OPEN PEER REVIEW

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What is "Open Peer Review" process?

An "Open Peer Review" process is making the details of all review process (including reviewers, associate editors, and EICs comments) as "Public" as it is agreed by EIC, Authors, and reviewers.

Advantages of "Open Peer Review" process

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- Education of both authors and new students
- Prevents reviewers from following their individual agendas and leading to the detection of reviewers' conflicts of interests

You can find out more at:
https://brieflands.com/briefland/knowledgebase/category/tree.html#opr.html

Shiraz E-Medical Journal
Article DOI: 10.5812/semj.100351
Published in: Shiraz E-Medical Journal: 22(1); e100351

Peer Review Report for "Comparison of the Particle Swarm Optimization with the Genetic Algorithms as a Training for Multilayer Perceptron Technique to Diagnose Thyroid Functional Disease"

Author(s): Ali Sharifi, Kamal Alizadeh

Review Timeline:

Submit Date: 28 Dec 2019
Revised Date: 26 Feb 2020
Accepted Date: 28 Feb 2020

Revision (0)

Here, you can see the **Reviewers**, **Associate Editors** and **EICs'** comments from the beginning to the end of the revision process.

REFEREE: Associate Editor | **Revision** (0) 27 Jan 2020

Dear EIC,
Below the authors can find the comments made by reviewers. They are kindly requested to address the required modifications.
1- In general please consider the followings:
- Please edit the manuscript from the English writing style point of view.
- Please enrich the reference list by incurring newly published articles in the literature.
2- ANN: regarding the neural network model:
A- How did you drive five inputs? Please list whole the variables you have initially used. Why did you use these five inputs?
B- What is the training algorithm in the MLP?
C- Why did you select MLP?
D- You have adopted one hidden layer and one unit, according to table1. However, in figure 1, you have shown four neurons for the MLP. Please clarify the mechanism behind the selection of a number of neurons in the hidden layer.

3- You have 30,30 and 150 cases. How did you apply 30 cases for MLP? The number of cases for applying a neural network model is very limited.
4- GA
A- Please specify stopping conditions in GA
B- Describe how you could tune the GA and corresponding parameters like mutation.
5- Validation:
You have just reported the overall validation of the proposed models. You are kindly requested to add “cross-validation” corresponding to each category.
6- Run statistical analysis like ANOVA and report p-value in order to significantly demonstrate hybrid GA-ANN is superior to other methods.
7- Prior to conclusion, list your new findings/contribution after running a heavy intensive mathematical model.
Thanks.

REFEREE: EIC | **Revision** (0) 28 Jan 2020

Dear Author,
The reviewers' comments are mentioned. Please correct the details as mentioned above carefully according to reviewers' request.
Thanks.

OPEN PEER REVIEW

Revision (1)

Reply to Reviewers

Ideally, the reviewing process can significantly improve the submitted manuscripts by allowing the authors to take into account the advice of reviewers. Author(s) must reply to all reviewers' comments in a separate Word file, point by point. A "**Reply to Reviewers**" document is submitted along with revised manuscript during submission of revised files, summarizing the changes that the authors made in response to the reviewers' comments. The responses to reviewers' comments specifies how the authors addressed each comment the reviewers made.

You can read the authors' responses to the reviewers' comments in the next page.

Dear Editor-in-Chief,

Thank you for your email on January 28, 2020. I have now revised our manuscript according to the reviewers' comments. All changes made are marked in "red" in the revised manuscript.

I hope that the overall quality of this revised copy of manuscript could reach the criteria for taking into consideration in your esteemed journal as an article.

Sincerely,

The comments of the reviewers and our responds to them (in blue color) are listed here:

Shiraz E-Medical Journal

Manuscript ID: 100351

Title: **Particle swarm optimization and the Genetic Algorithms Comparison as training for Multi-layer perceptron technique for Diagnosing Thyroid functional disease**

COMMENTS TO THE AUTHOR:

Reviewer's Comments:

Comment 1: Thank you for submitting your manuscript in Shiraz e-medical journal. Below you can find the comments made by reviewers. You are kindly requested to address the required modifications.

