**Original Manuscript ID:** PONE-D-23-38091

**Original Article Title:** Feature Selection using Hyper Learning-Based Binary Political Optimizer Algorithm

To: PLOS ONE Date: 20th Jan 2024

Re: Response to Editor

Dear Editor,

Thank you for allowing a submission of our revised manuscript, with an opportunity to address the reviewers’ comments.

We appreciate your assessment of our work, and we have taken suggestions of all reviewers into consideration to enhance the quality and comprehensiveness of our research.

We are uploading (a) our point-by-point response to the comments (below) (response to reviewers), (b) an updated manuscript with yellow highlighting indicating changes, and (c) a clean updated manuscript without highlights (PDF main document).

Best regards,

Dr. Maryam Bashir

Assistant Professor

Department of Computer Science,

National University of Computer and Emerging Sciences,

FAST-NUCES, Lahore Campus

Contact Number: +92-42-111128128 (Ext: 635)

Email: maryam.bashir@nu.edu.pk

**Editor Comment # 1:** Visualization of obtained results must be improved

**Author response:** We appreciate your feedback.

**Editor Comment # 2:** Motivation behind proposed research should be more clearly explain. Please elaborate what is "beyond state-of-the-art" of proposed. study.

**Author response:**

**Editor Comment # 3:** Make sure that the source code is available according to PLOS ONE publication policies

**Author response:**

**Editor Comment # 4:** Make sure that you have conducted rigid statistical analysis.

**Author response:**

**Reviewer # 1 Comment # 1:** Try to avoid using acronyms in the abstract.

**Author response:**

**Reviewer # 1 Comment # 2:** Keywords are too generic, please use more specific ones.

**Author response:**

**Reviewer # 1 Comment # 3:** Elaborate in more details why you have chosen PO algorithm as the starting point for your approach, as there are many metaheuristics algorithms available today.  
**Author response:**

**Reviewer # 1 Comment # 4:** Some important recent papers related to feature selection with metaheuristics-based approaches are missing from the literature. Please include the following:  
<https://link.springer.com/article/10.1007/s40747-023-01118-z>  
<https://www.mdpi.com/2076-3417/13/5/3223>  
<https://www.sciencedirect.com/science/article/pii/S0141933123000248>  
<https://www.mdpi.com/1424-8220/22/4/1396>  
<https://www.mdpi.com/1424-8220/22/5/1711>  
<https://www.nature.com/articles/s41598-022-18993-0>

**Author response:**

**Reviewer # 1 Comment # 5:** It is highly recommended to provide the basic search equations of the algorithm, and to explain each parameter in every equation in the text.  
**Author response:**

**Reviewer # 1 Comment # 6:** It is recommended to provide the worst results of each metaheuristics as well. Moreover, you should consider presenting the results in one merged table, for easier comparisons.  
In other words, for each algorithm, on each dataset, provide the best, worst, average and std.  
**Author response:**

**Reviewer # 1 Comment # 7:** Please provide convergence diagrams as well.

**Author response:**

**Reviewer # 1 Comment # 8:** Fig.3 - boxplots of the HLBPO - these are the results on which dataset?

**Author response:**

**Reviewer # 1 Comment # 9:** Fig.3 - also, it is not referred from the text. You should discuss these plots.

**Author response:**

**Reviewer # 1 Comment # 10:** I would recommend conducting statistical analysis, to verify that the results of the proposed algorithm are statistically significantly superior than other methods.  
**Author response:**

**Reviewer # 1 Comment # 11:** With that in mind, it is also recommended to include KDE diagrams as well.  
**Author response:**

**Reviewer # 1 Comment # 12:** What are the limitations of the proposed algorithm?

**Author response:**

**Reviewer # 1 Comment # 13:** Make sure that the appropriate paper template was used.

**Author response:**

**Reviewer # 1 Comment # 14:** Thorough proofreading is also recommended**.**

**Author response:**

**Reviewer # 2 Comment # 1:** It is suggested to rewrite the abstract and highlight the findings of this study.

**Author response:**

**Reviewer # 2 Comment # 2:** An impact analysis is recommended.

**Author response:**

**Reviewer # 2 Comment # 3:** This study lacks a deep literature review on the problem of feature selection and the recent optimizers that have been proposed for it. The following optimizers can be compared and reviewed. 10.3390/app13010564; 10.3390/math10152770;10.1007/s42235-023-00433-y; 10.1007/s11831-023-09928-7; 10.3390/math11040862; j.compbiomed.2022.105858.

**Author response:**

**Reviewer # 2 Comment # 4:** The authors claim that the proposed algorithm enhances the exploratory rate of the binary political optimizer (BPO), but they do not provide any experimental evaluation that supports this claim. They should conduct some experiments to compare the proposed algorithm with the original BPO and other existing algorithms and measure the exploratory rate using some indicators, such as the solutions' diversity, entropy, or distance. They should also explain how the hyper-learning strategy affects the algorithm's exploratory and convergence rates.  
**Author response:**

**Reviewer # 2 Comment # 5:** It is suggested to add equations that describe the strategies in section 3.

**Author response:**

**Reviewer # 2 Comment # 6:** It is suggested to explain the calibration mechanism you used in your experiment.

**Author response:**

**Reviewer # 2 Comment # 7:** The authors should add equation numbers to search strategies shown in Figure 1.

**Author response:**

**Reviewer # 2 Comment # 8:** The parameters of the equations 15 and 16 should be explained.  
**Author response:**

**Reviewer # 2 Comment # 9:** The impact of the parameters alpha and beta in equation 18 should be analyzed.  
**Author response:**

**Reviewer # 2 Comment # 10:** The authors should add the results' maximum, minimum, and standard deviation to tables 4-7 during the independent runs. This will provide more information about the variability and reliability of the results and allow for a better comparison of the performance of the different algorithms.  
**Author response:**

**Reviewer # 2 Comment # 11:** Convergence analysis is recommended.

**Author response:**

**Reviewer # 2 Comment # 12:** The visualization of this study should boosted.  
**Author response:**

**Reviewer # 2 Comment # 13:** The authors should mention the setting details and the experimental evaluation of the proposed algorithm and contender algorithms, such as the maximum number of runs, iterations, and classifier.

**Author response:**

**Reviewer # 3 Comment # 1:** The novelty of the paper is low. The binary POA has been proposed before. The author just modified the previous version using Hyper learning strategy. However, we could not see any comparison between the original and modified versions to prove the necessity of this modification. Please compare BPOA with the improved version in terms of the Convergence curve and evaluation metrics, and show that the results are statistically significant.  
**Author response:**

**Reviewer # 3 Comment # 2:** what is the time complexity of the proposed algorithm?

**Author response:**

**Reviewer # 3 Comment # 3:** The DOI of all references is missing. Please add them  
**Author response:**

**Reviewer # 3 Comment # 4:** Equation (18) should be Equation (17).

**Author response:**

**Reviewer # 3 Comment # 5:** Please highlight the pseudo-code of the proposed algorithm (declare the modification parts in comparison to BPOA) to facilitate understanding. Also please explain the hyper-learning approach more (its advantages, ability, type of modification)  
**Author response:**

**Reviewer # 3 Comment # 6:** Please add references where they are needed for example page 2 last paragraph (after the name of optimization algorithms).

**Author response:**

**Reviewer # 3 Comment # 7:** Please produce a brief literature review for POA and its different versions and applications, while some of the papers that should be included are:  
  
<https://doi.org/10.1007/s11063-020-10406-5>  
<https://doi.org/10.1016/j.compbiolchem.2022.107767>  
<https://doi.org/10.1007/s00521-022-07780-7>

**Author response:**