Multiple Sclerosis Lesion Segmentation from Structural MRI

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Structural magnetic resonance imaging (MRI) can be used to detect lesions in the brains of multiple sclerosis (MS) patients. The formation of these lesions is a complex sequence of inflammation, degeneration, and repair that MRI has been shown to be sensitive to. In order to analyze lesion formation in structural MRI data, it is necessary to first locate or segment the lesions in an MRI study. I will introduce an algorithm we developed for detecting and segmenting lesions called OASIS is Automated Statistical Inference for Segmentation (OASIS). OASIS uses logistic regression models incorporating multiple MRI sequences to estimate voxel-level probabilities of lesion presence. Intensity-normalized T1-weighted, T2-weighted, fluid- attenuated inversion recovery and proton density structural MRI from 131 studies (98 MS subjects, 33 healthy subjects) with manual lesion segmentations are used to train and validate the model. I will also briefly discuss ongoing work on the analysis of longitudinal data produced from lesion segmentation of MRI studies.