Voxel-wise Intermodal Coupling using Local Covariance Decompositions

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Various MRI and fMRI modalities contain unique information about brain structure and function. When subjects are imaged via multiple modalities, additional information exists in the covariance structure of these modalities. Here, we present a method of describing this covariance structure for two or more modalities at the voxel level based on local covariance decompositions. We apply this technique in a large neurodevelopmental cohort and find that intermodal coupling offers a promising perspective for unveiling otherwise undetected localized underlying relationships when analyzing studies involving multiple imaging modalities.