# 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. I would suggest changing the terminology of AD stages from "mental" to "cognitive", which is the correct terminology that is used commonly in the literature, e.g., early mental retardation to early mild cognitive impairment, etc. You continue with using the correct abbreviations, then just change the main terms.
2. Remove the repetition: The work classifies Alzheimer's patients into various stages using transfer learning with ResNet50, VGG16, and DenseNet121 along with CNN on a large dataset.
3. Provide full terms for the abbreviated terms: VGG16 or CNN, etc. Also, short version of the terms is usually not recommended to be included in the abstract.

### Introduction

1. Good 1$^{st}$ paragraph for introduction.
2. First time mentioning words such as PET, CSF, MRI and you should use the full terms.
3. VGG16 or VGG-16, Resnet50 or Resnet-50: one word and be consistent. Also change Alzheimer's to AD since you have introduced the abbreviation.
4. Remove ambiguities? Is that referring to noise or outliers? The wording needs to be changed.

### Proposed work/Methods

1. Why are you mentioning the data balancing when your data groups are all equal - 680 images from each class?
2. No need for subsection 4.1.

### Results (Result Evaluation)

1. The details of each model are not really given. We need to know about all the hyperparameters, etc.
2. I don't see the results for DenseNet121.

### Discussion

1. "recall" and "sensitivity" refer to the same metric.

2. Use software to show the equations/formulae.

**Conclusion**

1. 5 categories of AD and then you are mentioning only four here.
2. The accuracy rate is not correct, either here or in the abstract.
3. Specify the best model.
4. "The suggested model outperformed the others". What is “others”? How did you compare the results from your analyses?

**Other suggestions**

1. Improve the quality of the images. Not really publication-worthy.
2. Explain the details of the models for reproducibility purposes. Your analyses remain very vague to me and since you are using ADNI (large cohort, quite popular in the AD area, trending, etc.), it might make sense to include details and justify your findings. Nevertheless, it is a nice work if you improve the paper.