1- In general please consider the followings:

- Please edit the manuscript from the English writing style point of view.

Response: *Based on the reviewer's consideration, We have revised the whole manuscript carefully and corrected all grammatical and badly word-constructed sentences throughout the text.*

- Please enrich the reference list by incurring newly published articles in the literature.

Response: *Yes, we refined this point in the revised copy, as suggested some new references regarding to this point are added to revised copy (p. 15-18 & refs. 5, 9-12, 18, 24, 31, 33 and 36). Furthermore, the all other references have been rechecked carefully and all errors in the list of references were corrected according to the journal format in the revised copy as suggested (p. 15-18).*

Comment 2: ANN: regarding the neural network model:

A- How did you drive five inputs? Please list whole the variables you have initially used. Why did you use these five inputs?

Response: *Regarding the fact that the input data merely includes the diagnosis of healthy individuals from the two types of hyperthyroidism and hypothyroidism, the diagnostic experiments that relied exclusively on the five parameters mentioned are included as*

inputs and no data has been deleted. The text of the article was revised as follows for fluency (p. 4, l. 3, from bottom). " The data set applied in this research involve the results of five laboratory tests regarding the thyroid gland from the UCI machine learning respiratory. These are as follows: Total serum thyroxin (T4), the maximal absolute difference (ΔTSH), T3-resin uptake test (RT3U), total serum triiodothyronine (T3RIA) and basal thyroid-stimulating hormone (TSH) (12). The data were collected for 3 classes: 150 cases of euthroidism, 30 cases of hypothyroidism and 35 cases of hyperthyroidism."

B- What is training algorithm in the MLP?

Response: *Based on the reviewer's consideration, the training algorithm in the MLP method is more explained in the revised manuscript. The following sentence is added to the text (p. 6, l. 4, from bottom). "A typical MLP network of processing nodes comprises at least three layers: an input layer that gets external inputs, at least one output layer and a hidden layers that creates the classification. Multi-layer perceptron (MLP) is a prominent neural network models because of comparably simple algorithm and its clear architecture. Due to the variety of neural network training methods, choosing the most optimal training method can increase the accuracy of network predictions. In this paper, the researchers have used three algorithms: Levenberg–Marquardt algorithm, particle swarm optimization and genetic algorithms to train the neural network. "*

C- Why did you select MLP?

Response: *Yes. Regarding the neural network model flexibility, superior ability to solve clinical diagnosis problems, pattern recognition for problems with training data errors, and high sensitivity and specificity of this method, in case of designing software using proposed algorithms in health centers regarding its high speed and good generalizability compared to other therapies, it can be an effective step in diagnosing thyroid disease and reducing the cost of diagnosis in the early stages of the disease without using invasive procedures.*

D- You have adopted one hidden layer and one unit, according to table1. However, in the figure 1, you have shown four neurons for the MLP. Please clarify the mechanism behind selection of number of neurons in the hidden layer.

Response: *Yes, as you have pointed, we refined these points in throughout the text of the revised copy of manuscript. In addition, we should mention here that, According to the table 1, an input layer of 5 neurons is inserted that are the same 5 parameters of thyroid diagnosis. In the hidden layer, the number of layers and neurons is variable and the best performance has been obtained from 4 to 20 neurons per layer. In the outlet layer, there is 1 unit for disease diagnosing. The mechanism of selection of the number of neurons in the middle layer is very important to reduce the output error. An irrational increase in the number of middle layers and neurons causes an overlap error. To achieve the best classification, different architectures for the neural network, 4 to 20 neurons in the middle layer and weight optimization of the features through all three algorithms in 400 iterations (Epoch) were used. The mean squared error (MSE) index was used as the performance indicator calculation and the best model for each algorithm was reported.*

