Machine learning based classification of Schizophrenic and Healthy control

Using Resting State functional MRI data features

Karthik S, Suraj Kiran R, Raghav k, Palanisamy P

Department of Electronics and Communication Engineering, National Institute of Technology, Tiruchirappalli, India

Email:shivakarthik.grylls@gmail.com

In the last few years there has been growing interest in the use of machine learning classifiers to classify healthy control and patient using functional MRI (fMRI) data. In particular, for classification of Schizophrenic and healthy controls, using fMRI data has exhibited high precision and accuracy. Traditionally, task-based or behavioural response-based fMRI data was used for classification. The use of resting state networks (RSN), independent of any task-response criteria, for Schizophrenia classification is still a growing research topic. In this work, we have developed a computer aided automated classifier for Schizophrenic and Healthy Control classification using resting state fMRI Data. This is guided by the principle that Schizophrenic patients show varied RSN connectivity when compared to healthy controls. These RSNs contribute to the classification of Schizophrenic and compare its performance considering contributions of all networks using functional network connectivity and auto connectivity as the features. We evaluate the performance of Support Vector Machine and Neural Networks trained for classification on a set of schizophrenic and healthy control subjects. We achieved a mean accuracy of 85% which highlights the fact that machine learning can provide a more than reasonable first stage mental health prognosis.

Keywords: functional MRI, Schizophrenia, Resting State Network, SVM, Neural Networks