ABSTRACT

This work is aimed at exploring multi-variate pattern analysis of functional magnetic resonance imaging data of human brain as an alternative for situations/questions where the classical univariate analysis falls short. Pattern-based fMRI analysis enables us to address content-based processing in human brain and helps us study the direct link between multivoxel fMRI activity patterns and the corresponding cognitive representations. The first goal is to categorise the mental representations for colour and face perceptions, based on the pattern vectors. Region-of-interest based multivariate pattern analysis shows that there are distinct mental representations for colour and face perceptions, in the primary and secondary visual cortex and the ventral stream. These representations are classified into distinct categories by supervised machine learning algorithms such as support vector machine and linear discriminant analysis. The second part of the work is aimed at a whole brain searchlight analysis to validate the ROI based results. Searchlight analysis enabled us to look at the spatial encoding of task relevant information across the whole brain. In addition to this, efforts have been made to look at transformation of these mental representations with practice.