

Total generalized variation (TGV) for spatio-temporal denoising of high resolution ASL perfusion data

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In Arterial spin labeling (ASL) a perfusion weighted image is achieved by subtracting a label image from a control image. This perfusion weighted image has an intrinsically low signal to noise ratio and repeated measurements are required to achieve reliable images, especially at higher spatial resolutions. To overcome this limitation various denoising approaches have been published using the perfusion weighted image as input for denoising. In this study we propose a new spatio-temporal filtering approach based on total generalized variation (TGV) regularization which exploits the inherent information of control and label pairs simultaneously. In this way, the temporal and spatial similarities of all images are used to jointly denoise the control and label images. To assess the effect of denoising several high-resolution in-vivo PASL data sets were acquired and processed. The results show improved image quality, quantitative accuracy and robustness against outliers compared to five state of the art denoising approaches.