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Comparison of Machine Learning Classifiers for dimensionally reduced fMRI data using Random Projection and Principal Component Analysis
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Abstract
Machine learning has opened up the opportunity for understanding how the brain works. In this paper, functional magnetic resonance imaging (fMRI) data are analyzed with reduced dimension. We have carried out a performance comparison of random projection (RP) and principal component analysis (PCA) with different number of components of fMRI data. In addition to that, six different types of machine learning algorithm have been used. In particular, the Haxby dataset is chosen for our experiment. The dataset comprises 9 classes for object recognition. 10-fold cross validation step has been employed. We have discovered that RP outperforms PCA when the former is paired with logistic regression, Gaussian Naive Bayes and linear support vector machine. The best pair for this study was found to be PCA and k-nearest neighbors. Nevertheless, each algorithm was found to have its own strengths for fMRI classification approach. © 2019 IEEE.

Author Keywords
fMRI; machine learning; performance comparison; principal component analysis; random projection

Index Keywords
Classification (of information), Learning algorithms, Learning systems, Machine learning, Magnetic resonance imaging, Nearest neighbor search, Object recognition, Support vector machines; 10-fold cross-validation, Classification approach, fMRI, Functional magnetic resonance imaging, Linear Support Vector Machines, Number of components, Performance comparison, Random projections; Principal component analysis

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