# Evolutionary Computation - lab assignment 8

Szymon Bujowski, 148050, source: https://github.com/bujowskis/put-evolutionary-computation

## Problem description

Global convexity (fitness-distance/similarity correlations) tests

For each instance generate 1000 random local optima obtained from random solutions using greedy local search. For each solution calculate its similarity either to the best solution (could the best out of the 1000 local optima or an even better solution generated by another method) or the average similarity to all other local optima. Make charts, x-axis – value of the objective function, y-axis (average) similarity. In the results with similarity to the best solution do not include the best solution (it would be an outlier with 100% similarity to itself).

Use (separately) two measures of similarity:

- The number of common edges.
- The number of common selected nodes.

Finally we have 8 charts: 2 instances, 2 versions of similarity (either to the best or average), 2 similarity measures (either common edges or common selected nodes).

For each chart calculate also the correlation coefficient

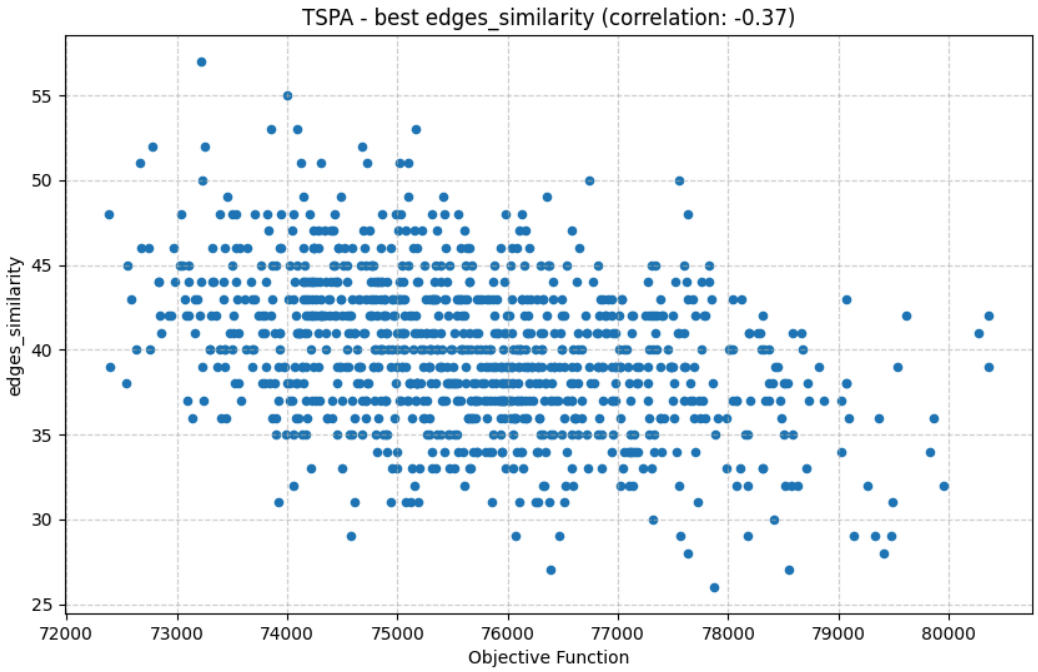
## Results

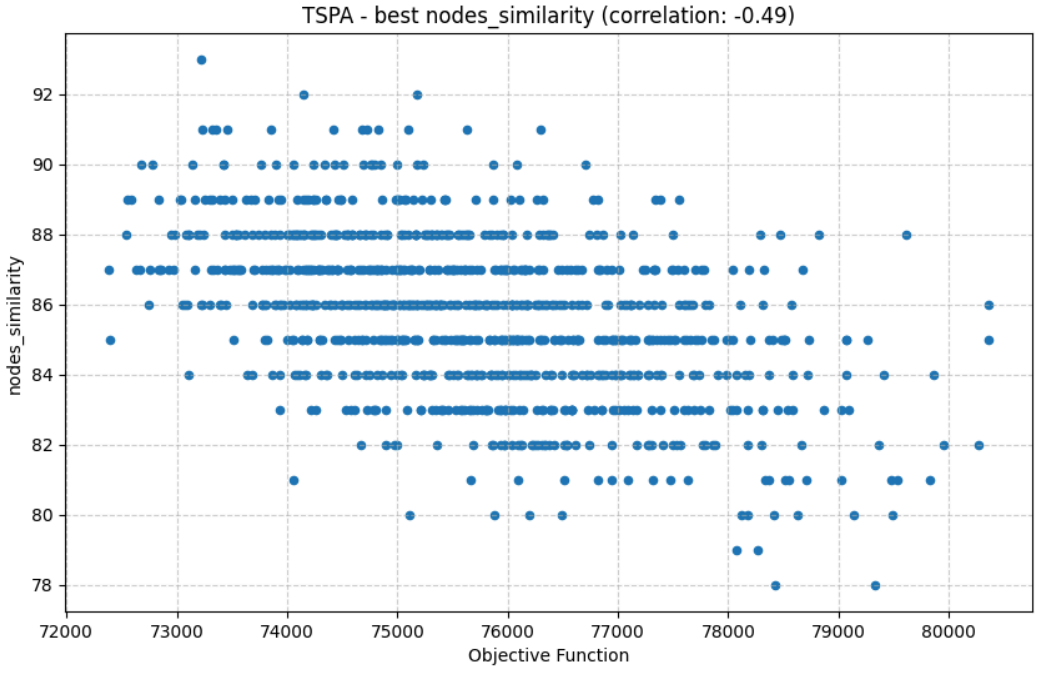
### Notes

- Comparison to best and avg of the 1000 runs (no separate method used)
- “Average solution” is determined by:
    - Calculating the average value of all solution’s objective functions
    - Choosing the solution with the smallest absolute value of the difference between its objective function and the average

