

Self-Supervised Pretraining on Sequences of Functional Magnetic Resonance Imaging Data for Transfer Learning to Brain Decoding Tasks

Authors : Sean Paulsen, Michael Casey

Abstract : In this work we present a self-supervised pretraining framework for transformers on functional Magnetic Resonance Imaging (fMRI) data. First, we pretrain our architecture on two self-supervised tasks simultaneously to teach the model a general understanding of the temporal and spatial dynamics of human auditory cortex during music listening. Our pretraining results are the first to suggest a synergistic effect of multitask training on fMRI data. Second, we finetune the pretrained models and train additional fresh models on a supervised fMRI classification task. We observe significantly improved accuracy on held-out runs with the finetuned models, which demonstrates the ability of our pretraining tasks to facilitate transfer learning. This work contributes to the growing body of literature on transformer architectures for pretraining and transfer learning with fMRI data, and serves as a proof of concept for our pretraining tasks and multitask pretraining on fMRI data.

Keywords : transfer learning, fMRI, self-supervised, brain decoding, transformer, multitask training

Conference Title : ICPRMLC 2023 : International Conference on Pattern Recognition, Machine Learning and Consciousness

Conference Location : New York, United States

Conference Dates : June 05-06, 2023