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Atlas-based reconstruction of high performance brain MR data

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Highlights

- To our knowledge, this is the first approach to combine internal and external priors in a single consistent model. Internal information is considered as groups of similar patches in the image, which are reconstructed together using multiple sparse dictionaries. These dictionaries are learned with a Gaussian Mixture Model (GMM), providing a more efficient and compact representation of patches. External information is also incorporated in the model in the form of a weighted TV regularization prior, the weights of which are driven by a probabilistic atlas of gradients. These internal and external image priors offer complementary information, the first one modeling nonlocal repetitive patterns and the other one preserving the contours and textures of anatomical structures.
- An extensive set of experiments is presented for validating the proposed approach. These experiments compare our approach against eight different CS methods on the task of reconstructing brain MR images from undersampled k-space measurements. Results show our approach to outperform state-of-the-art methods for this task.

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