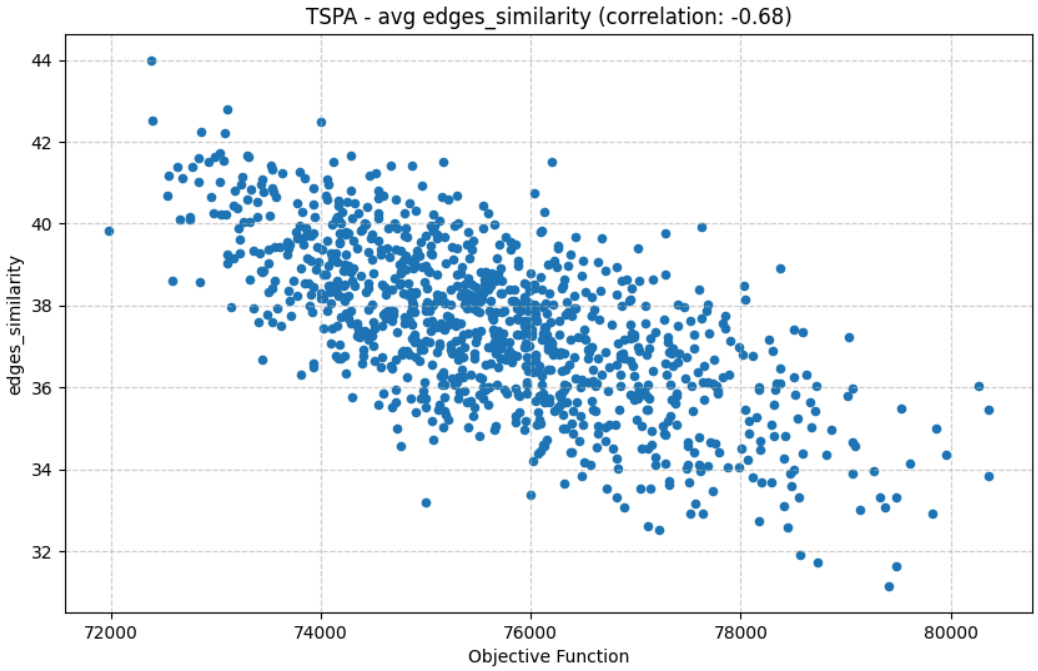
### Charts

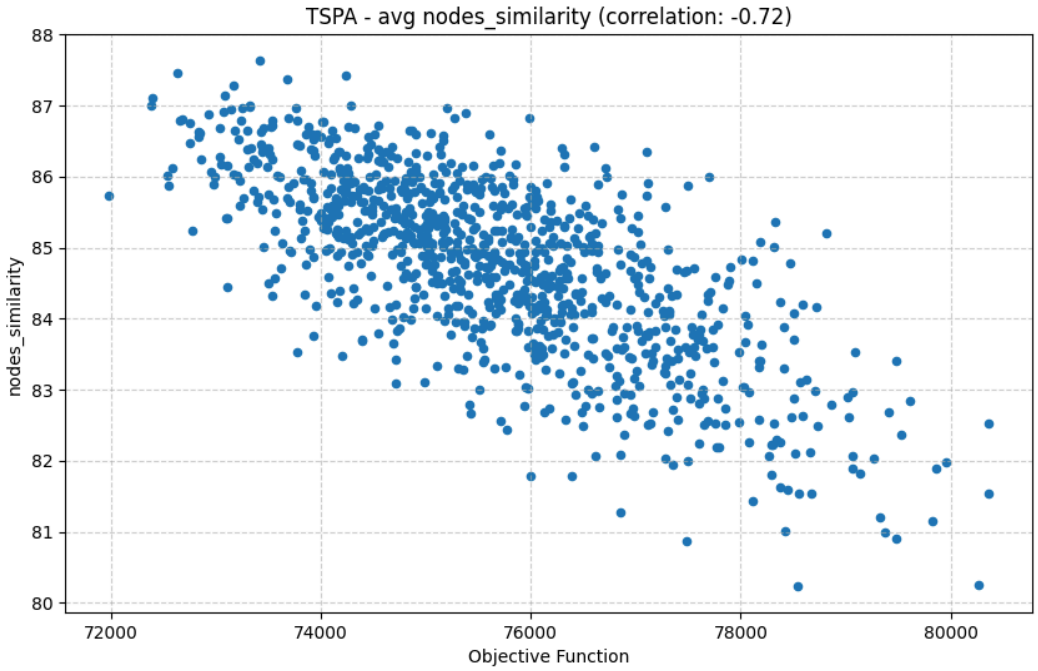
TSPA - compared to best solution



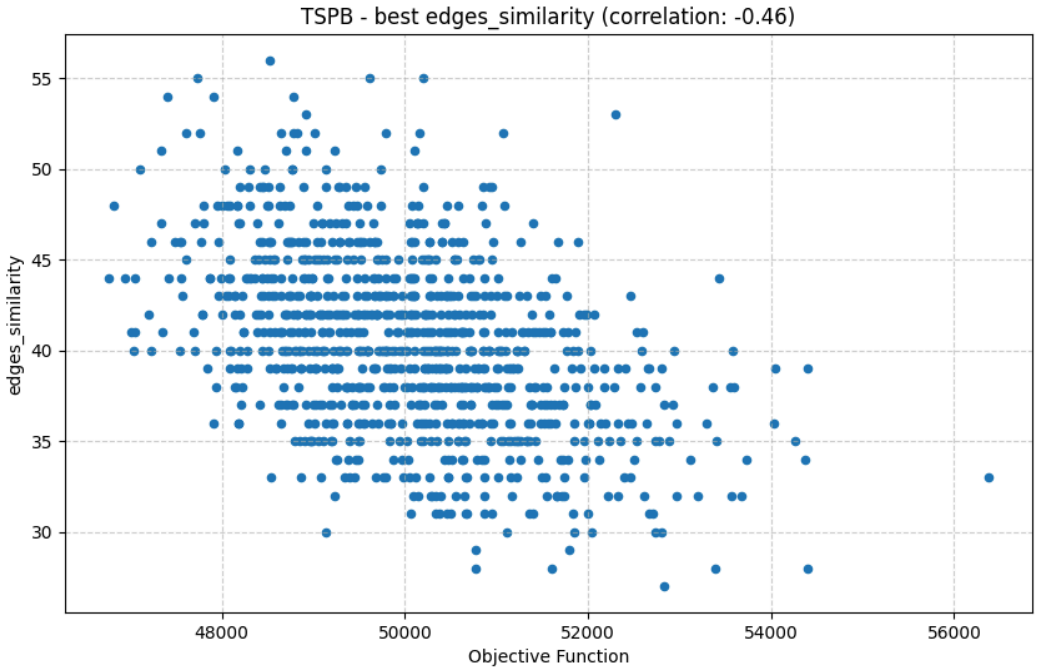



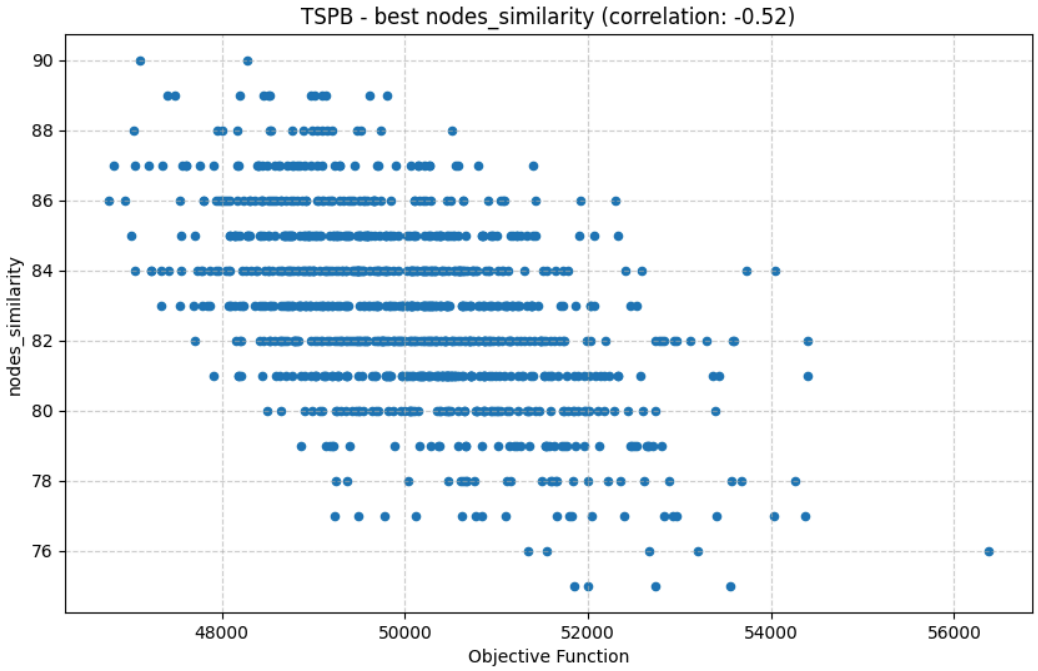
TSPA - compared to average solution



