
Augmentation of fMRI data analysis using resting state activity and Semi-supervised Canonical Correlation Analysis

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Resting state activity is brain activation that arises in the absence of any task, and is usually measured in awake subjects during prolonged fMRI scanning sessions where the only instruction given is to close the eyes and do nothing. It has been recognized in recent years that resting state activity is implicated in a wide variety of brain function. While certain networks of brain areas have different levels of activation at rest and during a task, there is nevertheless significant similarity between activations in the two cases. This suggests that recordings of resting state activity can be used as a source of unlabeled data to augment kernel canonical correlation analysis (KCCA) in a semi-supervised setting. We evaluate this setting empirically yielding three main results: (i) KCCA tends to be improved by the use of Laplacian regularization even when no additional unlabeled data are available, (ii) resting state data seem to have a similar marginal distribution to that recorded during the execution of a visual processing task implying largely similar types of activation, and (iii) this source of information can be broadly exploited to improve the robustness of empirical inference in fMRI studies, an inherently data poor domain.