Review of: "An Improved Hybrid Transfer Learning-Based Deep Learning Model for Alzheimer's Disease Detection Using CT and MRI Scans"

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Potential competing interests: No potential competing interests to declare.

Abstract

1. The authors have presented a good overview of the work and have categorized the classes into EMCI, MCI, LMCI and AD. The acronyms do not match with the various stages of the classification of AD patients. I suggest to either remove the line " The model is trained …… And AD" or reframe the context accordingly.
2. Please be consistent with the abbreviations and acronyms. The authors have provided full forms of some acronyms like Deep Learning but the same is not true for VGG or CNN and the rest. I suggest to present these acronyms in uniformity. In my opinion the acronyms should be avoided in abstract.

Introduction

1. As mentioned above, the authors should remain consistent with acronyms in entire paper. For example- PET, fMRI, etc.
2. In line " the disorder is split into four stages…." the acronyms for Alzheimer's is given but is absent for the rest of the stages. I suggest the authors to present in a uniform manner.
3. A standard reference is required for the fact presented by the authors for the line- " According to established clinical dementia rating …….. and Alzheimer's (AD)".
4. In abstract, the authors have mentioned classification into 4 stages of AD but in introduction, para second, the authors are mentioning five classes - " To categorize AD into five classes,….". The authors should clarify the statement.
5. In the bullet point third, the authors are mentioning to remove ambiguities. What kind of ambiguities are faced while normalizing, because the authors haven't mentioned the word ambiguity in the rest of the paper? Did the authors meant "noise" by ambiguity? A clarification is needed.

Proposed work

1. The authors have created a sub section 4.1 but there is no other sub section which, in my opinion looks awkward. The authors have only elaborated on Data Augmentation but have not given proper clarification on other terms that have been mentioned in figure 2. The methodology as whole needs more clarification with proper sub sections and how they are being used by the authors in their proposed work. Define the terms to build foundation and then explain how they have been used in the work. It will provide more weight to the paper.

2. “ Each measuring 224 x 224”. What are they measuring, the statement looks incomplete on reading as a whole sentence.
3. Have authors used hyper-parameters in their work? If yes, the authors should mention about them in the paper.

Results

1. The authors are providing confusion matrix parameters in results but the their general formulas have been discussed in Section 6. In my opinion these formulas should be discussed in the results section.
2. The authors have provided tables containing accuracies and other parameters for ResNet and VGG16 models but not for DenseNet. Uniformity is required while presenting data results. The authors can combine the results gathered from 3 respective models in a single table.
3. Figure 5 caption says, “ Accuracy and loss plot generation…”, but the figure doesn't mention anything related to accuracy or loss. Its basically a CNN workflow. Either change the provided caption or provide something related to the mentioned terms in caption.
4. Also, the figure 6 is captioned with almost same heading depicting accuracy and loss. Refer figure 6 to modify figure 5 accordingly.
5. Explain what ROC curve is, since you are using those in your work.

Discussion

1. In the first line, the authors are mentioning recall and sensitivity. Are they different?
2. The presented equations need proper formatting with the numbers provided to them.

Conclusion

1. Line “ ….MRI image is divided into five categories…”, yet the authors have mentioned only four classes. This unevenness needs to be addressed properly throughout the manuscript.
2. Also, the accuracies mentioned in abstract, conclusion and the ones presented in result sections are different from each other. The authors should look into it with more attention.
3. “Highest accuracy achieved by the model..”. Which model has achieved the highest accuracy?
4. "The suggested model outperformed the others". Have you done some comparative analysis with other machine learning model? As per your manuscript, three models have been applied. Clearly explain the context of the statement. Which model is your suggested model?

Other suggestions

1. Figures can be more attractive, Figure 2 especially.
2. Try to explain the terms that have been used in the paper to provide clear explanation to the readers.