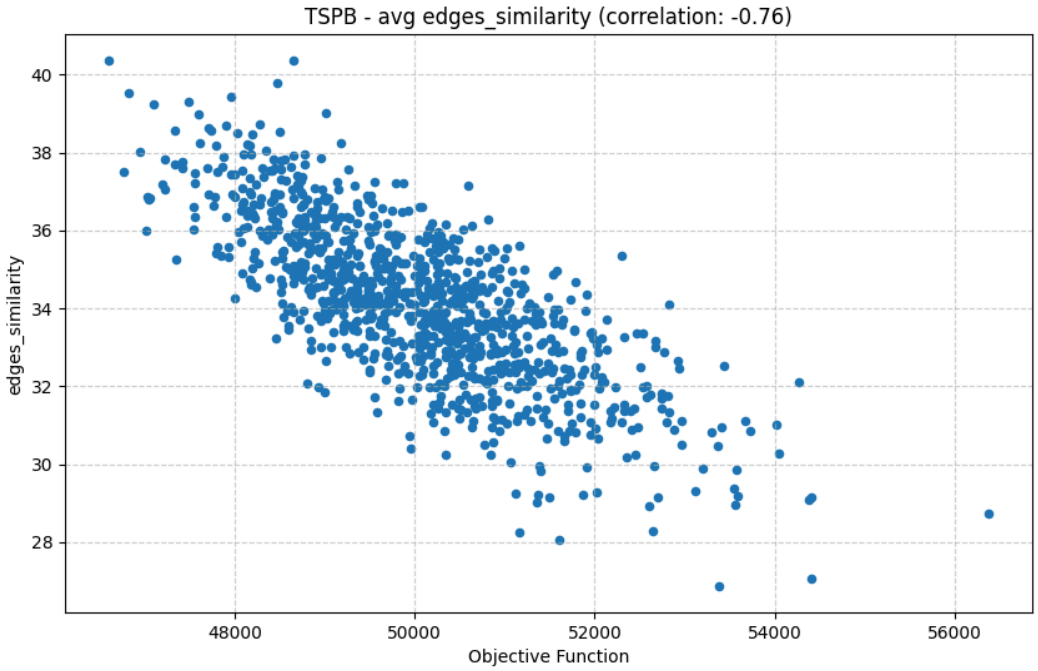



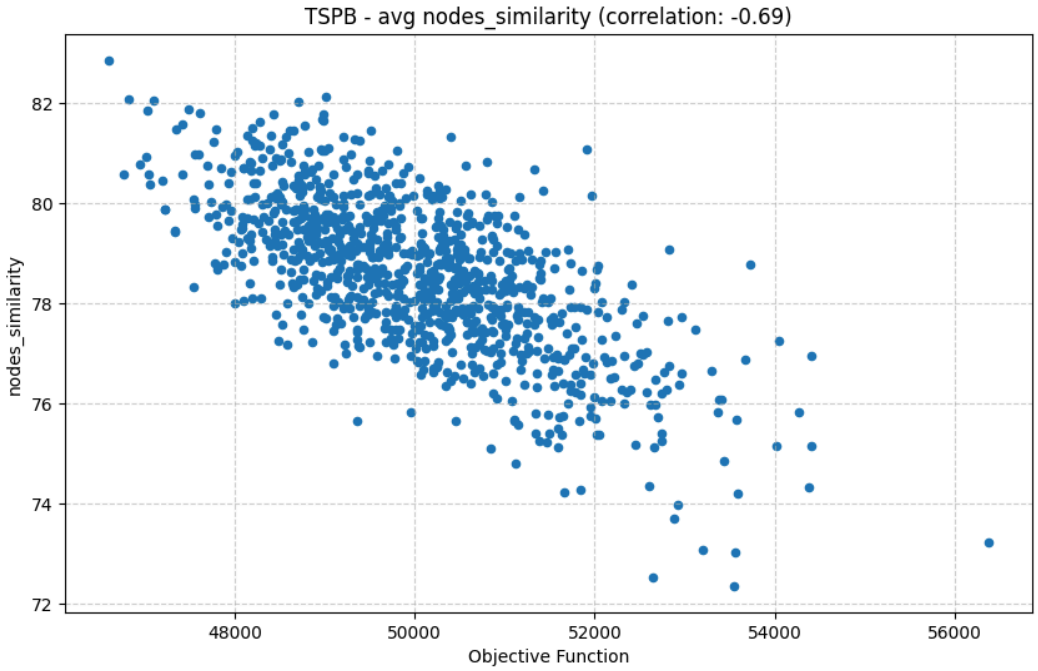
TSPB - compared to best solution



TSPB - compared to average solution



# Conclusions

- There are significantly more similar nodes than edges
    - Conditions for common edge are much more restricting than for common node (and common edge entails two common nodes)
- For both best and average similarities
    - Majority of nodes are common (above 70% in all cases)
    - Substantial amount of edges is common (around 40% on average)
- In general, both edges and nodes similarities are higher when compared to best solution than the average
- However, there's significantly higher correlation between average similarities and objective function than to best