Author's response to reviews

Title: The impact of image dynamic range on texture classification of brain white matter.

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Author's response to reviews: see over
Dear Sir

Please find below a point-by-point revision report responding to all reviewers comment on my manuscript entitled: The impact of image dynamic range on texture classification of brain white matter.
My replies/corrections are highlighted in red and indicating the page number in which the corrections have taken place.

Sincerely,

Doaa Mahmoud Ghoneim
Reviewer # 1

• Major Compulsory Revisions

1. In the context of statistical pattern recognition and texture classification, the present approach seems to employ a resubstitution method in that the same data (i.e. manually outlined ROIs / VOIs from the PtWm and DWm classes, respectively) are used both to define the discriminant rule and to judge its accuracy (e.g. sensitivity and specificity). One could consider a way to avoid this probably over-optimistic performance of MRI texture classification of WM close and distant to a glioblastoma tumor by using a separate data set for training the classifier and another dataset for testing and evaluating the classifier. This comment should be addressed, either by convincing arguments and discussion, or by reanalyzing the data and performing a new assessment using separate datasets for training the texture classifier and for testing its performance.

Author’s response: In the revised manuscript the author has employed leave-one-out cross-validation criterion for testing the classification results using Minitab 15 software. The cross validation has been performed in the software by leaving one observation out of classification then projecting this observation back to classes to check the validity of the classification model. This validation method uses all observations, except one, for training and then tests the left observation against the others. This process is repeated for all observations. The table in the revised manuscript includes the new results after cross-validation,

See page: 9 and 17

• Minor Essential Revisions

2. (Page 8) The selection criteria for using the five parameters: (i) Angular Second Moment, (ii) Inverse Difference Moment, (iii) Entropy, (iv) Contrast and (v) Correlation, as those that could be calculated from the NxN co-occurrence matrix should be justified.

Author’s response : We have used these parameters as they have been successfully employed in a previous work giving good separation results (reference 8). These parameters are descriptors of image homogeneity, contrast and grey level correlation.

See page: 8
3. (Figure 1) The arrows could be complemented by outlining the ROIs corresponding to the classes pTWm and DWm, respectively. That would make the reader better informed about the type of data (and their location) that are going into WM texture analysis and classification in this slice.

Author’s response: Done. See figure 1

4. (Figure 2) What kind of statistical information do the ellipses represent?

Author’s response: figure removed after manuscript revision to avoid redundancy.

5. (Figure 3) A minor observation: the 110 mark along the Sensitivity and Specificity axes should be removed.

Author’s response: Done. See figure 2


Author’s response: Done. See references

• Discretionary Revisions

7. (Page 7) … with 14 driven features -> … with 14 derived features Done. See page 7

8. (Page 11) … or in another word -> … or in other words Done. See page 11

9. (Page 11) … is a graphical representation of the method sensitivity and specificity in function of dynamic range -> … is a graphical representation of the sensitivity and specificity of the method as a function of dynamic range Deleted

10. (Page 11) … N= 128 is a well compromised choice for brain white matter … -> … N=128 is a the optimal choice [or, best choice] for brain white matter … Done. See page 11

11. (Page 12) … the conventional tendency of texture analysis -> … the conventional practice of texture analysis Deleted

12. (Page 12) .. less computing extensive -> … computationally less expensive Done. See page 12

13. A minor observation regarding results shown in Table 1: If the summary statistics for CCOM-S1, …, CCOM-S3 were using the median instead of the mean, the results for CCOM methods would appear as good as that obtained using 3DCOM methods.

Author’s response: Results have changed after validation so comment would be NA.
14. A minor observation regarding Fig.2b: Using N=128 grey levels in the 3DCOM calculations the single parameter MDF1 would be sufficient to linearly separate the two classes PtWm and DWm at a threshold of about $MDF_1 = 0.0001$.

Author’s response: figure removed after manuscript revision to avoid redundancy.

**Reviewer # 2:**

- **Major Compulsory Revisions**
  - It is my understanding that in each of the pattern classification scenarios in the present work (i.e. for each combination of graylevel quantization and COM computation strategy) ten features are selected for further linear discriminant analysis. Given that the authors have only 30 ROIs, it would be appropriate to analyze the classification performance of the method using cross-validation, perhaps a leave-one-out cross-validation given the relatively (to the number of features) small size of the dataset.

Author’s response: In the revised manuscript the author has employed leave-one-out cross-validation criterion for testing the classification results using Minitab 15 software. The cross validation has been performed in the software by leaving one observation out of classification then projecting this observation back to classes to check the validity of the classification model. This validation method uses all observations, except one, for training and then tests the left observation against the others. This process is repeated for all observations. The table in the revised manuscript includes the new results after cross-validation, See page: 9 and 17

- The statistical performance of most classifiers presents a trade-off between higher sensitivity and higher specificity. It is recommended to present the results of an experiment involving pattern classification using Receiver Operating Characteristics (ROC) analysis.

Author’s response: since the manuscript represent 10 different classification scenarios it would be difficult to represent the ROC curve for each. However, in the revised manuscript a bar graph representing the sensitivity/specificity tradeoff has been added in order to to clarify this point (Figure 2) Page:

**Discretionary revisions**

I'd like to suggest a few points which I feel that would be beneficial for the understanding of the paper: - Add a figure showing a typical ROI for each type of tissue (T, PtWm, Dwm)

Author’s response: Done in figure 1

- Add a figure showing the COM for each level of quantization, to illustrate the effect of different quantizations in the COM.

Author’s response: Done for one quantization as example (from 256 to 32) in figure 1