Machine learning for neuroimaging applied to functional connectivity data

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During last years, large neuroimaging datasets have been made publicly available. These datasets, in particular fMRI scans, allow for the study of whole-brain connectivity using different multivariate approaches, and are a tool to reach better understanding of both cognition and clinical condition of the brain. In this context, statistical machine learning methods are increasingly applied to deal with this kind of high-dimensional data. Supervised and unsupervised classification techniques can be used to discriminate between populations and to make predictions of connectivity patterns for unseen data. Resting state BOLD time series are traditionally transformed into connectivity matrices, constructing in this way a new space, where a better separation between classes could be achieved. In this work, we obtained functional connectivity matrices from fMRI data of different datasets, calculated through pairwise Pearson correlation of BOLD time series. The main goal is to study the impact of different common machine learning pipelines, parameters and techniques on classification performance of both subjects and conditions, which is of paramount importance in the new era of personalized medicine.