Dear Editor, Dear Reviewers,

We sincerely want to thank you for you deep, detailed and insightful feedback concerning our manuscript titled "Anomaly Detection in Multi-Wavelength Photoplethysmography using Lightweight Machine Learning Algorithms". The comments are all valuable and constructive for revising and improving our paper.

We have addressed all comments by modifying the manuscript and the models accordingly. The corresponding response and adaptations are individually described in more depth below. Finally, the modifications are highlighted in the manuscript.

Yours sincerely,

Vlad-Eusebiu, Joan, Angel, Juan Carlos Johan and Bruno

Reviewer 1

1. **The manuscript reports experiments and analysis of lightweight anomaly detection algorithms photoplethysmography. The manuscript has a lot of descriptive content and it is also very long to comprehend the research work done on anomaly detection in multi-wavelength PPG technology. 26 pages are many for a paper that simply covers a few ensemble learning methods, such as decision trees, Random Forest, SVM, a custom SVM algorithm, and an autoencoder towards machine learning algorithms, and that are state-of-the-art for the use case, in a top quality journal such as Sensors! The F1 scores and accuracy for the custom SVM algorithm are impressively high for various feature sets experimentally investigated in the study and these results can be interesting in the context of use case that use hand crafted feature generation based classifiers. The authors needs to shorten the manuscript by focusing the main experiments with the selected anomaly detection algorithms and present the most striking results in the main paper to 16 pages. Anything that does not fit in 16 pages can be made available online as Supplemental Material online.**

   Response: Thanks for your comment. ....

   Modifications: ...

2. **In addition the English and presentation style of the manuscript should be improved, for example using some concept diagrams, more equations, and succinctly described methods.**

   Response: Thanks for your comment. ....

   Modifications: ...

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Reviewer 2

This paper presents a study of anomaly detection algorithms to detect various types of artifact in multiple wavelength PPG signals. Using a limited true dataset with data augmentation, the authors describe the identification of salient features and the training and testing of various ML models to separate artifactual time windows from clean time windows of data. I believe this paper could benefit from several major and a few minor revisions, as detailed below.

1. **Throughout the paper, the terms "multi-wavelength", "multi-channel", "multi-site", and "multi-sensor" are used casually without clear delineation or definition. This is very confusing to understand and should be distinguished early on clearly. For example, are there multiple sensors for each wavelength as well as multiple channels per sensor?**

   Response: Thanks for your comment. ....

   Modifications: ...

2. **How was the data collected? Was there IRB approval? What were the age ranges of the subjects etc.? Was it done fully in a controlled setting? How was true artifact annotated? None of this is included.**

   Response: Thanks for your remark. ....

   Modifications: ...

3. **How was ground truth of artifact determined in the data? Was it done by visual inspection? Was it done for each channel? What were the criteria? In what window size? This was left unclear throughout.**

   Response: Thanks for your comment. ....

   Modifications: ...

4. **The data augmentation process needs to be explained in more detail.**

   Response: Thanks for your suggestion. ....

   Modifications: ...

5. **Why were the tsfresh and TSFEL packages chosen to be used in the first place?**

   Response: Thanks for your remark. ....

   Modifications: ...

6. **Is all of Section 4 done using the entire dataset? Or just the training data? This is not clear. If Section 4 is performed on the entire dataset, does this not introduce bias into Section 5's analysis since the features were selected by including the test data?**

   Response: Thanks for your suggestion. ....

   Modifications: ...

7. **Are the y-axis labels in Figures 12-14 Entropy or Information Gain?**

   Response: Thanks for your comment. ....

Modifications: ...

8. **The threshold setting process used to arrive at a subset of features needs to be better explained.**

   Response: Thanks for your comment. ....

   Modifications: ...

9. **The motivation for the entire PCA section (Section 5.2) is not clear or compelling, and this analysis may be better served in the Supplementary Material. Also it is not clear if the PCA was performed separately on normal and anomalous windows or altogether.**

   Response: Thanks for your comment. ....

   Modifications: ...

10. **The terms "custom" and "proposed" features are both used and the delineation is unclear.**

    Response: Thanks for your comment. ....

    Modifications: ...

11. **Can the authors provide more clarity on what the features in each of the final datasets in Section 5 actually consist of? How many features are in each feature set and how are they defined? Otherwise, it is difficult to reproduce these results.**

    Response: Thanks for your comment. ....

    Modifications: ...

12. **Are all of the results reported in Section 5 on the test set? Can the number of windows in the training, validation, and test sets be noted for each window size in a table?**

    Response: Thanks for your comment. ....

    Modifications: ...

13. **What about F1 score in Figure 22?**

    Response: Thanks for your comment. ....

    Modifications: ...

14. **There is no discussion of limitations of the study in Section 6. For example, one major one is that this only includes data from 2 subjects.**

    Response: Thanks for your comment. ....

    Modifications: ...

15. **Define 'lightweight' ML earlier in the paper. Currently the definition is in Section 3.3 but the term is referenced in Section 2 as well.**

    Response: Thanks for your comment. ....

    Modifications: ...

16. **Can the authors also label the AC and DC components of the signal in Figure 1?**

    Response: Thanks for your comment. ....

    Modifications: ...

17. **The reference to [16] towards the end of Section 2 seems placed a bit late in the section. It should be moved up a few paragraphs earlier when all of the other previous studies are mentioned.**

    Response: Thanks for your comment. ....

    Modifications: ...

18. **Figure 16 needs an x-axis label.**

    Response: Thanks for your comment. ....

    Modifications: ...

19. **Consider renaming LF/HF ratio since that has a very specific definition in the very related domain of heart rate variability.**

    Response: Thanks for your comment. ....

    Modifications: ...