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Brief Report

About a discussion ‘‘Development a new mutation operator to solve the Traveling Salesman Problem by aid of genetic algorithms’’, by Murat Albayrak and Novruz Allahverdi, 2011. Expert System with Applications, 38; 3, pp. 1313–1320.

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Abstract: In the Short Communication published in “Expert Systems with Application” in volume 41 2014, (Comments on "Albayrak, M., & Allahverdi N. (2011). Development a new mutation operator to solve the Traveling Salesman Problem by aid of Genetic Algorithms. Expert Systems with Applications, 38(3), 1313-1320" [1]: A Proposal of Good Practice; E. Osaba, E. Onieva, F. Diaz, R. Carballedo, Volume: 41, Issue: 4, Pages: 1530-1531, Part: 1, March 2014) [4] the Osoba E. et al have discussed our method to solve the Traveling Salesman Problem pointing that we use our developed new algorithm to compare different versions of a classical genetic algorithm, each of one with a different mutation operator and they write that this can generate some controversy. Here we shortly analyze the comment of Osaba E. et al. to show that our comparing method has a chance of existence.

Keywords: *Genetic algorithms, Traveling Salesman Problem, algorithm Greedy Sub Tour Mutation (GSTM).*

1. Analysis:

We can classify the proposals Osaba E. and others four class:

(1) Comparison and evaluation of the Greedy and Normal mutation methods together are not correct (it is wrong).
As stated in our article "Development a new mutation operator to solve the Traveling Salesman Problem by aid of Genetic Algorithms" [1] our new mutation algorithm Greedy Sub Tour Mutation (GSTM) has a hybrid structure. GSTM operator acts as a greedy, at the same time include the operators of Simple Inversion Mutation (SIM) and Scramble Mutation (SCM). Also if you look at the values of PRC = 0.5, PCP = 0.8, as used in our analysis it can be seen that the probability of using GSTM classical operators is larger. In this case we can say that the comparison of operators GSTM greedy and classic is applied properly.

(2) Compare with Non-Sequential 4-Change that is described in literature (Freisleben & Merz (1996) [2].
It is not logical to compare the performance GSTM, and Non-Sequential 4-Change (Double Bridge Kick Move) techniques described in Freisleben & Merz (1996), as recommended by the Osaba & et. [4]. Non-Sequential 4-Change operator is not used singly as a mutation operator. This operator is also used to perturbations and then created a new generation to be having a local search by Lin-Kernighan method, which is a sort of heuristic improvement. So the quality of the resulting new generation is determined by the Lin-Kernighan method. GSTM which we have described in the article [1] acts as greedy and also includes a natural hybrid mutation operation and is not a local search method. Therefore, to compare our method with the mutation method developed in this article is not proper.

(3) It is confirmed that all greedy methods are used together (NN + DPX). So which of these methods have a success is not clear.
All of Genetic Algorithms in the analysis Table 1 and Table 2 presented in our article the primary population (Nearest Neighbor) and crossover method (DPX) were chosen the same way. The only option is different: mutation methods. In thıs way, the impact of mutation methods in GA was observed. From Tables 1 and 2, it is clear that the reason for getting the best value error (%) and average error (%) obtained in the GSTM arises from the operator developed by us. Even if you use a standard crossover method and random initial population in GA worked with a level of time equal intervals as shown in Table 2, is not difficult to see that the use of other methods of mutation gives a higher value of the error and the difference between GSTM and the other methods will increase.

(4) Generate primary population by randomly and make OX crossover and test again…
We can analyze the methods proposed in the Osaba and coauthor’s papers [3] and [5] in this way:
In this regard, we can say that performance some of naturel crossover operators (OX+CX+PMX) in GSTM was investigated and very good results comparing with other mutation operators were submitted as graphics. This case proves that GSTM performance is not depend on greedy crossover methods and it (GSTM) can demonstrate high performance with naturel crossover methods.

2. Conclusion

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So, we believe that our comparing method has a chance of existence. The proposal of comparing our and Osaba E. and coauthors algorithms is interesting, but they have to test it themselves, because their paper was published after our paper.

3. Comment

When this article was prepared for printing Osaba and coauthors published some new works. In these studies, they give the reference to the algorithm developed by us [1] and they say: "Some other operators of this type can be … the greedy sub-tour mutation" [6] and "Normally, these operators are heuristic, and they are applied to a particular problem, in which they get a great performance" [7].

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