

Autism Spectrum Disorder Classification Algorithm Using Multimodal Data Based on Graph Convolutional Network

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Abstract : Machine learning has shown extensive applications in the development of classification models for autism spectrum disorder (ASD) using neural image data. This paper proposes a fusion multi-modal classification network based on a graph neural network. First, the brain is segmented into 116 regions of interest using a medical segmentation template (AAL, Anatomical Automatic Labeling). The image features of sMRI and the signal features of fMRI are extracted, which build the node and edge embedding representations of the brain map. Then, we construct a dynamically updated brain map neural network and propose a method based on a dynamic brain map adjacency matrix update mechanism and learnable graph to further improve the accuracy of autism diagnosis and recognition results. Based on the Autism Brain Imaging Data Exchange I dataset (ABIDE I), we reached a prediction accuracy of 74% between ASD and TD subjects. Besides, to study the biomarkers that can help doctors analyze diseases and interpretability, we used the features by extracting the top five maximum and minimum ROI weights. This work provides a meaningful way for brain disorder identification.

Keywords : autism spectrum disorder, brain map, supervised machine learning, graph network, multimodal data, model interpretability

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