Comment 3: You have 30,30 and 150 cases. How did you apply 30 cases for MLP? Number of cases for applying a neural network model is very limited.
Response: *Yes. Based on the reviewer's consideration, the corresponding section was rewritten and more clarified in the revised manuscript. The following sentence is added to the text (p. 11, l. 1, second paragraph).“All 215 individuals with 5 features mentioned in these algorithms participated and 70% of them were selected as training, 10% as validation and 20% as test data.”*

Comment 4: GA
A- Please specify stopping conditions in GA
Response: *Thanks for the comment, You are right. Based on the reviewer's consideration, the corresponding section was rewritten and the following sentence is added to the text (p. 11, l. 3, second paragraph). “To achieve the best classification, different architectures for the neural network, 4 to 20 neurons in the middle layer and weight optimization of the features through all three algorithms in 400 Epoch were used. The mean squared error (MSE) index was used as the performance indicator calculation and the best model for each algorithm was reported. In case of no improvement in fitness values after 40 Epoch, the algorithm was stopped.”*

B- Describe how you could tune the GA and corresponding parameters like mutation.
Response: *Yes. All right, the genetic algorithm was coded to neural network weights optimization to achieve the least error model. By adjusting the number of middle layers, the number of neurons in each layer, and the number of results repetitions will shift to a lower relative error function and more optimal and stable generations. Besides, based on the reviewer's consideration, the corresponding corrections were made in the text to respect the referee's request (p. 9, l. 1, in 3.4. Genetic Algorithms section & p. 10, l. 3, from bottom).*

Comment 5: Validation:
You have just reported the overall validation of the proposed models. You are kindly requested to add “cross- validation” corresponds to each category.
Response: *Thanks for this comment, as you have pointed, some new data regarding to this point are added in table 2, (p. 12,).*
Comment 6: Run statistical analysis like ANOVA and report p-value in order to significantly demonstrate hybrid GA-ANN is superior over other methods.
Response: *- Yes. This point was refined in the revised copy by adding the following sentences "The significance of each term was determined by the P-values and the R%-values. The smaller the P-value and the larger the R%-value, the more significant is the corresponding term. The results of the analysis of variance (ANOVA) in the diagnosis of thyroid disease after applying the genetic algorithm as neural network training, validation and testing, showed that there was a significant difference at the 0.05 level and the better performance of the GA-MLP model compared with the PSO-MLP and BP-ANN models." in page 12, line 2 & table 2.*

Comment 7: Prior conclusion, list your new findings / contribution after running heavy intensive mathematical model.

Response: *Yes, Based on the reviewer's consideration, we refined this point. As you see in the following paragraph which is added to the text to make the discussion more clarify: "The examination demonstrates that our strategy has the second most astounding diagnosis accuracy. Despite the fact that the accuracy is somewhat lower than that some of the best previous reported methods with the proposed one. Due to the advantages of the mentioned method with respect to former reported ones it may be used as an alternative method in most of the laboratories." (p. 12, l. 3, from bottom) & "The aim of the current research was to formulate thyroid functional disease diagnostic models with suitable analytical characteristics by MLP ANNs. The results show using GA is more successful than using PSO on diagnosing thyroid functional disease and that the proposed GA-MLP can achieve very high diagnosis accuracy (95%). To streamline the diagnostic procedure in daily routine and prevent misdiagnosis and reducing the cost of diagnosis in the early stages of the disease without using invasive procedures, GA-MLP can be employed." (p. 14, l. 5).*

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Revision (1)

Here, you can see the **Reviewers**, **Associate Editors** and **EICs'** comments from the beginning to the end of the revision process.

REFEREE: EIC | **Revision (1)** 28 Feb 2020

Dear Author,
The document is reviewed carefully by the reviewers. According to their comments and your revisions as requested, this manuscript is accepted.
Thanks.