Responses to the comments of Reviewers for IJCISTUDIES-82651

1. COMMENT

The authors need to add further tests to make their case stronger

RESPONSE

We have made additional runs to demonstrate the strength of clustering in Multistart. The following text has been added in the Experiments Section: *"To fully demonstrate it an additional run has been performed using different values for the samples and constant number of centers: in Figure fig:Plot-for-the the number of required function calls for Function EXP4 are plotted against the number of samples. The number of samples varies between 100 and 900 and the number of centers remains K=100 for all the runs. As is is evident, the number of function calls remains constant, regarding the increase of samples."*

2. COMMENT

In the third column of Table 2, I think M=200 and not 100.

RESPONSE

Corrected.

3. COMMENT

The authors should add a section with the description of similar works.

RESPONSE

We have added the following text in Section 2: *"Due to its simplicity, the Multistart method is the base method for a series of stochastic methods in the relevant literature such as hybrid methods[mshybrid1, mshybrid2], GRASP methods[grasp] etc. Also, it has been tested on many practical problems such as the TSP problem [multistart-tsp], the vehicle routing problem [multistart-vehicle], the maximum clique problem [multistart-clique], flowshop rescheduling [multistart-res], energy consumption etc. The base method has been extended in different works such as enhanced stopping rules for the multistart method [stop1, stop2, stop3, stop4], parallel techniques [parallel-multistart, parallel-multistart2], multistart hybrid methods executed on modern GPU architectures [msgpu1, msgpu2] etc. Also, a variety of methods have been introduced that enhance the sampling in the procedure such as the repulsion sampling [mssampling1], methods where the sampling is guided by a neural network [mssampling2]*

etc. Furthermore, the multistart method has been extended to solve also constrained optimization problems [mscons1]. ”

4. COMMENT

A statistical test should be used for the comparison of the examined methods.

RESPONSE

We have added a plot with statistical tests with the following caption:*”Scatter plot representation and Wilcoxon rank-sum test results of the comparison between the samples M=100 with the M=200 for different functions. A p-value of less than 0.05 (2-tailed) was used for statistical significance”*

5. COMMENT

The authors should better explain why the proposed methodology seems to work well.

RESPONSE

1. We have added the following text in the Conclusion section: *“The proposed method outperforms traditional multistart due to creation of the centers, that seem to be more accurate representatives of the regions of attractions for the underlying function. To achieve better representation of these regions of attractions, the centers are gradually improved through repetitive sampling of the objective function. “*

2. A new plot has been added in the Experiments section with the following text: *““To fully demonstrate it an additional run has been performed using different values for the samples and constant number of centers: in Figure fig:Plot-for-the the number of required function calls for Function EXP4 are plotted against the number of samples. The number of samples varies between 100 and 900 and the number of centers remains K=100 for all the runs. As is is evident, the number of function calls remains constant, regarding the increase of samples.””*

3. A new plot with statistical comparisons of different cases of the proposed method has been added with the following caption: *“Scatter plot representation and Wilcoxon rank-sum test results of the comparison between the samples M=100 with the M=200 for different functions. A p-value of less than 0.05 (2-tailed) was used for statistical significance”*

6. COMMENT

In the conclusion, the authors should mention the limitations of their study and how these could be handled in a future work.

RESPONSE

The following text has been added in the Conclusions section: *"Despite the promising results, the method has some limitations that can be addressed in future research. First of all the method depends heavily on the Kmeans algorithm. The method creates K clusters that are enhanced through sampling, but this processes can take long especially for problems of higher dimension. A possible solution could be to use parallel techniques for the estimation of the clusters. Also, the method requires an excessive memory storage just to hold the member points for the K clusters and some efficient memory allocation mechanism should be incorporated here."*