Reflection on “A Powerful Genetic Algorithm Using Edge Assembly Crossover for the Traveling Salesman Problem”

By Liliya Spasova

Student number 7473885

Every person in the software industry has heard of the Traveling salesman problem (TSP). It is so widely known because, it is relatively easy to explain the idea, but still the problem is NP complete, which makes finding new algorithms for solving it, interesting.

In my opinion this paper adds great value to the research community as we see that the proposed algorithm surpasses the current state-of the art algorithms on couple of instances, and even finds new best solutions. The structure of the paper is very clear and detailed. The crossover operator itself is thoroughly explained in the paper which makes is relatively easy to understand even for an inexperienced reader. The list of possible enhancements and their impact on the overall performance was also quite useful.

This paper proposes a novel crossover operator called Edge Assembly Crossover (EAX) which effectively combines information from parent solutions to create high-quality offspring solutions. This operator manages to preserve good building blocks from the parents, while also managing to preserve the diversity of the population and avoid premature convergence. It focuses on the edges, instead of the vertices and thus manages to maintain connectivity and validity of all the solutions it produces.

The experimental results showed after the description in algorithm are all very thorough. They show data for various parameters, using a couple different combinations of operational parameters. The results are then compared to state of the art algorithms after multiple runs of both algorithms on same machines using different instances for their runs. Afterwards there can be no doubt in the reader’s mind about the validity and relevance of the algorithm.

Ideas for further development:

* The EAX algorithm shows very good results, however on relatively small instances. Thus I would like to suggest finding a way to optimize for bigger examples. In the paper they are saying that parallel implementation may be suitable for this case, so maybe this is a logical next step.
* The TSP problem is a single-objective problem. However there are some versions, which are modified to be multi-objective, so maybe tailoring the algorithm to explore trade-offs between objective would be an interesting project.