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(UG) (POS-30) Multi-Modal Neuroimaging based Mutual Information Decomposition for Alzheimer's Disease Diagnosis

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Precise diagnosis of Alzheimer's disease (AD) is crucial to ensure timely intervention and evaluate patient prognosis. Although integrating multi-modal neuroimaging such as MRI and PET has the potential, there are still challenges in effectively integrating multi-modal images. To this end, we propose a deep learning-based framework that uses Mutual Information Decomposition to obtain modality-specific information and combines attention mechanisms to learn the optimal multi-modal feature combinations. Our proposed framework includes three parts. First, we design a feature extractor for modality-specific information through mutual information separation. Second, we optimize the combination of modality-specific features by adding attention constraints. Third, we mitigate the over-fitting of the model through multi-task learning to improve the generalization ability. Evaluation results on the ADNI dataset highlight the effectiveness of our method. Our work demonstrates the potential of effectively integrating multi-modal neuroimaging data for advancing early AD detection and treatment.

Keyword-1

Multi-Modal Neuroimaging

Keyword-2

Information Decomposition

Keyword-3

Alzheimer's Disease Diagnosis

Authors: Mr LIU, Fei (Anhui Provincial International Joint Research Center for Advanced Technology in Medical Imaging); Dr ZHANG, Gong (Sino Canadian Health Research Institute); Dr WANG, Huabing (Anhui Provincial International Joint Research Center for Advanced Technology in Medical Imaging); Mr QI, Mutian (Shenzhen International Foundation College); Mr SHI, Xiang (Shenzhen International Foundation College); Mr LIU, Yichen (Shenzhen International Foundation College); Ms REN, YuJie (University of Winnipeg)

Presenter: Ms REN, YuJie (University of Winnipeg)

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