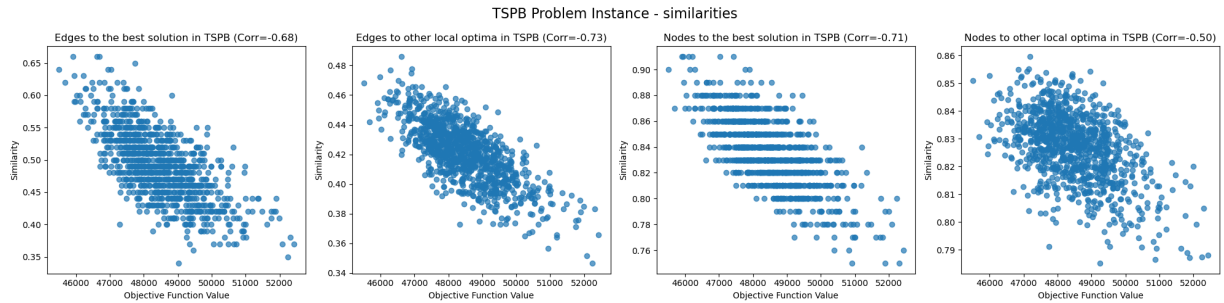
Additional Information

Source code link

The source code is available in a repository here under the Lab8 folder.

Conclusions

Based on the above analysis, we can conclude that, as anticipated, a decrease in similarity to the best solution, whether in terms of edges or nodes, consistently results in a deterioration of the objective function value in both problem instances. This relationship is strongly supported by the observed negative correlations across all similarity metrics. While the correlations for nodes and edges, when compared to the best solution, are relatively close in value, a slight preference for node similarity can be observed. This indicates that node selection plays a marginally more influential role in achieving the quality of the solutions.

Authors

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