Response Letter

Paper: TCCSI-2014-12-0666 Title: Classification of Massive Electrocardiogram Signals with Autoencoder-Based Deep Neural Network

Authors:

The authors would like to thank the reviewers for their valuable and constructive comments. We have carefully revised the paper according to the comments. The detailed comments from the reviewers are greatly helpful for improving the quality. We provide below a detailed account on the changes that we have made in response to every comment that the editor and reviewers have provided.

1 Response #1

1. The motivation of developing such classification is not well articulated. The proposed method is an ad hoc combination of several components such as autoencoder based algorithm, deep neural network structure, sparsity constraint, etc. It is not well justified why this combination is chosen. Is there other combination that works better? This needs to be justified.

2. What is the novelty and what are the major contributions of the paper, just a stack of several existing methods?

In the rewriting procedure we reorganized the structure of the manuscript. Since this research is more focus on the better performance compare to the earlier work, there were lots of inherent mechanisms had been ignored in the last edition of manuscript.

3. Technical details are lacking or missing in the presentation of the proposed method. For example, on page 3 (right column, second paragraph), it is stated that “In the adapted algorithm, we impose a sparsity constraint on the hidden units to guarantee the representation expression ability”. How can this be achieved?

4. It is mentioned on page 5 (left column) that the cost function J(\theta) is strictly convex. This needs to be justified (not just stated).

5. The paper is poorly written and presented. There are too many grammatical errors and types. This has significantly affected the reviewer’s understanding of the proposed method, for example,

Abstract: “The system perform … and consumed …..”, “The result shows that with ….. can get …..”, “ …. Collected from the subjects in the division of cardiology of the hospital” (which hospital?), and so on.

The rewrite manuscript had been paid greater attention on the grammar and spelling. The ambulatory ECG database was provided by the Biomedical Instruments Co.,Ltd, as stated in the acknowledgment part.

6. The number and type of samples used in the simulation are mentioned in the Conclusion section. It should be mentioned in Section V.

This problem had been solved in the revision manuscript.

7. Different formats are used for references, e.g., see [19] and [20].

This problem had been solved in the revision manuscript.

8. The notations are currently shown in the appendix. It is better to show them at the end of Section I.

The authors changed the structure of the whole manuscript, this problem had been solved in the revision manuscript.

2 Response #2

In part IV, the authors compare under 2-layers, 3-layers and 4-layers of the networks. When using 2-layers, the accuracy is 99.33%, and it drops to 99.07% under 3-layers, and then raises to 99.34% when 4-layers. The results seems unstable, why increasing the layer of networks will cause an accuray drop ? Why it is not always increasing of accuracy by adding layers? how did you set the parameters in the experiments? The paper needs more discussions on this point.

The electrocardiography signal is a bit different from images, in image or vision related problems, generally these might need more layers than the signal based problems. In the experiments we found that sometimes 2 layer of autoencoder could be good enough in accuracy. In the ECG classification clinical application, the abnormalities were more important, we found that more layers would help in the performance, but an acceptable reason had not been propsed.