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.

The article titled "An Improved Hybrid Transfer Learning-Based Deep Learning Model for Alzheimer's Disease Detection Using CT and MRI Scans" by Sami Alshmrany, Gowhar Mohi ud din dar, and Syed Immamul Ansarullah presents a comprehensive approach to Alzheimer's disease detection using deep learning techniques. The study leverages transfer learning with ResNet50, VGG16, and DenseNet121, along with CNN networks, on a large dataset of MRI images from the ADNI database. The paper proposes a systematic methodology for classifying Alzheimer's patients into various stages, achieving a final accuracy of 96.6%.

The introduction effectively highlights the significance of early Alzheimer's detection and the escalating global burden of the disease. It provides a clear overview of the conventional diagnostic criteria and the evolution of biomarker-based approaches. The literature review offers a thorough examination of existing research in Alzheimer's detection, emphasizing the use of machine learning techniques and imaging modalities like MRI.

The methodology section elucidates the workflow, dataset selection, preprocessing steps, and augmentation techniques employed, demonstrating a systematic approach to model development. The utilization of transfer learning with state-of-the-art CNN architectures is justified, and the choice of evaluation metrics is appropriate for multiclass classification tasks. However, the use of transformer architectures and their pretrained models like CLIP has been shown to produce better results and can be explored to see if any improvements in accuracy could be achieved.

Results are presented comprehensively with accuracy and loss plots for each model, along with classification reports, confusion matrices, and comparative performance analysis. The discussion effectively interprets the results, emphasizing the superiority of the proposed model and addressing key issues such as underfitting and overfitting.

The conclusion summarizes the findings and outlines future research directions, demonstrating a forward-looking perspective. Overall, the article provides valuable insights into the application of deep learning for Alzheimer's disease detection and offers a systematic framework for future studies in the field.