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.

Alzheimer's Disease (AD) is a neurological disorder that affects cognitive functions, including memory, thinking, and behavior. Early detection of Alzheimer's disease is critical for effective treatment and management of the condition. Deep Learning (DL) is a powerful tool that can be used for AD detection and diagnosis. DL algorithms can learn patterns and features in large datasets that can be used to classify and predict the presence of Alzheimer's Disease. The most common approach is to use brain imaging techniques, such as computed tomography and brain MRI scans, to extract features that are characteristic of Alzheimer's Disease. Transfer learning-based deep learning models can be effective in detecting Alzheimer's disease from medical images. Transfer learning involves using pre-trained neural network models as a starting point and fine-tuning them to suit a specific task, such as Alzheimer's disease detection. This paper focuses on classifying AD patients into various stages (early mental retardation, mild mental impairment, late mild mental impairment, and final Alzheimer's stage) by utilizing transfer learning with ResNet50, VGG16, and DenseNet121 along with CNN networks on a large dataset. The work classifies Alzheimer's patients into various stages using transfer learning with ResNet50, VGG16, and DenseNet121 along with CNN on a large dataset. The model is trained and tested on ADNI data using Keras API and divides the MRI images into: EMCI, MCI, LMCI, and AD. The performance of VGG16, DenseNet121, and ResNet50 outperformed other models significantly. The results demonstrate a significant improvement in accuracy compared to previous approaches, with a final accuracy of 96.6%.

This work is written well and can be accept after the following major revision.

1. According to the established Clinical Dementia Rating (CDR) result, the disorder is split into four stages: early mild cognitive impairment, mild cognitive impairment, late mild cognitive impairment, and Alzheimer's (AD). Early diagnosis of dementia disorders is crucial for patient recovery and treatment expenses because the cost of treating patients with EMCI and LMCI is different.- add a reference for this statement.

2. maging biomarkers are used to assess Alzheimer's disease, such as CT, fMRI, MRI, and PET scans. The hippocampus and entorhinal cortex have shown extremely early changes in Alzheimer's disease that are consistent with pathology- add the following reference for this statement: A Long Short-Term Memory Biomarker-Based Prediction Framework for Alzheimer's Disease

3. In computerized medical image processing, convolutional neural networks (CNNs) have achieved major advancements. As a result, various CNN models, including VGG, MobileNet, AlexNet, and ResNet, are available for object detection and segmentation.- add the following references for this statement: MSRNet: Multiclass Skin Lesion

Recognition Using Additional Residual Block Based Fine-Tuned Deep Models Information Fusion and Best Feature Selection; D2LFS2Net: Multi-class skin lesion diagnosis using deep learning and variance-controlled Marine Predator optimisation: An application for precision medicine; SkinNet-INIO: Multiclass Skin Lesion Localization and Classification Using Fusion-Assisted Deep Neural Networks and Improved Nature-Inspired Optimization Algorithm.

4. Transfer learning is one of the efficient methods for building deep convolutional neural networks without overfitting when the amount of data is minimal- add the following references for this statement: B2 C3 NetF2 : Breast cancer classification using an end-to-end deep learning feature fusion and satin bowerbird optimization controlled Newton Raphson feature selection; BRMI-Net: Deep Learning Features and Flower Pollination-Controlled Regula Falsi-Based Feature Selection Framework for Breast Cancer Recognition in Mammography Images; BC2NetRF: Breast Cancer Classification from Mammogram Images Using Enhanced Deep Learning Features and Equilibrium-Jaya Controlled Regula Falsi-Based Features Selection.

5. A model created for one task is used as the basis for another using the machine learning technique known as transfer learning. Deep learning tasks in computer vision and natural language processing are built on pre-trained models. Compared to building neural network models from scratch, they are both cheaper and faster, and they perform remarkably better on related tasks.- add a reference for this statement, I suggest the following: SkinNet-ENDO: Multiclass Skin Lesion Recognition using deep Neural Network and Entropy-Normal Distribution Optimization Algorithm with ELM; D2BOF-COVIDNet: A Framework of Deep Bayesian Optimization and Fusion-Assisted Optimal Deep Features for COVID-19 Classification Using Chest X-ray and MRI Scans.

6. How many parameters have been trained for the proposed model?

7. How many layers have been freezed during the training process?

8. What are the hyperparameters of this work? How you validate the results on these parameters? I recommend to add an ablation study.