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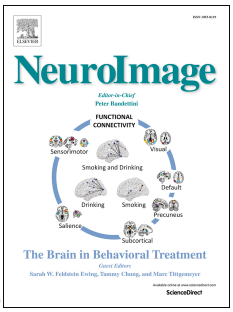

Reading the (functional) writing on the (structural) wall: Multimodal fusion of brain structure and function via a deep neural network based translation approach reveals novel impairments in schizophrenia

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Reading the (functional) writing on the (structural) wall: multimodal fusion of brain structure and function via a deep neural network based translation approach reveals novel impairments in schizophrenia

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Abstract

This work presents a novel approach to finding linkage/association between multimodal brain imaging data, such as structural MRI (sMRI) and functional MRI (fMRI). Motivated by the machine translation domain, we employ a deep learning model, and consider two different imaging views of the same brain like two different languages conveying some common facts. That analogy enables finding linkages between two modalities. The proposed translation-based fusion model contains a computing layer that learns "alignments" (or links) between dynamic connectivity features from fMRI data and static gray matter patterns from sMRI data. The approach is evaluated on a multi-site dataset consisting of eyes-closed resting state imaging data collected from 298 subjects (age- and gender matched 154 healthy controls and 144 patients with schizophrenia). Results are further confirmed on an independent dataset consisting of eyes-open resting state imaging data from 189 subjects (age- and gender matched 91 healthy controls and 98 patients with schizophrenia). We used dynamic functional connectivity (dFNC) states as the functional features and ICA-based sources from

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